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CA FINAL NEW COURSE

PAPER 5

Strategic Cost Management & Performance Evaluation

[Strategic Cost Management and Decision Making]

Practice Manual In DKC Format

Part–A: Strategic Cost Management & Decision Making

Sub Part-I

Sub Part-II

Part–B: Performance Evaluation and Control

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Part–C: Case Study

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He has given coaching to thousands of students; he is into Coaching since last 15 years.

His teaching method is so simplified that over a period the Cost Accountancy subject is known amongst students as Dani ki Costing.

He is available to students 365 days a year on phone also.

He has written several Books on Cost Accountancy, Operations Research and Financial Management.

For Final year students he has prepared Video Lectures and Hard book (Full course), Last Minute Revision (LMR) Video Lectures and Hard book, Practice Manual (PM) Hard book.

I recommend him as a true friend of all CA students.

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STRATEGIC COST MANAGEMENT & PERFORMANCE EVALUATION

CA Final New Course

Paper-5 Group-II

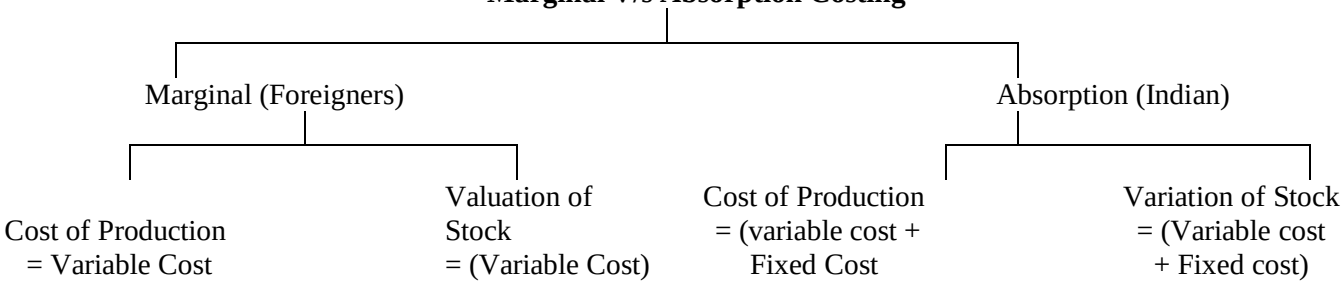
Author
Prof. Dani Khandelwal (CA)

PM in DKC format (Final CA NEW Sylabus) INDEX

CHAPTER – 1

Introduction to strategic Cost Management

Marginal V/s Absorption Costing



Case Study -1

WONDER LTD. manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	**50%**	**100%**
Sales and production (units)	400	800
	(₹)	(₹)
Sales	8,00,000	16,00,000
Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		
- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year.

In the first quarter, 220 units were produced and 160 units were sold.

Required:

(a) What would be the fixed production costs absorbed by ZEST if absorption costing is used?
(b) What would be the under/over-recovery of overheads during the period?
(c) What would be the profit using absorption costing?
(d) What would be the profit using marginal costing?

Note No.1 Fixed Production Overhead (Quarterly)

Budget			**Actual**	
Units	**R.R**	**Expenses**	**Units**	**Expenses**
200	200	40,000	220	40,000
(800 ÷ 4)		(1,60,000 ÷ 4)		(1,60,000 ÷ 4)

Fixed Overheads Account

To Bank A/c.	40,000	By Recovery	44,000
To Over Recovery	40,000	(220 x ₹ 200)	

(a) Absorbed Overheads = 44,000 (220 x ₹ 200)
(b) Over Recovery = 44,000 – 40,000
= **₹ 4,000**

(c) Statement Showing Analysis of Profit & Loss As Per Absorption Costing

Particulars		**₹**
(A)Sales $= \left(\frac{8,00,000}{400} \text{ x } 160 \text{ units}\right)$	=	3,20,000
(B) Cost of Sales		
(i) Variable Cost of Production	1,76,000	
$\left(\frac{3,20,000}{400} \text{ x } 220 \text{ units}\right)$		
(ii) Fixed Cost of Production	44,000	
Opening Finished Goods	–	
Closing Finished Goods	(60,000)	
$\left(\frac{2,20,000}{220} \text{ x } 60\right) \rightarrow (220 - 160)$	1,60,000	
↳ (1,76,000 + 44,000)		
Selling Overheads		
Variable $\left(\frac{1,60,000}{400} \text{ x } 160\right)$	64,000	
Fixed (2,40,000 ÷ 4)	60,000	
	2,84,000	(2,84,000)
Operating Profit		36,000
Over Recovery		4,000
Net Profit		**40,000**

(d) Statement Showing Analysis of Profit & Loss As Per Marginal Costing

Particulars			**₹**
(A) Sales $= \left(\frac{8,00,000}{400} \text{ x } 160 \text{ units}\right)$			3,20,000
(B) Cost of Production			
Variable Cost			
$\left(\frac{3,20,000}{400} \text{ x } 220 \text{ units}\right)$	=	1,76,000	
Opening Finished Goods	=	–	
Closing Finished Goods	=	(48,000)	
$\left(\frac{1,76,000}{220} \text{ x } 60\right)$		1,28,000	
Selling & Distribution			
Variable Cost			
$\left(\frac{1,60,000}{400} \text{ x } 160\right)$	=	64,000	
Contribution			1,92,000
			1,28,000
Fixed Cost (1,60,000 ÷ 4)			(4,000)
Fixed Cost (2,40,000 ÷ 4)			(60,000)
Net Profit			**28,000**

- ✓ Why is there a difference in profit in absorption & marginal ?

Profit as per absorption	40,000
Over valuation of closing stock	(12,000)
Profit as per marginal cost	28,000
→	Due to difference in valuation of stock

Case Study -2

Practical Questions

1. XYZ Ltd. has a production capacity of 2,00,000 units per year. Normal capacity utilization is reckoned as 90%. Standard variable production costs are ₹11 per unit. The fixed costs are ₹3,60,000 per year. Variable selling costs are ₹3 per unit and fixed selling costs are ₹ 2,70,000 per year. The unit selling price is ₹20.
   In the year just ended on 30th June, 20X4, the production was 1,60,000 units and sales Were 1,50,000 units. The closing inventory on 30th June was 20,000 units. The actual Variable production costs for the year were ₹ 35,000 higher than the standard.

   (i) Calculate the profit for the year
   (a) by absorption costing method and
   (b) by marginal costing method.

1) Sales	1,50,000
+ Closing Stock	20,000
─ Opening Stock	10,000
Production	1,60,000

2) Fixed Production Overhead

Budget			Actual	
Units	**RR**	**Expenses**	**Units**	**Expenses**
1,80,000 (90 %)	2	3,60,000	1,60,000	3,60,000

Fixed Overhead A/c.

To bank	3,60,000	By Recovery (1,60,000 x 2)	3,20,000
		By Under Recovery	40,000

3) Variable Cost For Production (1,60,000 x 11) + 35,000	=	17,95,000
4) Variable Cost For Selling (1,50,000 x 3)	=	4,50,000
5) Fixed Cost For Selling	=	2,70,000
6) Sales (1,50,000 x 20)	=	30,00,000

(a) **Statement Showing Analysis of Profit & Loss**

(A) Sales		30,00,000
(B) Cost of Sales		
Variable Cost of Production	17,95,000	
Fixed Production Overheads	3,20,000	
Opening Finished Goods	1,30,000	
(11 + 2) x 10,000		
→ Variable + Fixed		
Closed Finished Goods		
$\left(\frac{21,15,000}{1,60,000} \text{ x } 20,000\right)$	(2,64,375)	
CoGs	**19,80,625**	
Selling Overheads		
Variable	4,50,000	
Fixed	2,70,000	(2,700,625)
Cost of Sales		2,99,375
Under Recovery		(40,000)
Net Profit		**2,59,375**

b) Statement Showing Analysis of Profit & Loss

(A) Sales		30,00,000
(B) Cost of Sales		(21,30,625)
Variable Cost of Production	17,95,000	
Opening Finished Goods		
11x 10,000	11,000	
Closed Finished Goods		
$\left(\frac{17,95,000}{1,60,000} \text{ x } 20,000\right)$	(2,24,375)	
CoGs	16,80,625	
Selling Overheads		
Variable	4,50,000	
		86,937
Cost of Sales	21,30,625	
Fixed Cost (3,60,000 + 2,70,000)		(6,30,000)
		2,39,375

Showing Recovery

As per absorption	2,59,375
Opening Stock	20,000
Value of Closing Stock	(40,000)
As per marginal	**2,39,375**

Case Study -3

Value Added/Non-Value Added Activities

2. Queensland Furniture (QF) manufactures high-quality wooden doors within the forests of Queensland since 1919. Management is having emphasize on creativity, engineering, innovation and experience to provide customers with the door they desire, whether it is a standard design or a one-of-a-kind custom door. The following information pertains to operation during Jan:

Processing time	9.0 hrs.	Waiting time	6.0 hrs.
Inspection time	1.5 hr.	Move time	7.5 hrs.
Units per batch	60 units		

(*) average time per batch

Required:

Compute the following operational measures:

(i) Average non-value-added time per batch
(ii) Average value added time per batch
(iii) Manufacturing cycle efficiency
(iv) Manufacturing cycle time

(i) Average Non- Value Added Time Per Batch

Inspection time	=	1.5 hr
Waiting time	=	6.00 hr
Move time	=	7.5 hr
		15.00 hr

(ii) Average Value Added Time Per Batch

Processing Time = 9 hrs

(iii) Manufacturing Cycle Efficiency

$$\frac{\text{Processing time}}{\text{Processing time} + \text{Inspection time} + \text{Waiting time} + \text{Move time}}$$

$$\left(\frac{9}{9 + 1.5 + 6 + 7.5}\right) \text{x } 100 = 37.5\ \%$$

(iv) Man- Cycle Time

$$\left(\frac{\text{Total Production Time}}{\text{Units per batch}}\right) = \left(\frac{24}{60}\right) = 0.40$$

CHAPTER – 2

MODERN BUSINESS ENVIRONMENT

Total Quality Management

Case Study -4

1. Hindustan Bikes Ltd. (HBL) formerly known as HELCO is an Indian multinational company. It's headquarter is located in Bengaluru, India. It has been founded in the year 1990 as a manufacturer of locomotives. The company is presently listed locally as well as in international stock market. HBL's parent company is Hindustan Group. The management of HBL recognizes the need to establish a culture at the company so that-
"Do the right things, right the first time, every time."

Management has provided you following actual information for the most recent month of the current year:

Cost Data	**₹**
Customer Support Centre Cost	35 per hr.
Equipment Testing Cost	18 per hr.
Warranty Repair cost	1,560 per bike
Manufacturing Rework Cost	228 per bike

Volume and Activity Data	
Bikes Requiring Manufacturing Rework	3,200 bikes
Bikes Requiring Warranty Repair	2,600 bikes
Production Line Equipment Testing Time	1,600 hrs.
Customer Support Centre time	2,000 hrs.

Additional information:

HBL carried out a quality review of its existing suppliers to enhance quality levels during the month at a cost of ₹ 1,25,000. Due to the quality issues in the month, the bike production line experienced unproductive 'down time' which cost ₹ 7,70,000.

Required:

Prepare a statement showing ' Total Quality Cost'

Statement Showing Relevant Cost

Particulars	₹
(1) Supp - Review Cost	1,25,000
(2)Equivalent Testing Cost (18 x 1,600)	28,800
(3) Down Time	7,70,000
(4) Man force Rework (228 x 3,200)	7,29,600
(5) Customer Supplier Cost (35 x 2,000)	70,000
(6) Warranty Repair (1,560 x 2,600)	40,56,000
	57,79,400

Case Study -5

NZ Ltd. implemented a quality improvement programme and had the following results:

Particulars	2012	2013
	(Figures in ₹'000)	
Sales	6,000	6,000
Scrap	600	300
Rework	500	400
Production Inspection	200	240
Product Warranty	300	150
Quality Training	75	150
Materials Inspection	80	60

Required:

(i) Classify the quality costs as prevention, appraisal, internal failure and external failure and express each class as a percentage of sales.

(ii) Compute the amount of increase in profits due to quality improvement.

(i) Statement Showing Classification of Quality Costs"

	2012		2013	
	₹ '000	% of Sales	₹ '000	% of Sales
Prevention:				
Quality Training	75	1.25%	150	2.50%
Appraisal:				
Product Inspection	200	3.33..%	240	4.00%
Materials Inspection	80	1.33..%	60	1.00%
Internal Failure:				
Scrap	600	10.00%	300	5.00%
Rework	500	8.33..%	400	6.66..%
External Failure:				
Product Warranty	300	5.00%	150	2.5
Total	1,755	29.25%	1,300	21.66..%

(ii) Cost reduction was affected by 7.583 % (29.25 – 21.66..) of sales, which is an increase in profit by₹ 4,54,980.

Case Study -6

7 Star Sports Co. (7SSC) is engaged in the manufacture of cricket bats. Following table shows the budgeted figures for the coming year:

Particulars	₹ per unit
Selling Price	4,800
Less: Components (1 Set)	1,200
Assembling Costs	2,000
Delivery Cost	800
Contribution	800

Components like willow, rubber grip and handle bar in a set, are bought in and an assembling process carried out to transform them into a single bat. Market is intensely competitive where 7SSC currently holds 30 % market share. Annual demand of these bats is 1,00,000 units.

On reviewing previous performance it is revealed that 3% of the bats supplied to customers were returned for free replacement because of faults. Defective components, which are initially bought into assembling process, are held responsible for this. These returned bats cannot be repaired and have no scrap value. Supply of faulty bats to customers could be eliminated by implementing an inspection process immediately before the goods are delivered. This would improve customer perception thus resulting in an increase 5% in current market share (marking in all a total share of 35%).

Required:

i. Calculate the quality non-conformance cost for the coming year, based on the budgeted figures and sales returns rate.
ii. Calculate the impact on profitability due to implementation of inspection process for the bats.

Selling Price (p.u)=4,800

V. Cost
4,000 (P.U)

Contribution
4,800 - 4,000
= 800 (P.U)

Component(1 Set) 1,200

Assembling-Cost 2,000

Delivery-Cost 800

Statement Showing Calculation of Quality- Non- Conformance- Cost

Annual Sales (1,00,000 x 30 %) = 30,000

Supplied to Customer 100

Return - Free of Replacement 3

Good Units 97
30,000

$\left(\frac{30,000 \times 100}{97}\right)$ = 30927.83

Customer
30,000 Nos.

Replaced Free of Cost
(30,927.83 - 30,000)
927.83
say – 928

Cost of 928 units that are replaced Free of charge (928 x 4,000)	37,12,000
Contribution lost (Market Share) Due to Faulty Bats (Note No.1)	35,04,000
	72,16,000

Note No.(1) Statement Showing Contribution Lost (Market Share) Due to Faulty Bats

Sales = 2,40,00,000
(5,000 x 4,800)

= 20,496,000

Variable Cost (*)

Supplied to Customer	Returned By Customer	Good Units
100	3	97
$\left(\frac{5,000 \times 100}{97}\right)$		5,000

= 5,154.63 or 5,155

5,000 x (1,200 + 2,000 + 800) **= 2,00,00,000**

155 x (1,200 + 2,000) **= 4,96,000**

Contribution = 35,04,000
(240,00,000 - 204,96,000)

(iii) Impact on Profitability Due to Implementation of Inspection Process.

Case Study -7

Illustration

A company produces and sells a single product. The cost data per unit for the year 2017 is predicted as below:

Direct Material	35
Direct Labour	25
Variable Overheads	15
Selling Price	90

The company has forecast that demand for the product during the year 2017 will be 28,000 units. However, to satisfy this level of demand, production quantity will be increased?

There are no opening stock and closing stock of the product

The stock level of material remains unchanged throughout the period.

The following additional information regarding costs and revenue given:

- 12.5 % of the items delivered to customers will be rejected due to specification failure and will require free replacement. The cost of delivering the replacement item is₹ 5 per unit.
- 20% of the items produced will be discovered faulty at the inspection stage before they are delivered to customers.
- 10% of the direct material will be scrapped due to damage while in storage.

Due to above, total quality costs for the year is expected to be ₹ 10,75,556.

The company is now considering the following proposal:

1) To introduce training programmes for the workers which. The management of the company believes, will reduce the level of faulty production to 10%. This training programme will cost ₹ 4,50,000 per annum.

2) To avail the services of quality control consultant at an annual charges of ₹50,000 which would reduce the percentage of faulty items delivered to customers to 9.5%.

Required:

a. PREPARE a statement of expected quality costs the company would incur if it accepts the proposal. Costs are to be calculated using the four recognized quality costs heads.

b. Would you RECOMMEND the proposal? Give financial and non-financial reasons.

Note No.1 Statement Showing Analysis of T.Q.M

Present Before- T.Q.M			**Proposed After T.Q.M**		
External Failure			→ **External Failure**		
Unit Delivered To Customer	**Return By Customer**	**Goods Units**	**Unit Delivered To Customer**	**Return By Customer**	**Goods Units**
100	12.5	87.5	100	9.5	90.50
		28,000			28,000
$\left(\frac{28,000 \times 100}{87.50}\right)$			$\left(\frac{28,000 \times 100}{90.5}\right)$		
= 32,000			= 30,939		
Verification					
Units Delivery	32,000		30,939		
Loss 12.5 %	(4,000)		2,939 (9.5%)		
Goods Units	28,000		**28,000**		
External Failure Cost					
DMat	35.00		35.00		
DLAb	25.00		25.00		
VO.	15.00		15.00		
Del-Cost	5.00		5.00		
	80.00		**80.00**		
(4,000 units x 80) = **3,20,000**			x 2,939 = **2,35,120**		

Note No.2 Statement Showing Internal Failure Cost

Gross Production	**Loss Due to Inspection**	**Goods Units**	**Gross Production**	**Loss Due to Inspection**	**Goods Units**
100	20	80	100	10	90
$\left(\frac{32,000 \times 100}{80}\right)$ = 32,000			$\left(\frac{30,939 \times 100}{90}\right)$ = 30,939		
= 40,000 Units			= 34,377		
Gross Production	40,000		34,377		
Faulty Units	8,000		(3,438)		
Goods Units	**32,000**		**30,939**		
Cost					
DMat	35		35		
DLab	25		25		
VO.	15		15		
	75		75		
	x 8,000		x 3,438		
	=**6,00,000**		= **2,57,850**		

Statement Showing Material Scrapped

STATEMENT SHOWING			MATERIAL SCRAPPED		
100	10	90	100	10	90
(40,000x100/90)=44,444.44		40,000	(34,377×100) /90) =34,397		34,377
(44,444.44 – 40,000)		4,444.44	34,397 x 35	3,957	30,440
(4,444.44x35)		1,55,555	3,819x35		1,33,665
(6,00,000 +1,55,555)		7,55,555	6,00,000 +1,33,665		7,33,665

Statement Showing Analysis Of Exp-Quality Cost

	Currrent Siti Action	**Proposed Sit**
Prev-Cost	–	4,50,000
App-Cost	–	50,000
Ext-F-Cost	3,20,000	2,35,120
Int-F-Cost	7,55,556	3,91,538
	3,95,556	**11,26,538**

Case Study -8

Thomson Ltd. makes and sells a single product, the unit specification are as follows:

Direct Materials X : 8 sq. metre at ₹40 per square metre
Machine Time : 0.6 Running hours
Machine cost per gross hour : ₹400
Selling price : ₹1,000

Thomson Ltd. requires to fulfill orders for 5,000 product units per period. There are no stock of product units at the beginning or end of the period under review. The stock level of material X remains unchanged throughout the period.

Thomson Ltd.is planning to implement a Quality Management Programme (QMP). The following additional information regarding costs and revenues are given as of now and after implementation of Quality Management Programme.

Before the implementation of QMP	After the implementation
1.5% of incoming material from suppliers scrapped due to poor receipt and storage organisation	1. Reduced to 3%
2. 4% of material X input to the machine process is wasted due to processing problems.	2. Reduced to 2.5%
3. Inspection and storage of material X costs ₹.1 per square meter purchased.	3. No change in the unit rate.
4. Inspection during the production cycle, calibration checks on inspection equipment vendor rating and other check cost ₹ 2,50,000 per period.	4. Reduction of 40% of the existing cost.
5. Production Qty. is increased to allow for the down grading of 12.5% of the production units at the final inspection stage. Downgraded units are sold as seconds at a discount of 30% of the standard selling price.	5. Reduction to 7.5%
6. Production Quantity is increased to allow for return from customers (these are replaced free of charge) due to specification failure and account for 5% of units actually delivered to customer.	6.Reduction to 2.5%
7. Product liability and other claims by customers are estimated at 3% of sales revenue from standard product sale.	7.Reduction to 1%
8. Machine Idle time is 20% of Gross machine hrs. Used (i.e. running hour=80% of gross/hrs.)	8.Reduction to 12.5%
9. Sundry costs of Administration, Selling and Distribution total ₹6,00,000 per period.	9.Reduction by 10% of the existing
10. Prevention program costs ₹2,00,000	10. Increase to ₹6,00,000.

The Total Quality Management Programme will have a reduction in Machine Run Time required per product unit to 0.5 hr.

Required:

(a) Prepare summaries showing the calculation of (i) Total production units (pre inspection), (iv) Purchase of Materials X (square meters), (iii) Gross Machine Hours.

(b) In each case, the figures are required for the situation both before and after the Implementation of the Quality Management Programme so that orders for 5,000 product units can be fulfilled.

Prepare Profit and Loss Account for Thomson Ltd. for the period showing the profit earned both before and after the implementation of the Total Quality Programme.

Before QMP			**After QMP**		
Units Delivered to Customer	**Return by Customer**	**Goods Units**	**Units Delivered to Customer**	**Return by Customer**	**Goods Units**
500 units	51 x 5,000 = 250	5,250	5,000	5,000 x 2.51 = 125	5,125
Gross Production	**Down Grade**	**Goods Units**	**Gross Production**	**Down Grade**	**Goods Units**
100	12.5	87.5	100	7.5	92.5
6,000 units		5,250	554 units		
Down Grade (6,000 - 5,250) = 750 units			Down Grade Sales (5,541 - 5,125) = 416 units		

Answer (a) part 2 Statement Showing Gross Purchase

Before TQM			**After TQM**		
Input to Machine	**Normal loss**	**Input to Production**	**Input to Machine**	**Normal loss**	**Input to Production**
100	4	96	100	2.5	98
50,000		6,000 x 8 = 48,000	45,465		5,541 x 8 = 44,328
Before TQM			**After TQM**		
Gross Purchase	**Loss due to poor receipt**	**Input**	**Gross Purchase**	**Loss due to poor receipt**	**Input**
100	5	95	100	3	97
52,632		50,000	46,871		45,764.61

Answer (a) (iii) Statement Showing Gross Machine Hrs.

Before QMP			**After QMP**		
Gross Hrs.	**Loss due to idle time**	**Hrs. for Production**	**Gross Hrs.**	**Loss due to idle time**	**Hrs. for Production**
100	20	80	100	12.5	88
$\left(\frac{3,600 \times 100}{80}\right)$ = 4,500 hrs.		6,000 x 0.6 = 3,600 units	$\left(\frac{2,770.5 \times 100}{87.5}\right)$ = 3,167 hrs.		5,541 x 0.5 = 2,770.5

Thomson Ltd. Answer (b) Statement Showing Analysis of Profit/Loss

	Before QMP	After QMP
(A) Sales	50,00,000	50,00,000
	(5,000 x 1,000)	(5,000 x 1,000)
Down Grade Sales	5,25,000	2,91,200
	(750 x 1,000 x 70 %)	(416 x 1,000 x 70 %)
(B)Relevant Cost		
1) Material Cost	(2,105,280)	(18,74,840)
	(52,632 x 40)	(46,871 x 40)
2) Inspection	(52,632)	(46,871)
Storage Cost	(52,632 x 1)	(46,871 x 1)
3) Other Check Cost	(2,50,000)	(1,50,000)
		(2,50,000 x 60 %)
4) Product liability cost only for normal goods we will give claims & not for seconds	(1,50,000) (50,00,000 x 3 %)	(50,000) (50,00,000 x 1 %)
5) Machine Cost	(18,00,000)	(12,66,800)
	(4,500 x 400)	(3,167 x 400)
6) Sundry Admin	(6,00,000)	(5,40,000)
		(6,00,000 x 90 %)
7) Prevention Cost	(2,00,000)	(6,00,000)
	3,67,088	7,62,689

Throughout Accounting /Theory of Constraints

Case Study -9

BTS Ltd. produces three products A, B and C. the following information is available for a period:

	A	B	C
Contribution (per unit) (Sales - Direct materials)	₹ 30	₹ 25	₹ 15

Machine hours required per unit of production:

	Hours			Throughout Accounting Ratio
	A	B	C	
Machine 1	10	2	4	133.33%
Machine 2	15	3	6	200.00%
Machine 3	5	1	2	66.67%

Estimated sales demand for A, B and C are 500 units each and machine capacity is limited to 6,000 hours for each machine.

You are required to analyze the above information and apply theory of constraints process to remove the constraints.

How many units of each product will be made?

Theory of Constraints

Through Out Accounting Ratio is Highest for Machine – 2- Accordingly Machine -2- is Key Factor (Bottleneck)

Step no. 1

Statement Showing Cont P.U/P.H/Rank

	A	B	C
Cont (p.u)	30	25	15
÷ Hrs. p.u	÷ 15	÷ 3	÷ 6
Cont p.h	2	8.33	2.5
Rank	III	I	II

Step No.2 Final Answer

Statement Showing Production Plan For Maximum Profit

Hrs. Available	Product	Units x Hrs. p.u = Total	Balance
6,000	B	500 x 3 = 1,500	4,500
	C	500 x 6 = 3,000	1,500
	A	100 x 15 = 1,500	0

Case Study – 10

Phi Ltd. produces 4 products P, Q, R and S by using three different machines X, Y and Z.
Each machine capacity is limited to 6,000 hours per month. The details given below are of July, 2013:

Particulars	P	Q	R	S
Selling Price p.u (₹)	10,000	8,000	6,000	4,000
Variable Cost p.u. (₹)	7,000	5,600	4,000	2,800
Machine Hours Required p.u.				
Machine X	20	12	4	2
Machine Y	20	18	6	3
Machine Z	20	6	2	1
Expected Demand (units)	200	200	200	200

Required:

a) Find out the bottleneck activity.
b) Allocate the machine hours on the basis of the bottleneck.
c) Ascertain the profit expected in the month if the monthly fixed cost amounts to ₹ 9,50,000.
d) Calculate the unused spare hours of each machine

Statement Showing Calculation of Key-Factor (Bottle Neck)

Machine	P	Q	R	S	Total Hrs. Required	Total Hrs. Available	Shortage
X	4,000	2,400	800	400	7,600	6,000	(1,600)
	(200 x 20)	(200 x 12)	(200 x4)	(200 x 2)			
Y	4,000	3,600	1,200	600	9,400	6,000	(-3,400)
	(200 x 20)	(200 x 18)	(200 x 6)	(200 x 3)			
Z	4,000	1,200	400	200	5,800	6,000	100
	(200 x 20)	(200 x 6)	(200 x 2)	(200 x 1)			

$$\text{Throughout Accounting Ratio} = \left(\frac{\text{Total Hrs. Required}}{\text{Total Hrs. Available}}\right)$$

X $\left(\frac{7,600}{6,000} \text{x } 100\right)$ = 126.67%

Y $\left(\frac{9,400}{6,000} \text{x } 100\right)$ = 156.67%

Z $\left(\frac{5,800}{6,000} \text{x } 100\right)$ = 96.67%

Statement Showing Analysis of Profit/Loss

Product			
P	200	x 3,000	6,00,000
Q	11	x 2,400	26,400
R	200	x 2,000	4,00,000
S	200	x 1,200	2,40,000
		Total Cont =	12,66,400
Fixed Cost			(9,50,000)
		Net Profit	**3,16,400**

Statement Showing Un-used Hrs.

	Machine X	**Machine Z**
Product		
P	(200 X 20) = 4000	(200 X 20) = 4000
Q	(11 x 12) = 132	(11 x 6) = 66
R	(200 x 4) = 800	(200 x 2) = 400
S	(200 x 2) = 400	(200 x 1) = 200
Total Hrs. Required	**5,332**	**4,666**
Total Hrs.	**6,000**	**6,000**
Balance (Unused)	**668**	**1,334**

Case Study – 11

H. Ltd. manufactures three products. The material cost, selling price and bottleneck resource details per unit are as follows:

Particulars	**Product X**	**Product Y**	**Product Z**
Selling price (₹)	66	75	90
Material and Other Variable Cost (₹)	24	30	40
Bottleneck Resource Time (Minutes)	15	15	20

Budgeted factory costs for the period are ₹ 2,21,600. The bottleneck resources time available is 75,120 minutes per period.

Required:

1. Company adopted throughout accounting and products are ranked according to 'product return minute'. Select the highest rank product.
2. Calculate throughput accounting ratio and comment on it.

Statement Showing Cont P.U/Per Min. Rank

Product	X	Y	Z
S.P (p.u)	66.00	75.00	90.00
V.P (p.u)	(24.00)	(30.00)	(40.00)
Cont (p.u)	42.00	45.00	50.00
Min/p.u	÷ 15	÷ 15	÷ 20
Cont/p.m	2.80	3.00	2.50
Rank	II	II	III

$$\text{Throughout Accounting Ratio} = \left(\frac{\text{Total Cost}}{\text{Total Mints}}\right)$$

$$2.95 = \left(\frac{221{,}600}{75{,}120}\right)$$

Statement Showing Rank As Per T.A Ratio

	X	Y	Z
Cont Per Units	2.80	3.00	2.50
Cost Per min	÷ 2.95	÷ 2.95	÷ 2.95
Cost Per min	0.95	1.02	0.85
Cost Per min	II	I	III

CHAPTER – 3
LEAN SYSTEM & INNOVATION
JUST IN TIME

Case Study – 1

United Video International Company (UVIC) sells package of blank video tapes to its customer. It purchases video from Indian Tape Company (ITC) @ ₹ 140 a package. ITC pays all freight to UVIC. No incoming inspection is necessary because ITC has a superb reputation for delivery of quality merchandise. Annual demand of UVIC is 13,000 packages. UVIC requires15% annual returns on investment. The purchase order lead time is two weeks. The purchase order is passed through Internet and it costs ₹ 2 per order. The relevant insurance, material handling etc. ₹ 3.10 per package per year. UVIC has to decide whether or not to shift to JIT purchasing. ITC agrees to deliver 100 packages of video tapes130 times per year (5 times every two weeks) instead of existing delivery system of 1,000 packages 13 times a year with additional amount of ₹ 0.02 per package. UVIC incurs no stock out under its current purchasing policy. It is estimated UVIC incurs stock out cost on 50 video tape packages under a JIT purchasing policy. In the event of a stock out. UVIC has to rush order tape packages which costs ₹ 4 per package. Comment whether UVIC should implement JIT purchasing system.

Hindustan Tape Company (HTC) also supplies video tapes. It agrees to supply @ 136 per package under JIT delivery system. If video tape purchased from HTC, relevant carrying cost would be ₹ 3 per package against ₹ 3.10 in case of purchasing from ITC. However HTC doesn't enjoy so sterling a reputation for quality. UVIC anticipates following negative aspects of purchasing tapes from HTC.

- To incur additional inspection cost of 5 paisa per package.
  Average stock out of 360 tapes packages per year would occur, largely resulting from late deliveries. HTC cannot rush order at short notice. UVIC anticipates lost contribution margin per packageof₹8 from stock out.
- Customer would likely return 2 % of all packages due to poor quality of the tape and to handle this return an additional cost of ₹ 25 per package.

Required:

Comment whether UVIC places order to HTC.

(Given)	**I.T.C**	**I.T.C**	**H.T.C**
	Traditional	**JIT**	**JIT**
Purchase Price	140 p.u	140.02	136
		(Additional loss of 0.02 per package)	
Annual Demand	13,000 units	13,000 units	13,000 units
ROI	15%	15%	15%
Lead Time	2 weeks	No effect	
Ordering Cost	₹ 2 per order	₹ 2 per order	₹ 2 per order
Storage Cost	3.10 per package	3.10 package	3 per package
(ins/Mat handling)			
Order Size	1,000 packages	100 packages	101 packages (As JIT)
Stock out Cost	–	(50 x 4) = 200	(360 x 8)= 2,880
Inspection Cost	–	–	650
			(13,000 x 0.05)
Customer Return Cost	–	–	6,500
			(13,000 x 2 % x 25)

Statement Showing Analysis of Proposal

	Yhtd - Traditional	Yhtd - JIT	Zhtd - JIT
Purchase cost	18,20,000	18,20,260	17,68,000
	(13,000 x 140)	(13,000 x 140.02)	(13,000 x 136)
ROI	10,500	1,050.15	1,020
	$\left(\frac{1}{2}\text{x } 1{,}000 \text{ x } 140 \text{ x } 15\%\right)$	$\left(\frac{1}{2}\text{x } 100 \text{ x } 140.02 \text{ x } 15\%\right)$	$\left(\frac{1}{2}\text{x } 100 \text{ x } 136 \text{ x } 15\%\right)$
Ordering Cost	26	260	260
	$\left(\frac{13{,}000}{1{,}000}\text{x } 2\right)$	$\left(\frac{13{,}000}{1{,}000}\text{x } 2\right)$	$\left(\frac{13{,}000}{1{,}000}\text{x } 2\right)$
Storage Cost	1,550	155	150
	$\left(\frac{1}{2}\text{x } 1{,}000 \text{ x } 3.10\right)$	$\left(\frac{1}{2}\text{x } 100 \text{ x } 3.10\right)$	$\left(\frac{1}{2}\text{x } 100 \text{ x } 3\right)$
Stock out Cost	–	200	2,880
		(50 x 4)	(360 x 8)
Inspection Cost	–	–	650
			(13,000 x 0.05)
Cust Return Cost	–	–	6,500
	18,32,076	18,21,925.15	17,79,460

Case Study -2

Illustration

KP Ltd. (KPL) manufacturers and sells one product called "KEIA". Managing Director is not happy with its current purchasing and production system. There has been considerable discussion at the corporate level as to use of 'Just in Time' system for "KEIA". As per the opinion of managing director of KPL Ltd.- "Just-in-time system is a pull system, which responds to demand, in contrast to a push system, in which stocks act as buffers between the different elements of the system such as purchasing production and sales. By using Just in Time system, it is possible to reduce carrying cost as well as other overheads".

KPL is dependent on contractual labour which has efficiency of 95% for its production. The labour has to be paid for minimum of 4,000 hours per month to which they produce 3,800 standard hours.

For availing services of labour above 4,000 hours in a month, KPL has to pay overtime rate which is 45% premium to the normal hourly rate of ₹110 per hour. For avoiding this overtime payment, KPL in its current production and purchase plan utilizes full available normal working hours so that the higher inventory levels in the month of lower demand would be able to meet sales of month with higher demand level. KPL has determined that the cost of holding inventory is₹70 per month for each standard hour of output that is held in inventory.

KPL has forecast the demand for its products for the first six months of year 2018 as follows:

Jan'18	3,150
Feb'18	3,760
Mar'18	4,060
April'18	3,350
May'18	3,650
Jun'18	4,830

Following other information is given:

I. All other production costs are either fixed or are not driven by labour hours worked.

II. Production and sales occur evenly during each month and at present there is no stock at the end of Dec'17.

III. The labour are to be paid for their minimum contracted hours in each month irrespective of any purchase and production system.

Required:

As a chief accountant you are requested to COMMENT on managing director's view.

Statement Showing 'Inventory' Holding Under Current System

Particulars	(Hrs) Jan	(Hrs) Feb	(Hrs) Mar	(Hrs) April	(Hrs) May	(Hrs) June
Opening Inventory	-	650	690	430	880	1,030
(+) Production	3,800	3,800	3,800	3,800	3,800	3,800
Demand	(3,150)	(3,760)	(4,060)	(3,350)	(3,650)	(4,830)
Closing Inventory	650	690	430	880	1,030	–
Aug-Inventory (opening inventory +Closing inventory)/2	= 325	= 670	= 560	= 655	= 955	= 515
	(0+650/2)	**(650+690/2)**	**(690+430/2)**	**(430+880/2)**	**(880+1,030/2)**	**(1,030+0/2)**

Statement Showing Inventory Holding Cost For Six Months

Month	Avg Inventory	×70	= Total (₹)
Jan	325	×70	22,750
Feb	670	×70	46,900
March	560	×70	39,200
April	655	×70	45,850
May	955	×70	66,850
June	515	×70	36,050
			2,57,600

Statement Showing Relevant Overtime Cost As Per J.I.T- System

Particulars	Jan	Feb	March	April	May	June
Demand(Hrs)	3,150	3,760	4,060	3,350	3,650	4,830
Production(J.I.T)	3,150	3,760	4,060	3,350	3,650	4,830
Normal Standard Hrs	3,800	3,800	3,800	3,800	3,800	3,800
(Available) Shortage	–	–	260 (4,060-3,800)	–	–	1,030 (4,830-3,800)

Statement Showing Overtime Cost

Overtime Hrs	Gross-Hrs
March 260	(260x100/95) = 273.68 x 159.50 x (110+ 49.50)x(45%110)
June 1030	(1,030x100/95=1,084.21x159.50
	(273.68 x 159.50) + (1,084.21 x 159.50) = 2,16,583

Statement Showing Comparative Cost

Cost	As per Traditional	As per J.I.T
Cost	2,57,600	2,16,583
Saving As Per J.I.T	41,017	(2,16,583– 02,57,600)

Case Study – 3

Innovation Ltd. has entered into a contract to supply a component to a company which manufactures electronic equipment's.
Expected demand for the component will be 70,000 units totally for all the periods. Expected sales and production cost will be

Period	1	2	3	4
Sales (units)	9,500	17,000	18,500	25,000
Variable cost per unit	30	30	32.5	35

Total fixed overheads are expected to be₹ 14 lakhs for all the periods.

The production manager has to decide about the production plan.

The choices are:

Plan 1: Produce at a constant rate of 17,500 units per period. Inventory holding costs will be ₹ 6.50 per unit of average inventory per period.
Plan 2: Use a just-in-Time (JIT) system.
Maximum capacity per period normally……..18,000 units

It can produce further up to 10,000 units per period in overtime.
Each unit produced in overtime would incur additional cost equal to 30 % of the expected variable cost per unit of that period.
Assume zero opening inventory.
Required:

1. Calculate the incremental production cost and the savings in inventory holding cost by JIT production system.

2. Advise the company on the choice of a plan.

Statement Showing Inventory Holding

Cost Under Plan -1

	PD - 1	**PD - 2**	**PD - 3**	**PD - 4**
Opening Stock	–	8,000	8,500	7,500
Production	17,500	17,500	17,500	17,500
Sales	-9,500	17,000	18,500	25,000
Closing Stock	8,000	8,500	7,500	–
Avg - Stock	= 4,000	= 8,250	= 8,000	= 3,750
$\left(\frac{\text{Opening + Closing}}{2}\right)$	$\left(\frac{0+8,000}{2}\right)$	$\left(\frac{8,000+8,500}{2}\right)$	$\left(\frac{8,500+7,500}{2}\right)$	$\left(\frac{7,500+0}{2}\right)$
Inventory	(4,000 x 6.50)	(8,250 x 6.50)	(8,000 x 6.50)	(3,750 x 8.50)
Holding Cost	26,000	53,625	52,000	24,375

Statement Showing Inventory Holding Cost

	₹
PD - 1	26,000
PD - 2	53,625
PD - 3	52,000
PD - 4	24,375
	1,56,000

Production	**Total**	5,25,000	5,25,000	56,87,50	6,12,500
Cost	22,31,350	(17,500 x 30)	(17,500 x 30)	(17,500 x 32.50)	(17,500 x 35)
Holding	1,56,000	–			
T.Cost	23,87,350				

Statement Showing Additional Cost of Overtime – Under Plan -2 (J.I.T)

		PD - 1	**PD - 2**	**PD - 3**	**PD - 4**
	Demand	9,500	17,000	18,500	25,000
	Normal Production	9,500	17,000	18,000	18,000
	Production in Overtime	–	–	500	7,000
	Total				
Normal Cost		(9,500 x 30) = 2,85,000	(17,000 x 30) = 5,10,000	(18,500 x 32.50) = 601,250	(25,000 x 35) = 8,75,000
O.T		–	–	= 4,875 (500 x 32.5 x 30 %)	= 73,500 7,000 x 35 x 30%
	23,49,625	2,85,000	5,10,000	606,125	9,48,500

(23,87,250 - 23,49,625) = **37,625**

Advice

- Though Innovation Ltd. is saving₹ 37,625 by changing its production system to Just – in- time but it has to consider other factors as well before taking any final call which are as follows:-
- Innovation Ltd. has to ensure that it receives materials from its suppliers on the exact date and at the exact time when they are needed. Credentials and reliability of supplier must be thoroughly checked.
- To remove any quality issues, the engineering staff must visit supplier's sites and examine their processes, not only to see if they can reliably ship high – quality parts but also to provide them with engineering assistance to bring them up to a higher standard of product.

- Innovation Ltd. should also aim to improve quality at its process and design levels with the purpose of achieving "Zero Defects" in the production process.
- Innovation Ltd. should also keep in mind the efficiency of its work force. Innovation Ltd. must ensure that labour's learning curve has reached at steady rate so that they are capable of performing a variety of operations at effective and efficient manner. The workforce must be completely retrained and focused on a wide range of activities.

Case Study – 4

Napier Company uses a back flush costing system with three trigger points:

a) Purchase of Direct Materials
b) Completion of Good Finished Units of Product
c) Sales of Finished Goods

You are provided with the following information for July 2016

Direct Materials Purchased	₹ 2,64,000	Conversion Costs Allocated	₹ 1,20,000
Direct Materials Used	₹ 2,55,000	Costs Transferred to Finished Goods	₹ 3,75,000
Conversion Costs Incurred	₹ 1,26,600	Cost of Goods Sold	₹ 3,57,000

Required:

a) Prepared journal entries for July (without disposing of under allocated/over allocated conversion costs).
b) Under an ideal JIT production system, how would the amounts in your journal entries change from the journal entries in requirement (i)?

JENT	₹(Dr)	₹(Cr)
Material Contribution A/c.	2,64,000	
To Creditors A/c.		2,64,000
W.I.P Contribution A/c.	2,55,000	
To Material Con A/c		2,55,000
Conv- Cost- Contribution A/c	1,26,600	
To Cash Bank A/c		1,26,600
W.I.P Contribution A/c	1,20,000	
To Conv- Cost Contribution A/c		1,20,000
Finished Goods Contribution A/c	3,75,000	
To W.I.P Contribution A/c.(2,55,000 + 1,20,000) A/c		3,75,000
Cost of Goods Sold Contribution A/c	3,57,000	
To fin-Goods Contribution A/c.		3,57,000

Kaizen Costing- Basic Concepts

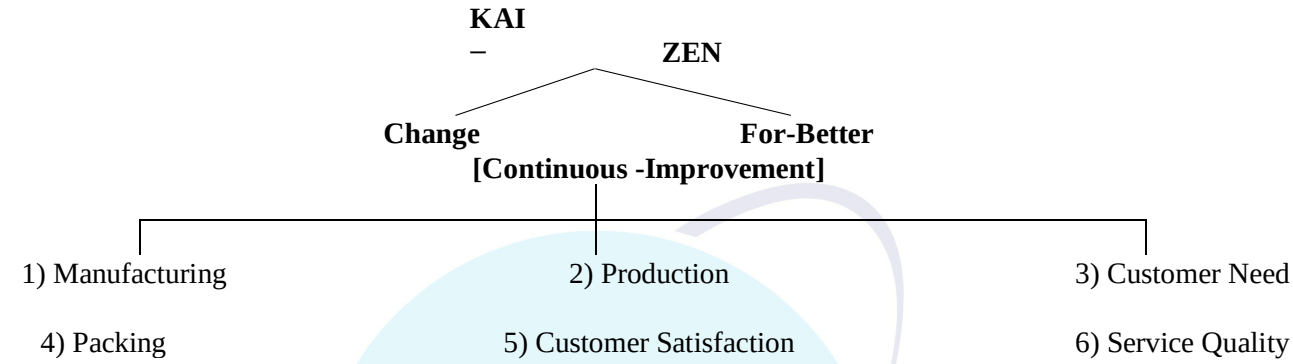
Case study -5

XYZ Ltd. is planning to introduce Kaizen Costing approach in its manufacturing plant.

State whether and why the following are Valid or Not in respect of Kaizen Costing.

i. VP (Finance) is of the view that company has to make a huge initial investment to bring a large scale modification in production process.
ii. Head (Personnel) has made a point that introduction of Kaizen Costing does not eliminate the training requirement of employees.
iii. General Manager (Manufacturing) firmly believes that only shop floor employees and workers involvement is prerequisite of Kaizen Costing approach.
iv. Manager (Operations) has concerns about creation of confusion among employees and workers regarding their roles and degradation in quality of production.

1. (i). **Invalid:** Kaizen Costing is the system of cost reduction procedures which involves making small and continuous improvements to the production processes rather than innovations or large-scale investment.
(ii). **Valid:** The training of employees is very much a long-term and ongoing process in the Kaizen costing approach. Training enhances the abilities of employees.
(iii). **Invalid:** Kaizen costing approach involves everyone from top management level to the shop floor employees. Every employee's active participation is a must requirement.
(iv). **Invalid:** Though the aim of Kaizen Costing is to reduce the cost but at the same time it also aims to maintain the quality. Kaizen costing also aims to bring the clarity in roles and responsibilities for all employees.



Kaizen Costing Principles

- The system seeks gradual improvements in the existing situation, at an acceptable cost.
- It encourages collective decision making and application of knowledge.
- There are no limits to the level of improvements that can be implemented.
- Kaizen involves setting standards and then continually improving these standards to achieve long-term sustainable improvements.
- The focus is on eliminating waste, improving systems, and improving productivity.
- Involves all employees and all areas of the business.

Case Study (1)

	No- Kaizen	**Yes-Kaizen**
Case-Study	Baidyanath	Patanjali
Patents	750	350
Years (Experience)	100 years	10 years
Business	Ayurveda	Ayurveda
Turn over	750 crore	10,500 crore
Focus on F.M.C.G	No	Yes
	Tooth paste	Dantkanti
	Bournvita	Power vita
Improvement in Packaging	No Jadi-Buti	Yes F.M.C.G
	No-Change-Over Time	Continuous Improvement
	No Improvement In-Customer Need	Improve Customer Need
	Nokia phone	Samsung , I-Phone
	Kodak	Nikon (DSLR)
	Onida (T.V)	Sony (LCD)

Kaizen Costing in Practice

Kaizen Costing becomes part of the Package At the start of 2002 a UK company called Kappa Packaging (now part of the Smurfit Kappa Group) had a factory in Greater Manchester that made, among other products, cartons to hold bottles to drink. That year the firm introduced a new approach to cutting the amount of waste paper and cardboard it was producing, which stood at 14.6 per cent of the raw materials consumed. The new approach included the following initiative a) Making employees more aware of how much waste was being produced. b) Requiring them to monitor the amount of waste for which they are individually responsible. c) Establishing a Kaizen team to find ways of reducing waste. As a result, Kappa was able to reduce waste from 14.6 percent to 13.1 percent of raw materials used by the end of 2002 and down to 11 percent in 2003. Each percentage-point saving was worth an estimated £ 110,000 a year.

(Source: "Accurate measurement of process waste leads to reduced costs", www.envirowise.gov.uk, 2003.)

(Case Study -3)

Case Scenario

M.Ltd. (MIL) is an automobile manufacturer in India and a subsidiary of Japanese automobile and motorcycle manufacturer Leon. It manufactures and sells a complete range of cars from the entry level of the hatchback to sedans and has a present market share of 22% of the Indian passenger car markets. MIL uses a system of standard costing to set its budgets. Budgets are set semi- annually by the Finance department after the approval of the Board of Directors at MIL. The Finance Department prepares variance reports each month for review in the Board of Directors meeting, where actual performance is compared with the budgeted figures. Mr. Suzuki group CEO of the Leon is of the opinion that Kaizen costing method should be implemented as a system of planning and control in the MIL.

Required:

RECOMMEND key changes vital to MIL's planning and control system to support the adoption of 'Kaizen Costing Concepts;

Solution

Kaizen Costing emphasizes on small but continuous improvement. Targets once set at the beginning of the year or activities are updated continuously to reflect the improvement that has already been achieved and that are yet to be achieved.

The suggestive changes which are required to be adopted Kaizen Costing concepts in MIL are as follows:

Standard Cost Control System to Cost Reduction System: Traditionally Standard Costing system assumes stability in the current manufacturing process and standard are set keeping the normal manufacturing process into account thus the whole effort is on to meet performance cost standard.

On the other hand Kaizen Costing believes in continuous improvements in manufacturing processes and hence, the goal is to achieve cost reduction target. The first change required is the standard setting methodology i.e. from earlier Cost Control System to Cost Reduction System.

Reduction is the periodicity of setting Standards and Variance Analysis: Under the existing planning and control system followed by the MIL, standards are set semi-annually and based on these standards monthly variance reports are generated for analysis. But under Kaizen Costing system cost reduction targets are set for small periods say for a week or a month. So the period covered under a standard should be reduced from semi-annually to monthly and the current practice of generating variance reports may be continued or may be reduced to a week.

Participation of Executives or Workers in standard setting: Under the Kaizen Costing system participation of workers or executives who are actually involved in the manufacturing process is highly appreciated while setting standards. So the current system of setting budgets and standards by the Finance department with the mere consent of Board of Directors required to be changed.

CHAPTER– 4

COST MANAGEMENT TECHNIQUES

COST CONTROL & COST REDUCTION /TARGET COSTING

Case Study – 1

UK Ltd. prepared a draft budget for the next year as follows:

Quantity – 10,000 units

	₹
Selling price per unit	60
Variable cost per unit	
Direct materials	16
Direct labour (2hrs. x ₹ 1)	12
Variable overheads (2 hrs. x ₹ 1)	2
Contribution per unit	30
Total Budgeted Contribution	3,00,000
Total Budgeted Fixed Overheads	2,80,000
Total Budgeted Profit	20,000

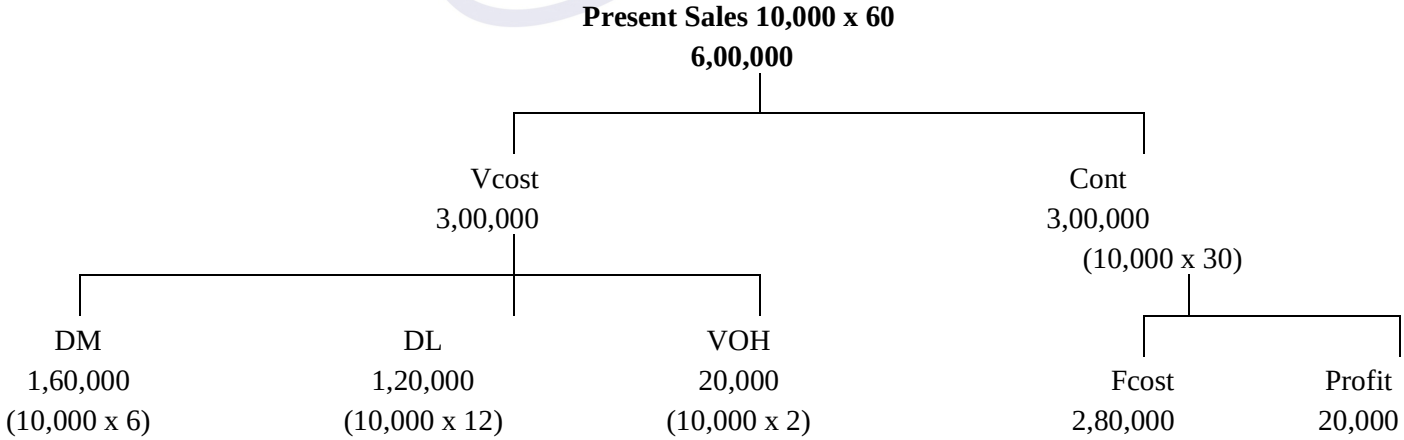
The boards of Directors are not satisfied with this draft budget and suggested the following changes for the better profit:

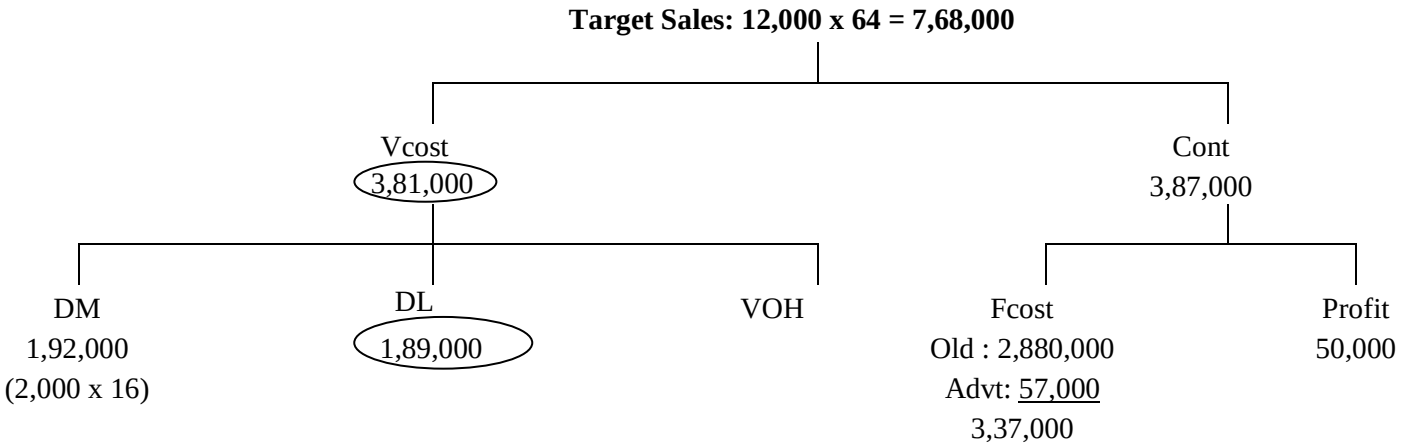
a. The budgeted profit is ₹ 50,000,
b. The company should spend ₹ 57,000 on advertisement and the target sales price up to 64 per unit.
c. It is expected that the sales volume will also rise, inspite of the price rise, to 12,000 units.

In order to achieve the extra production capacity, however, the work force must be able to reduce the time taken to make each unit of the product. It is proposed to offer a pay and productivity deal in which the wages rate per hour is increased to ₹ 8. The hourly rate of variable overheads will be unaffected.

Required:

Calculate the target labour timer require to achieve the target profit.





Lab Rate per hr. ₹ 8
VOH rate ₹ 1
₹ 9

Let total labour hrs. = x

$\therefore 9x = 1,89,000$

$\therefore x = 21,000$ hrs. for 12,000 units

$\therefore$ P.U = 1,075 hr. per unit

Case Study – 2

NEC Ltd. manufactures two parts 'P' and 'Q' for Computer Industry.
P: Annual Production and sales of 1,00,000 units at a selling price of ₹ 100.05 per unit.
Q: Annual Production and sales of 50,000 units at a selling price of ₹ 150 per unit.

Direct and Indirect costs incurred on these two parts are as follows:

			(₹ in thousands)
Direct Material Cost (Variable)	4,200	3,000	7,200
Labour Cost (Variable)	1,500	1,000	2,500
Direct Machining Cost (See Note *)	700	550	1,250
Indirect Costs			
Machine Setup Cost			462
Testing Cost			2,375
Engineering Cost			2,250

Note: Direct machining costs represents the cost of machine capacity dedicated to the production of each product. These costs are fixed and are not expected to vary over the long- run horizon.

Additional information is as follows:

	P	**Q**
Production Batch Size	1,000 units	500 units
Set- up Time per batch	30 hours	36 hours
Testing Time per unit	5 hours	9 hours
Engineering Cost incurred on each product	8.40 lakhs	14.10 lakhs

A foreign competitor has introduced product very similar to 'P'. To maintain the company's share and profit, NEC Ltd. has to reduce the price to₹ 86.25.The company calls for a meeting and comes up with a proposal to change design of product 'P'. The expected effect of new design is as follows:

- Direct Material cost is expected to decrease by ₹ 5 per unit.
- Labour cost is expected to decrease by₹ 2 per unit.
- Machine time is expected to decrease by 15 minutes; previously it took 3 hours to produce 1 unit of 'P'. The machine will be dedicated to the production of new design.

- ❖ Set up time will be 28 hours for each set up.
- ❖ Time required for testing each unit will be reduced by 1 hour.
- ❖ Engineering cost and batch size will be unchanged.

Required:

a) Company management identifies that cost driver for Machine set-up costs is 'Set up hours used in batch setting' and for testing costs is 'testing time'. Engineering costs are assigned to products by special study. Calculate the full cost per unit for 'P' and 'Q' using Activity-Based Costing.

b) What is the Mark-up on full cost per unit of P?

c) What is the Target Cost per unit for new design to maintain the same markup percentage on full cost per unit as it had earlier? Assume cost per unit of cost drives for the new design remains unchanged.

d) Will the new design achieve the cost reduction target?

e) List four possible management actions that the NEC Ltd. should take regarding new design.

Statement Showing Cost Driver Rate

Activity	Cost Driver	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$
(1) Machine Setup Cost	Machine Setup Hrs. (Note no. 1)	$\left(\frac{4,62,000}{6,600}\right)$ = 70.00
(2) Testing Cost	No. of Testing Hrs. (Note no. 2)	$\left(\frac{23,75,000}{9,50,00}\right)$ = 2.50
(3) Engg-Cost	Directly Given	**(22,50,000)**

P ₹ 8,40,000 Q ₹ 14,10,000

Note No. 1

No. of Machine Setup Hrs.

Product	Units	Batch size	No. of Batch x hrs.	Batch Hrs.
P	1,00,000	÷ 1,000	= 100 x 30	= 3,000
Q	50,000	÷ 500	= 100 x 36	= 3,600
				6,600

Note No. 2

Total Testing Hrs.

Product	Units	-	-
P	1,00,000	x 5	= 5,00,000
Q	5,00,000	x 9	= 4,50,000

Statement Showing Cost Sheet As Per ABC

Product Units	P		Q	
	1,00,000 Units		50,000 Units	
	Total	P.U	Total	P.U
Direct Cost				
Dmat	42,00,000	42.00	30,00,000	60.00
DLabour	15,00,000	15.00	10,00,000	20.00
Dcost	7,00,000	7.00	55,00,000	11.00
Prime Cost	64,00,000	64.00	45,50,000	91.00
Indirect Cost				
Activity (1)	2,10,000	2.10	2,52,000	5.04
Activity (2)	12,50,000	12.50	11,25,000	22.50
Activity (3)	8,40,000	8.40	14,10,000	28.20
	87,00,000	87.00	73,37,000	146.74

Ans No.(b)

Selling Price (p.u) 'P'

100.05

Cost P.U
87

Profit P.U
(100.05 - 87)
13.05

$$(\%) = \left(\frac{13.05}{87}\right) \text{x } 100 = 15\ \%$$

Statement Showing Target Cost

Selling Price = 86.25

Target Profit

$$\left(86.25 \text{ x} \frac{15}{115}\right) = 11.25$$

Target Cost Per Unit

75.00

Ans No. (a)

Product /Production = 'P' = 1,00,000 Units		
	Total	P.U
Direct Cost		
Dmat	37,00,000	37.00 = (42 - 5)
Dlab	13,00,000	13.00 = (15 - 2)
Prime Cost	50,00,000	50.00
Direct Machine Cost	7,00,000	7.00 (No Change)
Ind Cost		
Activity (1)	= 1,96,000	1.96
(Machine Setup)	$\left(\frac{1,00,000}{1,000}\right)$ x 28 hrs. x 70	
Activity (2)	= 10,00,000	10.00
(Testing Cost)	(1,00,000 x 4 x 2.50)	
Engg- Cost	8,40,000	8.40 (No Change)
Factory Cost	77,36,000	77.36

Case Study – 3

Ice-Cream Ltd. is engaged in production of three types of ice-cream products: Coco, Strawberry and Vanilla. The company presently sells 50,000 units of Coco @ ₹ 25 per unit, Strawberry 20,000 @ ₹ 20 per unit and Vanilla 60,000 units @ ₹ 15 per unit. The demand is sensitive to selling price it has been observed that every reduction at ₹ 1 per unit in selling price increases the demand for each product by 10% to the previous level. The company has the production capacity of 60,500 units of Coco, 24,200 units of Strawberry and 72,600 units of Vanilla. The company marks up 25% on cost of the product.
The Company management decides to apply ABC analysis. For this purpose it identifies four activities and the rate as follows:

Activity		Cost Rate
Ordering	…….	₹ 800 per purchase order
Delivery	…….	₹ 700 per delivery
Shelf stocking	…….	₹ 199 per hour
Customer support and assistance	…….	₹ 1.10 p.u sold

The other relevant information for the products are as follows:

Particulars	CoCo	Strawberry	Vanilla
Direct Material p.u (₹)	8	6	5
Direct Labour p.u (₹)	5	4	3
No. of Purchase Orders	35	30	15
No. of Deliveries	112	66	48
Shelf Stocking Hours	130	150	160

Under the traditional costing system, store support costs are changed @ 30% of prime cost. In ABC these costs area coming under customer support and assistance.

Required:

1) Calculate target cost for each product after a reduction of selling price required to achieve the sales equal to the production capacity.
2) Calculate the total cost and unit cost of each product at the maximum level using traditional costing.
3) Calculate the total cost and unit cost of each product at the maximum level using activity based costing.
4) Compare the cost of each product calculated in (i) and (ii) with (iii) and comment on it.

Ans No. 2

Statement Showing Cost Sheet (As Per Trad – Method)

	CoCo	Strawberry	Vanilla
Units	60,500	24,200	72,600
	P.U	P.U	P.U
	₹	₹	₹
Direct Cost			
DMat	8.00	6.00	5.00
DLab	5.00	4.00	3.00
Prime Cost	13.00	10.00	8.00
Ind/ReqCost			
Stores Supp Cost	9.00	3.00	2.40
(30 % Prime Cost)	(13 x 30 %)	(10 x 30 %)	(8 x 30 %)
Factory Cost (P.U)	22.00	13.00	10.40

Statement Showing Cost of Product Under Target Costing

CoCo		Strawberry		Vanilla	
S.P	Demand	S.P	Demand	S.P	Demand
25	50,000	20	20,000	15	60,000
24	55,000	19	22,000	14	66,000
23	60,500	18	24,200	13	72,600

Statement Showing Target Cost Per Unit

	CoCo	Strawberry	Vanilla
Selling Price (NET)	23.00	18.00	13.00
Profit Mark - Up	= (4.60) $\left(23 \times \frac{25}{125}\right)$	= (3.60) $\left(18 \times \frac{25}{125}\right)$	= (2.60) $\left(13 \times \frac{25}{125}\right)$
Target Cost	18.40	14.40	10.40

Ans No.3

Statement Showing Cost Sheet (As Per A.B.C)

	CoCo	Strawberry	Vanilla
Units	60,500	24,200	72,600
	₹	₹	₹
Dcost			
Dmat	8.00	6.00	5.00
Dlab	5.00	4.00	3.00
Prime Cost	13.00	10.00	8.00
Ind Cost			
Activity			
(1) Ordering	$.46\left(\frac{800 \times 35}{60,500}\right)$	$.99\left(\frac{800 \times 30}{24,200}\right)$	$.17\left(\frac{800 \times 15}{72,600}\right)$
(2) Delivery	$1.30\left(\frac{700 \times 112}{60,500}\right)$	$1.91\left(\frac{700 \times 66}{24,200}\right)$	$.46\left(\frac{700 \times 48}{72,600}\right)$
(3) Shelf Stocking	$.44\left(\frac{199 \times 130}{60,500}\right)$	$1.23\left(\frac{199 \times 150}{24,200}\right)$	$.44\left(\frac{199 \times 160}{72,600}\right)$
(4) Customer Support	$1.10\left(\frac{1.10 \times 60,500}{60,500}\right)$	$1.10\left(\frac{1.10 \times 24,200}{24,200}\right)$	$1.10\left(\frac{1.10 \times 72,600}{72,600}\right)$
Fcost	**16.30**	**15.23**	**10.17**

Statement Showing Comparative Cost – Sheet

	Traditional Method	Modern Method
	P.U	P.U
CoCo	22	16.29
Strawberry	13	15.23
Vanilla	10.4	10.17

Comment

The cost of product of strawberry is higher in ABC method in comparison to target costing and traditional methods. It indicated that actual profit under ABC is less than targeted. For remaining two products, ABC is most suitable

Case Study - 4

Transnet Ltd. is engaged in the production of four products: A, B, C and D. The price charged for the four products are ₹180, ₹ 175, ₹ 130 and ₹ 180 respectively. Market research has indicated that if Transnet Ltd can reduce the selling prices of its products by ₹ 5, it will be successful in getting bulk orders and

gain a significant share of market of those products. The company's profit markup is 25 per cent on cost of the product. The relevant information of product are as follows:

Products	A	B	C	D
Output in units	600	500	400	600
Cost per unit -				
Direct material (in ₹)	40	50	30	60
Direct labour (in ₹)	28	21	14	21
Machine hours (per unit)	4	3	2	3

The four products are usually produced in production runs of 20 units and sold in batches of 10 units. The production overhead is currently absorbed by using a machine hour rate, and the total of the production overheads for the period has been analyzed as follows:

		(₹)
Machine department costs	…….	52,130
Setup costs	…….	26,250
Stores receiving	…….	18,000
Inspection/Quality control	…….	10,500
Material handling and dispatch	…….	23,100

The cost drivers to be used for the overhead costs are as follows:

Cost	…….	Cost drivers
Setup costs	…….	Number of production runs
Store receiving	…….	Requisitions raised
Inspection/Quality control	…….	Number of production runs
Materials handling and dispatch	…….	Order executed

The number of requisitions raised in the stores was 100 for each product and the number of orders executed was 210, each order being for a batch of 10 units of a product.

Required:

a) To compute the target cost for each product.
b) To compute total cost of each product using activity based costing.
c) Compare target cost and activity based cost of each product and comment whether the price reduction is profitable or not.

Ans No.1

Statement Showing Target Cost (P.U)

Products	A	B	C	D
Present Selling Price	180	175	130	180
Proposed Selling Price	(180 -5) = 175	(175 - 5) = 170	(130 - 5) = 125	(180 - 5) = 175
Margin @ 25 %	(35)	(34)	(25)	(35)
	$\left(175 \times \frac{25\ \%}{125}\right)$	$\left(170 \times \frac{25\ \%}{125}\right)$	$\left(125 \times \frac{25\ \%}{125}\right)$	$\left(175 \times \frac{25\ \%}{125}\right)$
Target Cost	= 140	= 136	= 100	= 140

Step No.1 Statement Showing Cost Driver Rate

Activity	Cost Driver	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$
		= Cost Driver Rate
(1) Machine Dept-Cost	No. of Machine Hrs. (Note No.1)	$\left(\frac{52,130}{6,500}\right)$ = 8.02
(2) Setup Cost	No. of Production Runs (Note No.2)	$\left(\frac{26,250}{105}\right)$ = 250
(3) Stores Recovery	No. of Req. Raised (Note No.3)	$\left(\frac{18,000}{400}\right)$ = 45
(4) Ins Qlty Cont	No. of Production Runs (Note No.2)	$\left(\frac{10,500}{105}\right)$ = 100
(5) Material Hand & Dis.	No. of Orders Ex (Note No.4)	$\left(\frac{23,100}{210}\right)$ = 110

Note No.1

No. of Machine Hrs.

Products	Units x hrs. p.u	Total
A	600 x 4	= 2,400
B	500 x3	= 1,500
C	400 x2	= 800
D	600 x3	= 1,800
		6,500

Note No.2

No. of Production Runs

Product	Units ÷ 20 Units	Nos.
A	600 ÷20	30
B	500 ÷ 20	25
C	400 ÷ 20	200
D	600 ÷ 20	30
		105

Note No. 3

No. of Requisition Raised

-	-	-
A	100	
B	100	
C	100	
D	100	
	400	

Note No. 4

No. of Orders

Product	Units ÷ hrs. P.U	Total
A	600 ÷ 10	= 60
B	500 ÷ 10	= 50
C	400 ÷ 10	=40
D	600 ÷ 10	=60
		210

Step No. 2 Statement Showing Cost Driver Rate Per Unit – Per Products

Activity	Product	Cost Driver used x Cost Driver Rate	÷ Production	Cost Driver Rate P.U
		No. of M-Hrs.		
(1) Machine Dept Cost	A	2,400 x 8.02	÷ 600	= 32.08
	B	1,500 x 8.02	÷ 500	= 24.06
	C	800 x 8.02	÷ 400	= 16.04
	D	1,800 x 8.02	÷ 600	= 24.06
		No. of Prod Runs		
(2) Setup Cost	A	30 x 250	÷ 600	= 12.50
	B	25 x 250	÷ 500	= 12.50
	C	20 x 250	÷ 400	= 12.50
	D	30 x 250	÷ 600	= 12.50
		No. of Req-Raised		
(3) Stores Rec	A	100 x 45	÷ 600	= 7.50
	B	100 x 45	÷ 500	= 9.00
	C	100 x 45	÷ 400	= 11.25
	D	100 x 45	÷ 600	= 7.50
		No. of Prod Runs		
(4) Inspection Qlty Control	A	30 x 100	÷ 600	= 5.00
	B	25 x 100	÷ 500	= 5.00
	C	20 x 100	÷ 400	= 5.00
	D	30 x 100	÷ 600	= 5.00
		No. of Orders		
(5) Material Handling	A	60 x 110	÷ 600	= 11.00
	B	50 x 110	÷ 500	= 11.00
	C	40 x 110	÷ 400	= 11.00
	D	60 x 110	÷ 600	= 11.00

Statement Showing Cost Sheet – (A.B.C)

Products	**A**	**B**	**C**	**D**
	P.U	**P.U**	**P.U**	**P.U**
Direct Cost				
DMat	40	50	30	60
DLab	28	21	14	21
Prime Cost	68	71	44	81
Ind Cost				
Activity (1)	32.08	24.06	16.04	24.06
Activity (2)	12.50	12.50	12.50	12.50
Activity (3)	7.50	9.00	11.25	7.50
Activity (4)	5.00	5.00	5.00	5.00
Activity (5)	11.00	11.00	11.00	11.00
	136.08	132.56	99.79	60.06

Speedo Limited is a specialist car manufacturer that produces various models of cars. The organization is due to celebrate its 100th anniversary next year. To mark the occasion, Speedo Limited intends to produce a sports car; the Model Royal. As this will be a special edition, production will be limited to 1,000 numbers of Model Royal Cars.

Speedo Limited is considering using a target costing approach and has conducted market research to determine the features that consumers require in a sports car. Based on this market research and knowledge of competitor's products, company has decided to price the Model Royal at ₹ 9.75 Lacs.Company requires an operating profit margin of 25 % of the selling price of the car. Details for the forthcoming year are as follows:

Forecast of direct costs for a Model Royal Car-

Labour	₹ 2,50,000
Material	₹ 4,75,000

Forecast of annual overhead costs –

	₹ in Lacs	Cost Driver
Production Line Cost	2,310	See Note 1
Transportation Costs	900	See Note 2

Note 1

The production line that would be used for Model Royal has a capacity of 60,000 machine hours per year. The production line time required for Model Royal is 6 machine hours per car. This production line will also be used to make other cars and will be working at full capacity.

Note 2

Some models of cars are delivered to showrooms using car transporters. 60 % of the transportation costs are related to the number of deliveries made. 40 % of the transportation costs are related to the distance travelled.

The car transporters have forecast to make total of 640 deliveries in the year and carry 10 cars each time. The car transporter will always carry is maximum capacity of 10 cars.

The total annual distance travelled by car transporters is expected to be 2,25,000kms. 50,000 kms of this is for the delivery of Model Royals car only. All 1,000 Model Royal cars that will be produced will be delivered in the year using the car transporters.

Required:

i. Calculate the forecast total cost of producing and delivering a Model Royal car using Activity Based Costing principles to assign the overheads costs.

ii. Calculate the cost gap that currently exists between the forecast total cost and the target total cost of a Model Royal car.

Particulars of Cost	**A (₹)**	**B (₹)**	**C (₹)**	**D (₹)**
Direct Material	24,000	25,000	12,000	36,000
Direct Labour	16,800	10,500	5,600	12,600
Setup	7,500	6,250	5,000	7,500
	[30 Runs x ₹ 250]	[25 Runs x ₹ 250]	[20 Runs x ₹ 250]	[30 Runs x ₹ 250]
Stores Receiving	4,500	4,500	4,500	4,500
	[100 Req. x ₹ 45]	[100 Req. x ₹ 45]	[100 Req. x ₹ 45]	[100 Req. x ₹ 45]
Inspection/Quality	3,000	2,500	2,000	3,000
	[30 Runs x ₹ 100]	[25 Runs x₹ 100]	[20 Runs x ₹ 100]	[30 Runs x ₹ 100]
Handling/Dispatch	6,600	5,500	4,400	6,600
	[60 Orders x ₹ 110]	[50 Orders x ₹ 110]	[40 Orders x ₹ 110]	[60 Orders x ₹ 110]
Machine Dept. Cost	19,248	12,030	6,416	14,436
	[2,400 hrs x ₹ 8.02]	[1,500 hrs. x ₹ 8.02]	[800 hrs x ₹ 8.02]	[1,800 hrs. x ₹ 8.02]
Total Cost	81,648	66,280	39,916	84,636
Output (Units)	600	500	400	600
Cost per unit	136	133	100	141

Step No.1 **Statement Showing Cost Driver Rate**

Activity	Cost Driver	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$
		= Cost Driver Rate
(1) Production Line Cost	No. of Machine Hrs.	$\left(\frac{2{,}310 \text{ Lacs}}{60{,}000}\right)$ = 3,850
(2) Transport Cost Delivery Related (900 x 60 %) = 540	No. of Deliveries	$\left(\frac{540 \text{ lacs}}{640}\right)$ = 84,375
(3) Distance Related (40 % x 900) = 360	No. of kms.	$\left(\frac{360 \text{ lacs}}{2{,}25{,}000}\right)$ = 160

Statement Showing Cost Sheet As- Per – A.B.C

Direct - Cost :-	₹
(1) Materials	4,75,000
(2) Labour	2,50,000
Prime Cost	**7,25,000**
Indirect Cost	
(1) Production Line Cost (3,850 x 6 hrs.)	23,100
(2) Transport Cost	
(1) Delivery Related (84,375 ÷ 10 cards)	8,437.50
(2) Distance Related $\left(\frac{160 \text{ x } 50{,}000 \text{ Kms.}}{1{,}000 \text{ cars}}\right)$	8,000
Total	**7,64,537.50**

Statement Showing Cost Gap Between For Cast

Total Cost – And the Target Total Cost

Target - Price = 9,75,000

Operating Pt. Margin
(25 % x 9,75,000) = 2,43,750

Target Cost
7,31,250

Forecast Cost
7,64,537.5

Cost - Gap
33,287.50

Life – Cycle –Costing

Life Cycle Cost with Time Value of Money

Case Study - 6

A company has a choice to purchase either Machine A or b for producing its product. If the Machine has a life of 12 years, and Finance Costs 12 % a year, advice which Machine is preferable. The Annuity of 12 % Finance Costs for 12 years is 6.194.

Machine	A	B
Initial Cost	₹ 28,000	₹ 40,000
Annual Operating Costs	₹ 24,000 p.a.	₹ 18,000 p.a

Statement Showing Analysis of Proposal

Life		**Machine A**	**Machine B**
		12 years	**12 years**
Year			
0	Capital Exp	(28,000)	(40,000)
1 - 12	Annual OP Cost	(148,656)	(1,11,492)
		(24,000 x 6.194)	(18,000 x 6.194)
		(1,76,656)	(1,51,492)

Case Study – 7

A company is planning a new product. Market research information suggests that 40,000 units of the product can be sold at a maximum of ₹ 25 per unit. The company seeks a minimum mark – up of 25% on product cost. It is estimated that the lifetime costs of the product will be as follows:

1. Research and development, design costs ₹ 1,50,000.
2. Manufacturing costs ₹ 16 per unit.
3. End of life costs ₹ 70,000
4. Promotion and capacity cost ₹ 20,000

Should the product be manufactured?

S.P = 25.00

Margin

$\left(25 \times \frac{25}{125}\right)$

= 5

Cost (Target)

20

Statement Showing Life Cycle Cost Per - Unit

	₹
Manufacturing Cost Per Sheet	16.00
Research & Development	
Design Cost (1,50,000 ÷ 40,000)	3.75
End Life Cost $\left(\frac{70,000}{40,000}\right)$	1.75
Promotion Cost $\left(\frac{20,000}{40,000}\right)$	.50
Total life Cycle Cost per unit	22.00
Decisions - No Proposed Cost > Target Cost 22 > 20	

Case Study – 8

Life Cycle Costing – Effect of Price Reduction

PGIL has developed a new product "K" which is about to be launched into the market and anticipates to sell 80,000 of these units at a Sale Price of ₹ 300 over the product's life cycle of four years. Data pertaining to product 'K' are as follows:

Costs of Design and Development of Molds, Dies and Other Tools	₹ 2,25,000
Manufacturing Costs	₹ 125 per unit
Selling Costs	₹ 12,500 per year + ₹ 100 per unit
Administration Costs	₹ 50,000 per year
Warranty Expenses	5 Replacement Parts per 25 units at ₹ 10 per part, 1 Visit per 500 Units (Cost ₹ 500 per visit)

1. Compute Product "K"'s 'Life Cycle Cost'.
2. If PGIL can increase Sales Volume by 25% through 10% reduction in Selling Price, should PGIL choose the lower price

Statement Showing Analysis of Proposal

	At Budget	At Reduced Price
(A) Revenue (Sales)	2,40,00,000 (80,000 x 300)	2,70,00,000 (80,000 x 125 %) = 1,00,000 x (300 x 90 %)
(B) Relevant Cost		
(1) Cost of Design &Dev Cost	(8,25,000)	(8,25,000)
(2) Man Cost	(1,00,00,000) (8,000 x 125) = (50,000)	(1,25,00,000) (10,000 x 125) = (50,000)
(3) Selling Cost (F)	(12,500) x 4	(12,500) x 4
(V)	(80,00,000) (80,000 x 100) = (2,00,000)	(1,00,00,000) (1,00,000 x 100) = (2,00,000)
(4) Admin Cost (F)	(50,000) x 4	(50,000) x 4
(5) War Exp - Ref Cost	(1,60,000)	(2,00,000)
	$\left(\frac{80,000}{25} \text{ x } 5 \text{ x } 10\right)$	$\left(\frac{1,00,000}{25} \text{ x } 5 \text{ x } 10\right)$
Visit	(80,000)	(1,00,000)
	$\left(\frac{80,000}{500} \text{ x } 1 \text{ x } 500\right)$	$\left(\frac{1,00,000}{500} \text{ x } 1 \text{ x } 500\right)$
Profit/Loss	46,85,000	31,25,000

Decision – Price Decision Not Desirable.

Case Study – 9

Y- Connections, China based firm, has just developed ultra – thin tablet S-5 with few features like the ability to open two apps at the same time. This tablet cost ₹ 5,00,000to develop; it has undergone extensive research and is ready for production. Currently, the firm is deciding on plant capacity which could cost either ₹ 35,00,000 or ₹ 52,00,000. The additional outlay would allow the plant to increase capacity from 500 units to 750 units. The relevant data for the life cycle of the tablet at different capacity level are as under:

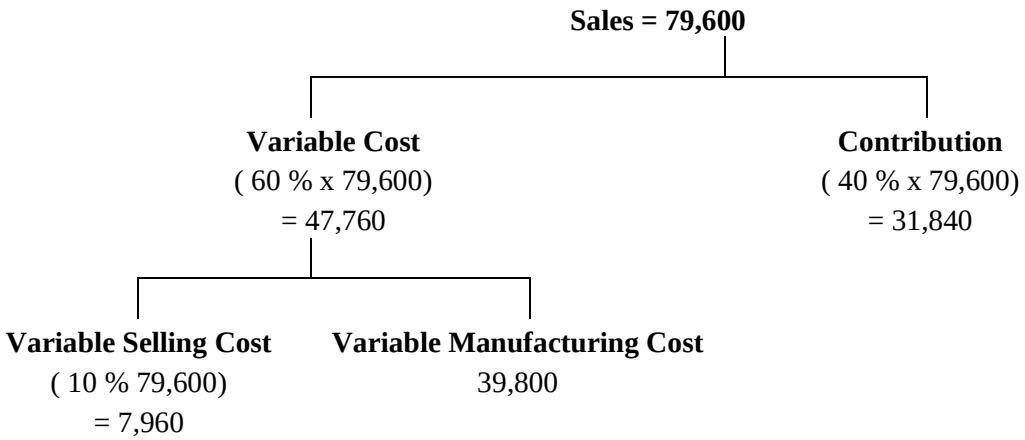
Expected Sales	500 units	750 units
Sale Price	₹ 79,600 per unit	₹ 69,600 per unit
Salvage Value - Plant	₹ 6,25,000	₹ 9,00,000
Profit Volume Ratio	40%	

Required:

Advise Y- Connections, regarding the 'Optimal Plant Capacity' to install. The tablet's life cycle is two years.

Note: Ignore the time value of money.

(Given)



Statement Showing Expected Profit

	'000	
	500 Units	**750 units**
Sales	= 39,800 (500 units x 79,600)	= 52,200 (750 units x 69,600)
Man - Variable Cost	(19,900) (500 units x 39,800)	(29,850) (750 units x 39,800)
Variable Selling Cost	(3,980) (39,800 x .10)	(5,220) (52,200 x 10 %)
Savage Value	625	900
Cost of Plant	(3,500)	(5,200)
Net- Pt.	13,045	12,830

Case Study – 10

Greta Eastern Appliances Ltd. (GEAL) manufactures consumer durable products in a very highly competitive market. GEAL is considering launching a new product 'Kitchen Care' into the market and gathered the following data:

Expected Market Price	₹ 5,000 per unit
Direct Material Cost	₹ 1,850 per unit
Direct Labour Cost	₹ 80 per hour
Variable Overhead Cost	₹ 1,000 per unit
Packaging Machine Cost (specially to be purchased for this product)	₹ 5,00,000

GEAL expects the selling price for the new product will continue throughout the product's life and a total of 1,000 units can be sold over the entire lifetime of the product.

Direct labour costs are expected to reduce as the volume of output increases due to the effects of 80 % learning curve (index is -0.3219). The expected time to be taken for the first unit is 30 hours and the learning effect is expected to end after 250 units have been produced. Units produced after first 250 units will take the same time as the 250^{th} unit.

Required:

I. Calculate the expected total labour hours over the life time of the product 'Kitchen Care'.
II. Profitability of product 'Kitchen Care' that GEAL will earn over the life time of the product.
III. Average target labour cost per unit over the life time of the product if GEAL requires average profit of ₹ 800 per unit, to achieve its long term objectives.

Note: $250^{-0.3219} = 0.1691$, $249^{-0.3219} = 0.1693$

Units Batch	Hrs. Per- Batch	Hrs. Per- Batch
1	30 hrs. (P.B)	80%

(Given)

If Production = 250 Units

Hrs. Per Batch = Log K $+\left(\frac{\text{Log L.C.Ratio}}{\text{Log 2}}\right) \text{x} \log(x)$

= Log 30 + $\left(\frac{\text{Log .80}}{\text{Log 2}}\right) \text{x} \log(250)$

= 1.4771 + $\left(\frac{-1+.9031}{0.3010}\right)$ x (2.3979)

= .7052 (Antilog) = 5,070

2

5.072

Total Hrs. = (5.072 x 250 Units) = 1,268 hrs.

If Production = 249 Unit

= Log 30 + $\left(\frac{\text{Log .80}}{\text{Log 2}}\right) \text{x} \log(249)$

= 1.4771 + $\left(\frac{-1+.9031}{.3010}\right)$ x (2.3962)

= .7057

0.7057 (Antilog)

5070

8

5,078

(5.078 x 249) = 1264.42

Hrs. for 250 = 1,268

Hrs. for 249 = 1264.42

3.58

Total Time Required = 1,000 Units

(750 x 3.58) = 2,685

250 = 1,268

3,953

Statement Showing Analysis of Profit/Loss

Sales (1,000 x 5,000)	50,00,000
Direct Material	(18,50,000)
Direct Labour (3,953 x 80)	(31,62,240)
Variable overhead (1,000 units x 1,000)	(10,00,000)
Contribution	**18,33,760**
Packing Machine Cost	(5,00,000)
Net Profit	**13,33,760**

Statement Showing Target Labour Cost

Exp - Sales = 50,00,000

Profit
8,00,000

Target - Cost
42,00,000

Direct Material Cost = 18,50,000
(1,000 x 1,850)

V.O
(1,000 x 1,000) = 10,00,000
Packing = 5,00,000
33,50,000

Labour Cost
(Bal - Fig)

(42,00,000 - 33,50,000)
= 8,50,000

Case Study – 11

P & G International Ltd. (PGIL) has developed a new product 'a^3' which is about to be launched into the market. Company has spent ₹ 30,00,000 on R & D of product 'a^3'. It has also bought a machine to produce the product 'a^3' costing ₹11,25,000 with a capacity of producing 1,100 units per week.

Machine has no residual value.

The company has decided to change price that will change with the cumulative numbers of units sold:

Cumulative Sales (units)	Selling Price ₹ per unit
0 to 2,200	750
2,201 to 7,700	600
7,701 to 15,950	525
15,951 to 59,950	450
15,951 and above	300

Based on these selling prices, it is expected that sales demand will be as shown below:

Weeks	Sales Demand per week (units)
1− 10	220
11−20	550
21−30	825
31−70	1,100
71−80	880
81−90	660
91−100	440
101−110	220
Thereafter	Nil

Unit variable costs are expected to be as follows:

	₹ per unit
First 2,200 units	375
Next 13,750 units	300
Next 22,000 units	225
Next 22,000 units	188
Thereafter	225

PGIL uses just-in-time production system. Following is the total contribution statement of the product 'a^3' for its introduction and Growth stage:

	Introduction	Growth	
Weeks	1 -10	11 - 30	
Number of units Produced and Sold	2,200	5,500	8,250
Selling Price per unit (₹)	750	600	525
Variable Cost per unit (₹)	375	300	300
Contribution per unit (₹)	375	300	225
Total Contribution (₹)	8,25,000	16,50,000	18,56,250

Required:

i. PREPARE the total contribution statement for each of the remaining two stages of the product's life cycle.
ii. DISCUSS Pricing Strategy of the product 'a^3'.
iii. FIND possible reasons for the changes in cost during the life cycle of the product 'a^3'.

Note: Ignore the time value of money

(Given)

2,200
Introduction
1 - 10
tes Units
= (220 x 10)
= 2,200
Cost = 375

Next - 13,750
Growth
11 - 30

20-Nov
10 x 550
= 5,500
@ 300

21 - 30
10 x 825
8,250
@ 300

Maturity
31 - 70

31 - 50
(20 x 1,100)
= 22,000
V.Cost225

51 - 70
(20 x 1,100)
= 22,000
@ 188

Decline
71 - 110
(71 - 80) (880 x 10)
= 8,800
(81 - 90) (660 x 10)
= 6,600
(91 - 100) (440 x 10)
= 4,400
(10 -1-210) (220 x 10)
= 2,200 Units
V.cost = 225

Statement Showing Total Contribution for Remaining Two Stages

	Maturity		Decline
Weeks	31 - 50	51 - 70	71 - 110
Units	22,000	22,000	22,000
S.P (P.U)	450	450	300
V.P (P.U)	225	188	225
	225	262	75
Total Cont	**49,50,000**	**57,64,000**	**16,50,000**

Pricing Strategy for Product a^3

PGIL is following the skimming price strategy that's why it has planned to launch the product a^3 initially with high price tag.

A skimming strategy may be recommended when a firm has incurred large sums of money on research and development for a new product.

In the problem, PGIL has incurred a huge amount on research and development. Also, it is very difficult to start with a low price and then raise the price. Raising a low price may annoy potential customers.

Price of the product $a^3$is decreasing gradually stage by stage. This is happening because PGIL wants to tap the mass market by lowering the price.

Possible Reasons for the changes in cost during the life cycle of the product 'a^3'

Product life cycle costing involves tracing of costs and revenues of each product over several calendar periods throughout their entire life cycle. Possible reasons for the changes in cost during the life cycle of the product are as follows:

PGIL is expecting reduction in unit cost of the product a^3 over the life of product as a consequence of economies of scale and learning/ experience curves.

Learning effect may be the possible reason for reduction in per unit cost if the process is labour intensive. When a new product or process is started, performance of worker is not at its best and learning phenomenon takes place. As the experience is gained the performance of worker improves, time taken per unit reduces and thus his productivity goes up. The amount of improvement or experience gained is reflected in a decrease in cost.

Till the stage of maturity, PGIL is in the expansion mode. The PGIL may be able to take advantages of quantity discount offered by suppliers or may negotiate the price with suppliers.

Product a^3 has the least variable cost ₹ 188 in last phase of maturity stage; this is because aproduct which is in the mature stage may require less marketing support than a product which is in the growth stage so, there is a saving of marketing cost per unit.

Again the cost per unit of the product a^3jumps to ₹ 225 in decline stage. As soon as the product reaches its decline stage, the need or demand for the product disappear and quantity discount may not be available. Even PGIL may have to incur heavy marketing expenses for stock clearance.

PARETO ANALYSIS

Case Study – 12

Pareto Analysis is a rule that recommends focus on the most important aspects of the decision making in order to simplify the process of decision making. It is based on the 80:20 rule that was a phenomenon first observed by Vilfredo Pareto, a nineteenth century Italian economist. He noticed that 80% of wealth of Milan was owned by 20% of its citizens. This phenomenon or some kind of approximation of it says, (70:30 etc.) Can be observed in many different business situations. The management can use it in a number of different circumstances to direct management attention to the key control mechanism or planning aspects. It helps to clearly establish top priorities and to identify the both profitable and unprofitable targets.

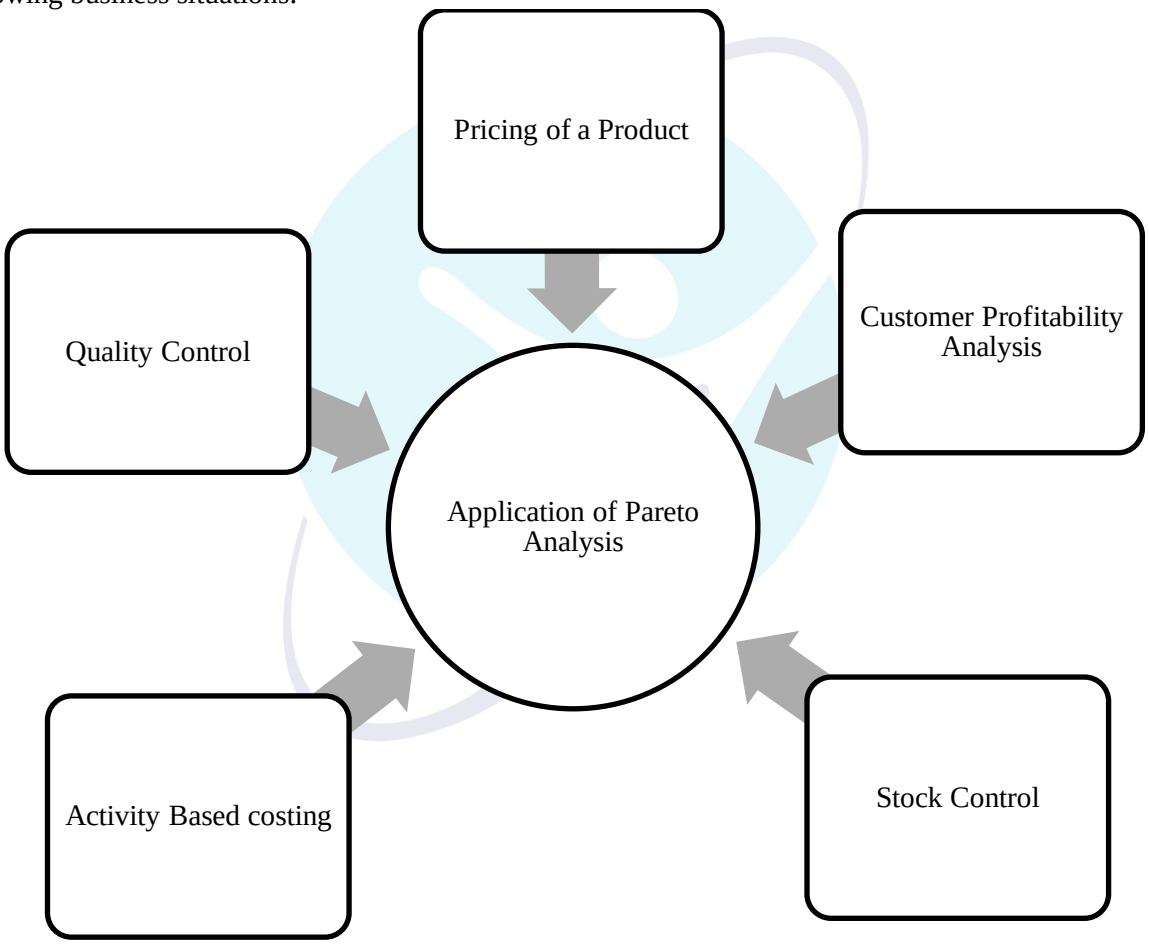
Usefulness of Pareto Analysis

It provides the mechanism to control and direct effort by fact, not by emotions. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets. Pareto analysis is useful to :-

- Prioritize problems, goals and objectives to identify root causes.
- Select and define key quality and improvement programs.
- Select key customer relations and service programs.
- Select key employee relations improvement programs.
- Select and define key performance improvement programs.
- Allocate physical, financial and human resources.

Application of Pareto Analysis

Pareto analysis may be applicable in the presentation of Performance indicators data through selection of representative process characteristics that truly determine or directly or indirectly influence or conformthe desired quality or performance result or outcome. The Pareto Analysis is generally applicable to the following business situations:



Pricing of a Product

- In the case of a firm dealing with multi products, it would not be possible for it to analyze cost – profit- price- volume relationships for all of them. In practice, in case of such firm approximately

2% of products may account for about 80% of total sales revenue. Pareto Analysis is used for analyzing the firm estimated sales revenues from various products and it might indicate that approximately 80% of its total sales revenue is earned from about 20% of its products.

- Such analysis helps the top management to delegate the pricing decision for approximately 80% of its products to the lower levels of management, thus freeing themselves to concentrate on the pricing decisions for products approximately 20% which are essential for the company's survival.
- Thus, a firm can adopt more sophisticated pricing methods for small proportion of products that jointly accounts for approximately 80% of total sales revenue. For the remaining 80% of the products with account for 20% of total sales revenue the firm may use cost based pricing method.

Customer Profitability Analysis

- Instead of analyzing products, customers can be analyzed for their relative profitability to the organization.

- Again, it is often found that approximately 20% of customers generate 80% of the profit. There will always be some customers who are less profitable than others, just as same products are less profitable than others.

- Such an analysis is useful tool for evaluation of the portfolio of customer profile and decision making such as whether to continue serving a same customer group, what is the extent of promotion expenses to be incurred.

ABC Analysis – Stock Control

- Another application of Pareto Analysis is in stock control where it may be found that only a few of the goods in stock make up most of the value. In practice, approximately 20 % of the total quantity of stock may account for about 80% of its value. The outcome of such analysis is that by concentrating on small proportion of stock items that jointly accounts for 80% of the total value, a firm may well be able to control most of monetary investments in stocks.

Application in Activity Based Costing

- In Activity Based Costing it is often said that 20% of an organization cost drivers are responsible for 80% of the total cost. By analyzing, monitoring and controlling those cost drivers that cause most cost, a better control and understanding of overheads will be obtained.

Quality Control

- Pareto analysis seeks to discover from an analysis of defect report or customer complaints which "vital few" causes are responsible for most of the reported problems.

- Often, 80 % of reported problems can usually be traced to 20% of the various underlying causes. By concentrating once efforts on rectifying the vital 20 %, one can have the greatest immediate impact on product quality.

- The Pareto Analysis indicates how frequently each type of failure (defect) occurs. The purpose of the analysis is to direct management attention to the area where the best returns can be achieved by solving most of quality problems, perhaps just with a single action.

Case study -13

Concept Illustration:

The following data of manufacture and sale is obtained from Veer Ltd for the 12 months ending 31st December.

Product	A	B	C	D	E	F	**Total**
Contribution (₹)	500	200	1,500	75	100	125	2,500

Prepare a Pareto Product Contribution Chart and Comment on the results.

Note: Re- arrange the products in descending order of Contribution, and cumulative Contribution Percentage.

Product	**Contribution (₹)**	**Cumulative Contribution (₹)**	**Cumulative Contribution (₹)**
C	1,500	1,500	60 %
A	500	2,000	80 %
B	200	2,200	88 %
F	125	2,325	93 %
E	100	2,425	97 %
D	75	2,500	100 %
Total	**2,500**		

Observation: On analysis it is found that 80% of the Total Contribution is earned by two products C and A. Hence, these products should be carefully monitored and nurtured, through careful attention to branding and promotion. The other products should be investigated to see whether their Contribution can be improved through increased prices, reduced costs, increased sales volume, etc.

Case study -14

Illustration

Generation 2050 Technologies Ltd. develops cutting-edge innovations that are powering the next revolution in mobility and has nine tablet smart phone models currently in the market whose previous year financial data is given below:

Model	**Sales (₹ 000)**	**Profit Volume (PV) Ratio**
Tab - A001	5,100	3.53%
Tab - B002	3,000	23.00%
Tab - C003	2,100	14.29%
Tab - D004	1,800	14.17%
Tab - E005	1,050	41.43%
Tab - F006	750	26.00%
Tab - G007	450	26.67%
Tab - H008	225	6.67%
Tab - I009	75	60.00%

Required:

(i) Using the financial data, carry out a Pareto ANALYSIS (80/20 rule) of Sales and Contribution.

(ii) DISCUSS your findings with appropriate RECOMMENDATIONS

Statement Showing Pareto Analysis of Sales

Model (TAB)	Sales ('000)	% $\left(\frac{\text{Sales}}{\text{Total Sales}}\right)$ x 100	Cumulative Total
A-001	5,100	35.05%	35.05%
		$\left(\frac{5,100}{14,550} \text{x } 100\right)$	
B-002	3,000	20.62%	55.67%
		$\left(\frac{3,000}{14,550} \text{x } 100\right)$	
C-003	2,100	14.43%	70.10%
		$\left(\frac{2,100}{14,550} \text{x } 100\right)$	
D-004	1,800	12.37%	82.47%
		$\left(\frac{1,800}{14,550} \text{x } 100\right)$	
E-005	1,050	7.22%	89.69%
		$\left(\frac{1,050}{14,550} \text{x } 100\right)$	
F-006	750	5.15%	94.84%
		$\left(\frac{750}{14,550} \text{x } 100\right)$	
G-007	450	3.09%	97.93%
		$\left(\frac{450}{14,550} \text{x } 100\right)$	
H-008	225	1.55%	99.48%
		$\left(\frac{225}{14,550} \text{x } 100\right)$	
I-009	75	0.52%	100%
		$\left(\frac{74}{14,550} \text{x } 100\right)$	
	14,550	**100%**	

Statement Showing Analysis of Contribution

Model (TAB)	(Contribution = Sales x P.V. Ratio)		Rounding - Off	
			'000	Rank
A-001	(5,100 x 3.53%)	=	180	6
B-002	(3,000 x 23%)	=	690	1
C-003	(2,100 x 14.29%)	=	300	3
D-004	(1,800 x 14.17%)	=	255	4
E-005	(1,050 x 41.43%)	=	435	2
F-006	(750 x 26.00%)	=	195	5
G-007	(450 x 26.67%)	=	120	7
H-008	(225 x 6.67%)	=	15	9
I-009	(75 x 60 %)	=	45	8
			2,235	

Statement Showing Contribution Analysis (Pareto)

Model	Model (TAB)	Contribution ('000)	$\left(\frac{\text{Contribution}}{\text{Total}}\right)$ x 100	Cumulative
(1)	B-002	690	$\left(\frac{690}{2,235} \text{x } 100\right) = 30.87\%$	30.87%
(2)	E-005	435	$\left(\frac{435}{2,235} \text{x } 100\right) = 19.47\%$	50.44%
(3)	C-003	300	$\left(\frac{300}{2,235} \text{x } 100\right) = 13.42\%$	63.76%
(4)	D-004	255	$\left(\frac{255}{2,235} \text{x } 100\right) = 11.41\%$	75.17%
(5)	F-006	195	$\left(\frac{195}{2,235} \text{x } 100\right) = 8.73\%$	83.90%
(6)	A-001	180	$\left(\frac{180}{2,235} \text{x } 100\right) = 8.05\%$	91.95%
(7)	G-007	120	$\left(\frac{120}{2,235} \text{x } 100\right) = 5.36\%$	97.32%
(8)	I-009	45	$\left(\frac{45}{2,235} \text{x } 100\right) = 2.01\%$	99.33%
(9)	H-008	15	$\left(\frac{15}{2,235} \text{x } 100\right) = 0.67\%$	100%
		2,235		

CHAPTER -5

COSTING OF SERVICE SECTOR

Basic Concepts

Costing of Service Sector	This is a method of ascertaining costs of providing or operating a service. This method of costing is applied by those undertakings which provide services rather than production of commodities.
Costing Methods Used in Service Sector	Costing Methods used in Serviced Sector are: (i) Job Costing Method (ii) Process Costing Method (iii) Hybrid Costing Method
Customer Costing in Service Sector	The central theme of this approach is customer satisfaction. For customer costing purpose, the costs are divided into following categories. These are: (i) Customer Specific Costs (ii) Customer - Line Categories (iii) Company Costs
Job costing in Service Sector	The two significant costs which are incurred in Service Sectors area: (i) Direct Labour (ii) Service Overheads
Process Costing in Service Sector	In this method the cost of services is obtained by assigning costs to masses of similar units and then computing unit cost on an average basis.
Hybrid Costing in Service Sector	This method of service costing combines elements of both Job Costing and Process Costing Method.

Utility Service Agency

Case Study -1

A public company responsible for the supply of domestic gas has been approached by several prospective customers in rural area adjacent to a high –pressure main. As a condition of its license to operate as a utility, the company is obliged to respond positively to current needs provided the financial viability of the company is not put at risk. New customers are charged ₹ 250 each for connection to the system.

Once a meter is installed, a standing charge of ₹ 10 per quarter is billed. Charges of gas are levied at ₹ 400 per 1,000 metered units.

A postal survey of the area containing, according to the rating authority, 5,000 domestic units, elicited at 40% response rate. 95% of those who responded confirmed that they wished to become gas users and expressed their willingness to pay the connection charge.

Although it is recognized that a small percentage of those willing to pay connection may not actually choose to use gas, it is expected that the average household will burn 50 metered units per month. There will be some seasonal differences.

The company's marginal cost of capital is 17% pa and supplies of bulk gas cost the company ₹ 0.065 per metered unit.

Required:

Determine what the maximum capital project cost can be allow the company to provide the service required if wastage of 15% has to be allowed.

Step No.1

Statement Showing No. of Customer

(5,000 x 40% x 95 %) = **1,900**

Statement Showing Consumption Gas

(1,900 x 50 x 12 Months) = 11,40,000

Statement Showing Gas Supply

$$\left(\frac{11,40,000 \text{ x } 100}{85}\right) = 1,341,176$$

Input	Wastage	Net
100	15	85

Statement Showing Cash Inflow

	₹
Rent (1,900 x 10 x 4 Quarters)	76,000
Consumption Charges	
(11,40,000 x 0.40)	4,56,000
Cost of Company (1,341,176 x 0.65)	(87,176)
Net Inflow	**4,44,824**
One Time Connection Charges	**4,75,000**
(250 x 1,900 Customers)	
(*x* - 4,75,000) x 0.17 = 4,44,824	
0.17 *x* - 80,750 = 4,44,824	
= 30,91,612	

Road Transport

Case Study -2

Fuji Ltd. is considering three alternative proposals for conveyance facilities for its sales personnel who have to do considerable travelling, approximately 20,000 kilometers every year. The proposals are as follows:

i) Purchase and maintain its own fleet of cars. The average cost of a car is₹ 1,00,000.

ii) Allow the Executive to use his own car and reimburse expenses at the rate of ₹ 1.60 per kilometer and also bear insurance costs.
iii) Hire cars from an agency at ₹ 20,000 per year per car. The company will have to bear costs of petrol, taxes and tyres.

The following further details are available:

Petrol	……..	₹ 0.60 per km
Repairs and Maintenance	……..	₹ 0.20 per km
Tyres	……..	₹ 0.12 per km
Insurance	……..	₹ 1,200 per car per annum
Taxes	……..	₹ 800 per car per annum
Life of the car	……..	5 years with annual mileage of 20,000 kms.
Resale Value	……..	₹ 20,000 at the end of the fifth year

Required:

Work out the relevant costs of three proposals and rank them.

Statement Showing Analysis of Proposal

Proposals		I	II	III
		Purchase & Maintain Cars	Reimburse Expenses	Hire Cars
		₹	₹	₹
1)	Depreciation	16,000 $\left(\frac{1,00,000-20,000}{5}\right)$	–	–
2)	Reimburse Expenses	–	32,000 (20,000 x 1.60)	–
3)	Hire Car	–	–	20,000
4)	Petrol	12,000 (20,000 x 0.6)	–	12,000
5)	Repair	4,000 (20,000 x 20)	–	–
6)	Tyres	2,400 (20,000 x 0.12)		2,400
7)	Insurance	1,200	1,200	–
8)	Taxes	800	–	800
		36,400	**33,200**	**35,200**
	Kms	÷ 20,000	÷ 20,000	÷ 20,000
	Per Km.	1.82	1.66	1.76
	Rank	III	I	II

Case Study -3

A company presently brings coal to its factory from a nearby yard and the rate paid for transportation of coal from the yard located 6 km away to factory is ₹ 50 per tonne. The total coal to be handled in a month is 24,000 tonne.

The Company is considering proposal to buy its own truck and has the option of buying either a 10 tonne capacity or a 8 tonne capacity truck.

The following information is available:

	10 Tonne Truck	**8 Tonne Truck**
Purchase Price (₹)	10,00,000	8,50,000
Life (Year)	5	5
Scrap Value at the end of the 5th year	Nil	Nil
K.M. per litre of Diesel	3	4
Repair/Maintenance per Truck p.a (₹)	60,000	48,000
Other Fixed Expenses p.a. (₹)	60,000	36,000
Lubricants & Sundries per 100 km (₹)	20	20

Each truck will daily make 5 trips (to and fro) on an average for 24 days in a month.

Cost of Diesel ₹15 per litre.

Salary of Drivers ₹ 3,000 per month – Two Drivers will be required for a Truck.

Other staff expenses ₹ 1,08,000 p.a.

Required:

Present a comparative Cost Sheet on the basis of above data showing transport cost per tonne of operating 10 and 8 Truck at full capacity utilization.

Statement Showing Total Kms/ Total Tonne Kms/ Total Truck Required/ Total Driver Required

	10 Tonnes	**8 Tonnes**
Total Kms. / Per Truck (Per Month)	= 1,440 (5 Trips x 2 x 6 kms. x 24 Days)	= 1,440 (5 Trips x 2 x 6 x 24 Days)
No. of Trucks Required (monthly) Truck (Nos.)	$\left(\frac{\text{24,000 Tonnes}}{\text{5 Trips x 24 days x 10 Tonnes}}\right)$ = 1,200 = 20	$\left(\frac{\text{24,000 Tonnes}}{\text{5 Trips x 24 days x 8 Tonnes}}\right)$ = 960 = 25
Total Drivers	(20 Trucks x 2 Drivers) = 40	(25 Trucks x 2) = 50

Statement Showing Comparative Cost – Sheet

	8 Tonne Truck	10 Tonne Truck
	₹	₹
(1) Driver Salary	= 1,20,000 (40 Drivers x 3,000)	= 1,50,000 (50 Drivers x 3,000)
(2) Staff Expenses	9,000 (108,000 ÷ 12)	9,000 (108,000 ÷ 12)
(3) Other Fixed Expenses	5,000 (60,000 ÷ 12)	3,000 (36,000 ÷ 12)
(4) Depreciation	3,33,333 = (16,666.67 x 20) $\left(\frac{10,00,000-0}{5}\right) \times \frac{1}{12}$ = 16,666.67	3,54,167 = (14,166.67 x 25) $\left(\frac{8,50,000-0}{5}\right) \times \frac{1}{12}$ = 14,166.67
(5) Diesel Cost	= 1,44,000 $\left(1,440 \text{ kms.} \times 20 \text{ Trucks} \times \frac{15}{3 \text{ Kms}}\right)$	= 1,35,000 $\left(1,440 \times 25 \times \frac{15}{4}\right)$
(6) Lubricant & Sundries	= 5,760 $\left(1,440 \times 20 \times \frac{20}{100}\right)$	= 7,200 $\left(1,440 \times 25 \times \frac{20}{100}\right)$
(7) Repairs & Maintenance	1,00,000 $\left(\frac{60,000}{12} \times 20\right)$	1,00,000 $\left(\frac{48,000}{12} \times 25\right)$
Total Cost ÷ Tonnes	7,17,093 ÷ 24,000 = 29.88	7,58,367 ÷ 24,000 = 31.60

Case Study -4

Expert Roadways Services Pvt. Ltd. is planning to run a fleet of 15 buses in Birpur city on a fixed route. Company has estimated a total of 2,51,85,000 passenger kilometers per annum. It is estimated buses to have 100% load factor. Buses are purchased at a price of ₹ 44,00,000 per unit whose scrape value at the end of 5 years life is ₹ 5,50,000. Seating capacity of a bus excluding a Driver's seat is 42. Each bus can give a mileage of 5kmpl.average cost of fuel is ₹ 66 per litre. Cost of Lubricants & Sundries per 1,000 km would be ₹ 3,300. Company will pay ₹ 27,500 per month to Driver and two attendants for each bus.

Other annual charges per bus: Insurance ₹ 55,000, Garage Charges ₹ 33,000, Repairs & Maintenance ₹ 55,000. Route Permit Charges upto 20,000 km is ₹ 5,500 and ₹ 2,200 for every additional 5,000 km or part thereof.

Required:

i) Calculate a suggested fare per passenger/km taking into account markup on cost @20% to cover general overheads and sufficient profit.
ii) The Transport Sector of Birpur is highly regulated. The Government has fixed the fare @ ₹ 1.35 for next 2 years. Comment on the two year's profitability taking into consideration the inflation rate of 8%.

Note : Route permit charges is not subject to inflation.

Statement Showing Total kms. / Total Pass Kms.

Given:

Total Kms. Passengers = **2,51,85,000**

Seating Capacity (42 – 2) = **40**

(Excluding –Driver)

No. of Buses = **15**

$$\text{Passenger Kms. Per Bus} = \left(\frac{2,51,85,000}{15}\right)$$

= 16,79,000

$$\text{Kms.} = \left(\frac{16,79,000}{40}\right) \quad = 41,975$$

Verification

Kms. x	Passengers x	No. of Buses =	No. of Passengers Kms.
41,975 x	40 x	15=	2,51,85,000

Step No. 2

Statement Showing Total Takings For the Year

		₹
1)	Depreciation $\left(\frac{44,00,000 - 5,50,000}{5 \text{ Years}}\right)$	= 7,70,000
2)	Fuel Cost $\left(\frac{41,975 \text{ x } 66}{5 \text{ Kms.}}\right)$	= 5,54,070
3)	Cost of Lubricants $\left(\frac{41,975 \text{ Kms. x } 3,300}{1,000}\right)$	= 1,38,517
4)	Salary of Driver & Attendants (27,500 x 12)	= 3,30,000
5)	Other Annual Charges	= 55,000
6)	Garage - Charges	= 33,000
7)	Repairs & Maintenance	= 55,000
8)	**Route Permit - charges**	= 16,500

₹	**Kms.**	**₹**	**Kms.**
5,500	20,000	2,200	5,000

(5,500 + 2,200 + 2,200 + 2,200 + 2,200)

Total Cost	**1,95,20,87.50**
Profit/ General Overhead (20% 1,95,20,87.50)	3,90,417.5

Step No. 3

Statement Showing Analysis of Profit

	Year (I)	Year (II)
1) Depreciation	7,70,000	7,70,000
2) Fuel Cost	5,98,395.60 (5,54,070 x 108%)	6,46,267.25 (5,98,395.60 x 108%)
3) Cost of Lubricants	1,49,598.90 (1,38,517.5 x 108%)	1,61,566.81 (1,49,598.9 x 108%)
4) Salary of Driver / Attendants	3,56,400 (3,30,000 x 108%)	3,84,912
5) Other Annual Charges	59,400 (55,000 x 108%)	64,152 (59,400 x 108%)
6) Garage Charges	35,640 (33,000 x 108%)	38,491.20 (35,640 x 108%)
7) Repair & Maintenance	59,400 (55,000 x 108%)	64,152 (59,400 x 108%)
8) Route Permit Charges	16,500	16,500
Total Cost	20,45,334.50	21,46,041.26
Profit	2,21,315.50	1,20,608.74
Revenues	22,66,650.00	22,66,650

$$\frac{(41,975\ \text{Kms.} \times 40\ \text{pass} \times 1.35)}{\left(\frac{\text{Profit}}{\text{Revenue}} \times 100\right)\left(\frac{2,21,315.50}{22,66,650} \times 100\right)\left(\frac{1,20,608.74}{22,66,650} \times 100\right)}$$

= 9.76 5.32%

AIR TRANSPORT

Case Study -5

Modern Airways owns a single jet aircraft and operates between EXETOWN and WYETOWN Flights leave EXETOWN on Mondays and Thursdays and depart from WYETOWN on Wednesdays and Saturdays. Modern Airways cannot afford any more flights between EXETOWN and WYETOWN. Only tourist class seats are available on its flights. An analyst has collected the following information:

Seating Capacity per plane	……..	360
Average passengers per flight	……..	200
Flights per week	……..	4
Flights per year	……..	208
Average one- way fare	……..	₹ 5,000
Variable Fuel costs	……..	₹ 1,40,000 per flight
Food service to passengers (not charged to passengers)	……..	₹ 200 per passenger
Commission paid to travel agents paid by Modern Airways on each ticket booked on Modern Airways. (Assume that all Modern Airways tickets are booked by travel agents)	……..	8 % of Fare
Fixed annual lease costs allocated to each flight	……..	₹ 5,30,000 per flight
Fixed ground services (maintenance, check-in, Baggage handling) costs allocated to each flight	……..	₹ 70,000 per flight
Fixed salaries of flight crew allocated to each flight	……..	₹ 40,000 per flight

For the sake of simplicity, assume that fuel costs are unaffected by the actual number of passengers on a flight.

Required:

a) What is the operating income that Modern Airways makes on each one way flight between EXETOWN and WYETOWN?

b) The market research department of Modern Airways indicates that lowering the average one way fare to ₹ 4,800 will increase the average number of passengers per flight to 212. Should Modern Airways lower its fare?

c) Zed Tours and Travels, a tour operator, approaches Modern Airways to charter its jet aircraft twice each month, first to take Zed's international tourists from EXETOWN to WYETOWN and then bring the tourist back from WYETOWN to EXETOWN. If Modern Airways accepts the after, it will be able to offer only 184 (208 minus 24) of its own flights each year. The terms of the charter are:

i) For each one-way flight Zed will pay Modern ₹ 7,50,000 to charter the plane and to use its flight crew and ground service staff.

ii) Zed will pay for fuel costs.

iii) Zed will pay for all food costs.

On purely financial considerations, should Modern Airways accept the offer from Zed Tours and Travels? What other considerations should Modern Airways consider in deciding whether or not to charter its plane to Zed Tours and Travels?

Solution

(a) Statement of "Operating Income of Modern Airways"

[Operating between EXETOWN and WYETOWN (on each one way flight)]

	(₹)
Fare Received per flight (200 Passengers x ₹ 5,000)	10,00,000
Less: Variable Costs per flight	
Commission Paid (₹ 10,00,000 x 8%)	80,000
Food Services (200 Passengers x ₹ 200)	40,000
Fuel Costs	1,40,000
Contribution per flight	7,40,000
Less: Fixed Costs per flight	
Fixed Annual Lease Costs	5,30,000
Baggage Handling (Fixed Ground Service Costs)	70,000
Fixed Salaries of Flight Crew	40,000
Operating Income per flight	1,00,000

(b) Should Modern Airways Lower Its Fare?

	(₹)
Fare Received per flight (212 Passengers x ₹ 4,800)	10,17,600
Less: Variable Costs per flight	
Commission (₹ 10,17,600 x 8%)	81,408
Food Services (212 Passengers x ₹ 200)	42,400
Fuel Costs	1,40,000
Contribution per flight	7,53,792

Modern Airways should lower its fare as it would increase its contribution towards profit by ₹ 13,792 per flight (₹ 7,53,792 - ₹ 7,40,000).

(c) Financial consideration of Modern Airways to Charter its plane to Zed Tours and Travel should use option (b) and not (a).

Under option (b) Modern Airways Receives Contribution per flight	₹ 7,53,792
Modern Airways would get per flight, if it charters the plane:	₹ 7,50,000

Case Study -6

Flyway Ltd. has hired an aircraft to specially operate between cities A and B. All the seats are economy class.

The following information is available:

Seating Capacity of the aircraft	……	260 passengers
Average number of passenger per flight	……	240 passengers
Average one-way fare from A to B	……	₹ 5,000 per passenger
Fuel costs per flight from A to B	……	₹ 90,000
Food Cost (A to B sector) (no charge to passenger)	……	₹ 300 per passenger
Commission to travel agents (All tickets are through agents)	……	10 % of the fare
Annual lease costs allocated to each flight	……	₹ 2,00,000
Ground services, baggage handling/checking in service costs per flight A to B	……	₹ 40,000
Flight crew salaries per flight A to B	……	₹ 48,000

There is an offer from another airlines operator, Haltgo Ltd. for a stop-over at destination D, which is on the way from A to B. due to this, the flight will operate from A to D, then from D to B.

The following terms are considered for the stop-over:

50 seats from D to B will be cooked by Haltgo at ₹ 2,700 per ticket, whether or not Haltgo is able to sell them to its customers. No agents' commission is payable on these tickets.

However, Snacks must be provided to these passengers also by Flyway Ltd. at no further charge to Haltgo or the passengers.

A maximum of 60 tickets can be sold by Flyway's travel agents for the A to D sector at a fare of ₹ 3,000 per passenger.

Since the stop-over fuel wastes more time, 25 of Flyway's original passengers in the A to B sector will voluntarily drop out in favour of other airlines offering direct flights between A and B.

Due to the stop- over fuel costs will increase from ₹ 90,000 to ₹ 1,35,000. Additional airport landing/ baggage handling charges of ₹ 19,000 per stop-over will have to be incurred by Flyway Ltd.

Flyway Ltd. will have to serve snacks to all the passengers in the D to B sector, at no charge to passengers. Each snack will cost Flyway ₹200. This will be in addition to the original food at ₹300 served in the A to D sector.

You may assume that fuel costs are not affected by the actual number of passengers in the flight, ignore non-financial considerations, additional wear and tear to aircraft due to extra landing/take-off.

Required:

i) What is the profit earned by Flyway Ltd. per flight from A to B?
ii) What is the Break-even number of passengers to each flight from A to B?

Considering the effects of Haltgo's offer,

iii) Evaluate whether Flyway should accept the offer.

(A detailed profitability statement is not essential. Only figures relevant for the cost-revenue analysis are required).

Step No.1

Statement Showing "Allocation of Seats In –Aircraft"

Existing Situation

Destination A to B:-

Seating Capacity
Of -Air -Craft = 260 Passengers

Average number of Passengers Per -Flight = 240

Proposed –Situation

For Destination D to B:-

Seats –Booked By –Haltgo Ltd.

For Destination A to B:-

Seats Available = 260

Booked By Haltgo Ltd. For - Destination –**D to B** 50

Seats Available 210

Requirement of Regular Passengers

215 (Seats)

240 — Original No. of Passengers

25 –No. of Passengers — Drop –out due to wastage of time

Possible –Allocation of Seats to Regular Passengers

For –Destination A to D

Capacity = 260

Seats Allocated to Regular Passengers of Destination A to B = 210

Seats Available = 50

Requirement of Agents = 60 Seats.
(Ticket –Can be –Sold by Flyway's Travel Agents).

Possible Allocation to Agents of Flyway Ltd. = 50 Seats.

Profit per Flight

	(₹)	(₹)
Revenue per passenger (Gross Fare)		5,000
Less: Total Variable Cost per passenger:		
10% Commission on Fare	500	
Food	300	800
Contribution per passenger		4,200
Contribution per flight (Contribution for 240 Passengers)		10,08,000
Less: Fixed Costs per flight		
Fuel Cost	90,000	
Annual Lease Cost	2,00,000	
Ground Service, Baggage Handling / Checking in	40,000	
Flight Crew Salaries	48,000	3,78,000
Profit per flight		6,30,000

Break –Even Point

$\text{Break} - \text{even Number of Passengers} @ \left(\frac{₹\ 3{,}78{,}000}{₹\ 4{,}200}\right)$	90 Passengers

$$@\ \text{Break} - \text{even Number of Passengers} = \frac{\text{Total Fixed Cost per Flight}}{\text{Contribution per Passenger}}$$

Proposed Situation

Contribution per Passenger (A to D)

	(₹)	(₹)
Revenue per passenger (Gross Fare)		3,000
Less: Total Variable Cost per passenger:		
10% Commission on Fare	300	
Food #	300	600
Contribution per passenger		2,400

Statement Showing "Additional Revenue / Expenditure from Haltogo Ltd.'s Offer"

	Additional	
	Cost (₹)	Revenue (₹)
Revenue from Destination D to B (50 Seats x ₹ 2,700)		1,35,000
Contribution from Destination A to D (50 Seats x ₹ 2,400)		1,20,000
Contribution Lost for Destination A to B (30 Seats * x ₹ 4,200)	1,26,000	
Snacks (260 Passengers x ₹ 200)	52,000	
Fuel Cost	45,000	
Airport Landing / Baggage Handling Charges	19,000	
Total	**2,42,000**	**2,55,000**

* 240 Seats (existing) Less 210 Seats (proposed)
# All the passengers booked for destination A to D are also served food free of cost

Flyway Ltd. will gain ₹ 13,000 (₹ 2,55,000 - ₹ 2,42,000) per flight if it accepts Haltgo's offer.

Decision
Accept Haltgo's offer

Travel Agency
Case Study -7

Vikas Travel Agency (VTA) specializes in flights between Delhi to Bangalore. It books passengers on Dolphin Airlines at ₹ 9,000 per round-trip ticket. Until last month, Dolphin paid VTA a commission of 10% of the ticket price paid by each passenger. This commission was VTA's only source of revenues. VTA's fixed costs are ₹ 1,40,000 per month (for salaries, rent and so on) and its variable costs are ₹ 200 per ticket purchased for a passenger. This ₹ 200 includes ₹ 150 per ticket delivery fee paid to Senti Express. (₹ 150 delivery fee applies to each ticket).

Dolphin Airlines has just announced a revised payment schedule for travel agents. It will now pay travel agents a 10% commission per ticket up to a maximum of ₹ 500. Any ticket costing more than ₹ 5,000 generates only a ₹ 500 commission, regardless of the ticket price.

Required:

(i) Under the old 10% commission structure, how many round –trip tickets must VTA's sell each month (a) to break –even and (b) to earn an operating income of ₹ 70,000.

(ii) How does Dolphin revised payment schedule affect your answers to (a) and (b) in requirement (i)?

Ans No.1 (a)

Commission Per Ticket = 900
(9,000 x 10%)

Variable Price	Contribution	
200	700	
	Fixed Cost	Profit
	1,40,000	0

$$\text{Break} - \text{Even Point (Number of Tickets)} = \left(\frac{1,40,000}{700}\right)$$

= **200 Nos.**

Ans No. 1 (b)

Expected Sales For Required Profit = 900

Variable Cost	700	Contribution	
200		1,40,000	
	Fixed Cost		Profit
	70,000		70,000

$$\text{Expected Sales For Required Profit} = \left(\frac{1,40,000+70,000}{700}\right)$$

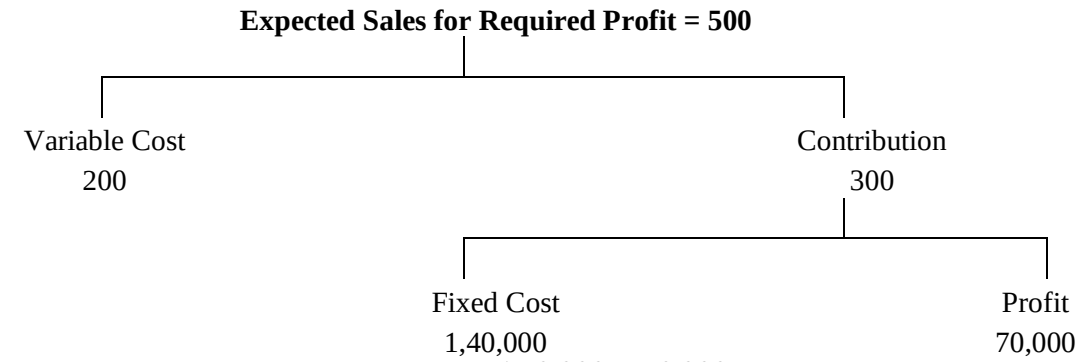
= **300 Nos.**

Ans No. (ii)

Commission = 500

Variable Price	Contribution	
200	300	
	Fixed Cost	Profit
	1,40,000	0

$$\text{Break} - \text{Even Point} = \left(\frac{1,40,000}{300}\right) = 466.66 \text{ (Tickets)}$$



$$\text{Expected Sales For Required Profit} = \left(\frac{1,40,000 + 70,000}{300}\right)$$

= 700 Nos.

The ₹ 500 cap on the Commission paid per ticket causes the Break –Even Point to more than double (from 200 to 467 tickets) and

The Tickets required to be sold to earn ₹ 70,000 per month to also more than double (from 300 to 700 tickets).

As would be expected, travel agents will react very negatively to the Dolphin Airlines decision to change commission payments.

Hotels/Lodges

Case Study -8

A Hotel having 50 single rooms is having 80% occupancy in normal season (8 months) and 50% in off – season (4 months) in a year (take 30 days month).

Annual Fixed Expenses		**(₹ Lakh)**
Salary of the Staff (excluding Room Attendant)	…….	7.5
Repairs & Maintenance	…….	2.6
Depreciation of Building & Furniture	…….	2.4
Other Fixed Expenses like Dusting, Sweeping etc.	…….	3.25
	Total	**15.75**
Variable Expenses (per Guest per Day)		
Linen, Laundry & Security Support	…….	₹ 30.00
Electricity & Other Facilities	…….	₹ 20.00
Misc Expenses like to Attendant etc.	…….	₹ 25.00

Management wishes to make a margin of 25% of Total Cost.

Required:

a) Calculate the Tariff Rate per Room.

b) Calculate the Break Even Occupancy in Normal Season assuming 50% Occupancy is off – Season.

c) Management is proposing 10% cut in Tariff to improve Occupancy at 100% and 70% in Normal Season and Off-Season respectively. Give your views on it.
d) What is the minimum rise in Occupancy % to take care of risk of fall in Profit due to Tariff –Cut?

Ans No.(a)
Normal Season:-

(50 x 80% x 8 months x 30 days) = 9,600
Off –Seasons:-

(50 x 50% x 4 months x 30 days) = 3,000

Total –Room –Days = **12,600**

Step No.2 Statement Showing total Taking For the Year

		₹
Variable Cost (12,600 x 75)		9,45,000
(1) Linen/Laundry/& Security Support	= 30	
(2) Electricity & Other	= 20	
(3) Misc Expenses	= 25	
	= 75	
Fixed Cost		15,75,000
(1) Salary to Staff	7,50,000	
(2) Repair & Maintenance	2,60,000	
(3) Depreciation	2,40,000	
(4) Other Fixed Expenses	**15,75,000**	
	Total Cost	**25,20,000**
	Profit (25% x 25,20,000)	**6,30,000**
	Total Takings	31,50,000
	÷ No. of Occupancy	÷ 12,600
	Tariff Per Day	= 250

Statement Showing Break –Even –Point

Selling Price (P.U) =250

Variable Price $\left(\frac{9,45,000}{12,600}\right)$ = 75.00

Contribution (250 - 75) = 175 (P.U)

$$\textbf{Break} - \textbf{Even} - \textbf{Point} = \left(\frac{\mathbf{15,75,000}}{\mathbf{175}}\right) = \mathbf{9,000\ Days}$$

Off -Seasons = 3,000 (50 Room x 0.50 x 30 x 4)

:

Normal Seasons 6,000

Ans No. (c) **<u>If 10% Discount is Allowed</u>**

Revised Tariff (250 - 25) = 225

Variable Cost	Revised Contribution	
75	150	
	x 16,200	**No. of Days**
	Total Contribution = <u>24,30,000</u>	**(Note No. 1)**

Fixed Cost	Profit
15,75,000	8,55,000

Note No. 1

Normal (50 x 100% x 8 x 30)	12,000
Off -Season (50 x 70% x 4 x 30)	4,200
Decision -yes Inc -Profit (8,55,000 - 6,30,000) = 2,25,000	**16,200**

<u>To Maintain –The Same Profit</u>

Tariff = 225

Variable Price	Contribution
75	150

Fixed Cost	Profit
15,75,000	6,30,000

$$\left(\frac{15,75,000 + 6,30,000}{150}\right) = 14,700 \text{ Room Days}$$

Old = **<u>(12,600)</u>** Room Days

Inc -Required = 2,100

$$(\%) = \left(\frac{2,100}{12,600}\right) \times 100$$

$$= 16.67\ \%$$

<u>Case Study -9</u>

The manager of a hotel providing lodging facilities wants to expand his services to include manual booking (reservation or cancellation) of railway tickets for his clients. He does not want to have electronic booking due to operational difficulty. He has the following information:

	₹ per month
Proportion of rent allocated for office space	4,000
General telephone expenses allocated to this service	2,400
Proportion of security charges/ maintenance expenses allocated	1,600
Salary to person exclusive to person booking ticket	20,000
Mobile phone charges exclusive to person booking ticket	3,000
Share of general miscellaneous fixed expense allocated	1,000
Conveyance incurred to book tickets (To and fro charges to the nearest booking station) (Fixed per month)	4,000

The manager estimates that there will be 2,500 booking per month for 3 months of peak season. 1,000 bookings per month for 2 months of moderate business and 700 bookings per month during the remaining period. He cannot charge more than prevailing rate of ₹ 30 per booking charged by other agents.

Required:

(i) Calculate the total cost per booking.
(ii) What is the estimated profit the manager hopes to achieve for the full year?
(iii) What should be the average minimum volume to justify the setting up of the new service?

Solution **Calculation of Total Cost per booking**

Cost Specific to booking operations:		
Direct Person's Salary	20,000	
Mobile Expenses	3,000	
Conveyance	4,000	27,000
Share of Other Overheads:		
Office Space	4,000	
General Telephone	2,400	
Security / Maintenance	1,600	
Miscellaneous Expenses	1,000	9,000
Total Cost Allocated to the service		36,000

$$\text{Average Demand per month}\left(\frac{2{,}500 \text{ x } 3 + 1{,}000 \text{ x } 2 + 700 \text{ x } 7}{12}\right) = 1{,}200$$

$$\text{Total Cost per booking}\left(\frac{\text{Total Cost per month}}{\text{Average Bookings per month}}\right) = \frac{₹\ 36{,}000}{1{,}200}$$

$$= ₹\ 30$$

(i) Estimated Profit to be achieved in full year

Revenue per ticket	=	₹ 30
Total Revenue Less Total Cost (₹ 30 - ₹ 30)	=	₹ 0
(Assuming that other Overheads will anyway exist even if the Service is not provided, the manager can hope to achieve a Profit)		
Revenue (₹ 30 x 1,200)	=	₹ 36,000
Less : Variable Cost	=	₹ 27,000
Profit	=	₹ 9,000

(ii) Average Minimum Volume to Justify the Setting –up of New Services

Minimum Average Volume to Setup the Service will be the amount needed to recover the Specific Costs of this Service, is ₹ 27,000 per month.

Minimum Average Books = ₹ 27,000 ÷ ₹ 30
= 900 Bookings

Case Study -10

Kangan Resorts operates a lodging house with attached facilities of a shopping arcade and restaurant on a National Highway. The following details are available.

(i) The lodging has 40 twin –bedded rooms, which are to be rented for ₹ 200 per night on double occupancy basis. The occupancy ratio is expected at 85% and always both the beds in the room will be occupied. The lodging facilities are operated, for 200 days in the year during foreign tourists season time only.

(ii) As per past record the spending pattern of each tourist staying in the lodge will be as under:
₹ 50 per day in the shopping arcade and ₹ 80 per day in the restaurant.

(iii) Ratios of variable cost to respective sales volume are:

Shops	Restaurant
50%	60%

(iv) For the lodging house the variable cost on house –keeping and electricity will amount ₹ 30 per day per occupied room.

(v) Annual fixed overhead for the entire complex is estimated at ₹ 10,00,000.

Required:

(i) Prepare an income statement for the next year.

(ii) The Lodging House Manager suggests a proposal of reducing room rent to ₹ 150 per day on double occupancy basis, which will increase occupancy level to 95%. Should the proposal be accepted or not?

Kangan Resort

Statement Showing Income

	₹
Sales Revenues:-	
(1) Lodging House (40 Rooms x 200 Days x ₹ 200 x 85%)	13,60,000
(2) Shopping Arcade (40 Rooms x 2 Persons x 200 days x 50 x 85%)	6,80,000
(3) Restaurant (40 Rooms x 2 Persons x 200 Days x 80 x 85%)	10,88,000
Variable Cost:-	
Lodging House	
(40 Rooms x 200 days x 30 x 85%)	(204,000)
Shopping Arcade (50% x 6,80,000)	(3,40,000)
Restaurant (60% x 10,88,000)	(6,52,800)
Contribution	**19,31,200**
Fixed Cost	**(10,00,000)**
Profit/Loss	**9,31,200**

Ans No. (ii) Kangan Resort Statement Showing Income

	₹
Sales Revenues:-	
(1) Lodging House (40 Rooms x 200 Days x 150 x 95%)	= 11,40,000
(2) Shopping Arcade (40 Rooms x 2 Persons x 200 days x 50 x 95%)	= 7,60 ,000
(3) Restaurant (40 Rooms x 2 Persons x 200 Days x 80 x 95%)	= 12,16,000
Variable Cost:-	
Lodging House	
(40 Rooms x 200 days x 30 x 95%)	= (2,28,000)
Shopping Arcade (7,60,000 x 50%)	= (3,80,000)
Restaurant (60% x 12,16,000)	= (7,29,600)
Contribution	**= (17,78,900)**
Fixed Cost	**(10,00,000)**
Estimated Profit	**7,78,400**
Present Profit	**(9,31,200)**
Reducing	**(1,52,800)**

Decision Proposal May not be accepted

Case Study -11

XY Hotel has 40 bed rooms with a maximum occupancy of 490 sleeper nights per week. Average occupancy is 60% throughout the year. Meals provided to guests have been costed and the average food cost per person per day is as follows

		(₹)
Breakfast	……..	72.00
Lunch	……..	220.00
Dinner	……..	268.00
		560.00

Direct wages and staff meals per week are as under:

		(₹)
Housekeeping	……..	39,040.00
Restaurant and Kitchen	……..	68,600.00
General	……..	35,200.00

Direct expenses per annum are ₹ 9,15,200 for house –keeping and ₹ 10,40,000 for restaurant. Indirect expenses amount to ₹ 68,22,400, which should be apportioned on the basis of floor area. The floor areas are as follows:

		Sq. Mt.
Bed Rooms	……..	3,600
Restaurant	……..	1,200
Service Area	……..	600

A net profit of 10% must be made on the restaurant taking and also on accommodation takings.

Required:

Calculate what inclusive term per person should be charged per day and also show the split between meals and accommodation charges.

Step No.1

Statement Showing Average Occupancy

(490 x 60%) = 294

Statement Showing Charges Per Person

Particulars	House Keeping	Restaurant	General & Services	Total
	₹	₹	₹	
(1) Direct - Wages (Per –Week)	39,040	68,600	35,200	1,42,840
(2) Other Direct Expenses (Per Week)	17,600 (9,15,200 ÷52)	20,000 (10,40,000 ÷52)	–	37,600
	56,640	88,600	35,200	
Direct Expenses (General) (Wages -Ratio) (39,040 : 68,600)	12,767	22,433	(35,200)	
	69,407	1,11,033	–	
Indirect Expenses (68,22,400 ÷ 52) 3,600 : 1,200 [Floor -Area]	98,400	32,800		1,31,200
	1,67,807 ÷ 294	1,43,833 ÷ 294	–	3,11,640
	= 570.77	= 489.23		1060.00
Food		560.00		560.00
Total Cost	570.77	1049.23		1,620.00
Profit	63.42	116.58		180.00
	$\left(570.77 \times \frac{10}{90}\right)$	$\left(1049.33 \times \frac{10}{90}\right)$		1,800
Takings	**634.19**	**1165.81**		

Case Study -12

Elegant Hotel has a capacity of 100 single rooms and 20 double rooms. It has a sports centre with a swimming pool, which is also used by persons other than residents of the hotel. The hotel has a shopping arcade at the basement and a specialty restaurant at the roof top.

The following information is available:

(i) Average occupancy: 75% for 365 days of the year.
(ii) Current cost are:

	Variable Cost per day (₹)	Fixed Cost per day (₹)
Single Room :	400	200
Double Room :	500	250

(iii) Average sales per day of restaurant is ₹ 1,00,000, and contribution is at 30%. Fixed cost ₹ 10,00,000.

(iv) The sports centre/swimming pool is likely to be used by 50 non –residents daily; average contribution per day per non –residential is estimated at ₹ 50 fixed cost is ₹ 5,00,000 per annum.

(v) Average contribution per month from the shopping arcade is ₹ 50,000 fixed cost is ₹ 6,00,000 per annum.

Required:

(a) Find out rent chargeable for single and double room per day so that there is a margin of safety of 20% on hire of room and that the rent for a double room shall be kept at 120% of a single room.

(b) Evaluate the profitability of restaurant, sports centre and shopping arcade separately.

Step No. 1

Ans No. a Statement Showing Number of Occupied Room Days / Rent

Rent –Per Day –Per Room – *x*(Single)

Single Room = 100 x 365 x 75% = 27,375 *x*

Double Room = (20 Rooms x 365 Days x 75%)

= 5,475

27,375 *x* + (5,475 x 1.20 *x*) = **6,570**

= 33,945*x*

Step No. 2 Statement Showing Total Takings

	₹
Variable Cost + Fixed Cost	
Single (400 + 200) x 27,375 =	1,64,25,000
Double (500 + 250) x 5,475 =	41,06,250
80%	**20,531,250**
Margin of Safety 20%	5,132,813
Rent 100%	**25,664,063**
$\left(\frac{20,531,250 \text{ x } 100}{80}\right)$	
$x = \left(\frac{25,664,063}{33,945}\right) = 756$	

Statement Showing Rent Per Day

Single Room: 756

Double Room: (756 x 1.20) = **907.20**

Ans No. (b)

Statement Showing Profitability

	Restaurant	**Sports Centre**	**Shopping Arcade**
Contribution	10,950,000 (1,00,000 x 30 % x 365)	9,12,500 (50 x 50 x 365)	6,00,000 (50,000 x 12)
Fixed Cost	(10,00,000)	(5,00,000)	(6,00,000)
Profit / Loss	**99,50,000**	**4,12,000**	–

Case Study -13

Mr. Perfect owns gift –shop, a restaurant and a lodge in Shimla. Typically he operates these only during the season period of four months in a year. For the past season the occupancy rate in the lodge was 90% and level of activity in case of gift –shop and restaurant at 80%.

The relevant data for the past season were as under:

	Gift - Shop		**Restaurant**		**Lodge**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**
	(₹)		**(₹)**		**(₹)**	
Receipts / Sales	48,000	100	64,000	100	1,80,000	100
Expenditure:						
Cost of Sales	26,400	55	35,200	55	---	---
Supplies	2,400	5	6,400	10	14,400	8
Insurance & Taxes	1,920	4	6,400	10	36,000	20
Depreciation	2,880	6	8,000	12 1/2	39,600	22
Salaries	4,800	10	4,800	7 1/2	25,200	14
Electricity Charges	960	2	3,200	5	13,500	$7^{1/2}$
Profit	8,640	18	---	---	51,300	$28^{1/2}$

Additional Information:

1) Cost of sales and supplies vary directly with the occupancy rate in case of lodge level of activity in case of gift –shop and restaurant.
2) Insurance & Taxes and depreciation are for the entire period of twelve months.
3) Salaries paid are for the season period except a chowkidar for the lodge that is paid for the full year at₹ 400 per month.
4) Electricity charges include fixed charges of ₹ 640 , ₹ 1,920 &₹ 9,900 for gift –shop, restaurant and lodge respectively. The balance amount varies directly with occupancy rate in case of lodge and level of activity in case of gift –shop and restaurant. Fixed electric charges are for the season except in case of lodge where ₹ 6,900 is for the season and ₹ 3,000 for the entire period of twelve months.

Mr. Perfect is interested in increasing his net income. The following two options are under his consideration:-

1) To continue the operations during the season period only by inserting advertisement in newspapers thereby occupancy rate to reach 100% in case of lodge and 90% level of activity in respect of gift –shop and restaurant. The costs of advertisement are estimated at ₹ 12,000.
2) To continue operations throughout the entire period of twelve months comprising season period for four months and off –season period of eight months. The occupancy rate is expected at 90% and 40% during season period and off –season period respectively in case of the lodge. The room rents are bound to be reduced to 50% of the original rate during off –season period. The level of activity of gift –shop and restaurant is expected at 80% and 30% during season and off –season period respectively but 5% discount on the original rates will have to be offered during off – season period.

Required:

Which options is profitable? Suggest Mr. Perfect any other alternative based upon the above figures which can be adopted to earn more net profit. (Use incremental revenue and differential cost approach).

IInd -Option

Statement Showing Analysis of Proposal

	₹
During Season Period For All Three Units	–
During Off Seasons	
Gift – Shop $\left(\frac{48,000}{4 \text{ months}} \text{x } 8 \text{ months x } \frac{30}{80} \text{ x } \frac{95}{100}\right)$	34,200
Restaurant $\left(\frac{64,000}{4 \text{ months}} \text{x } 8 \text{ months x } \frac{30}{80} \text{ x } \frac{95}{100}\right)$	45,600
Lodge $\left(\frac{1,80,000}{4 \text{ months}} \text{x } 8 \text{ monthss x } \frac{40}{80} \text{ x } \frac{50}{100}\right)$	80,000
	1,59,800
Relevant -Cost	
Cost of Sales	
Gift -Shop $\left(\frac{48,000}{4 \text{ months}} \text{x } 8 \text{ months x } \frac{30}{80} \text{ x } \frac{55}{100}\right)$	(19,800)
Restaurant $\left(\frac{64,000}{4 \text{ months}} \text{x } 8 \text{ months x } \frac{30}{80} \text{ x } \frac{55}{100}\right)$	(26,400)

Statement Showing Analysis of Proposal

	₹
Incremental Revenues:-	
Gift Shop $\left(\frac{48,000 \text{ x } 10}{80}\right)$	6,000
Restaurant $\left(\frac{64,000 \text{ x } 10}{80}\right)$	8,000
Lodge $\left(\frac{1,80,000 \text{ x } 10}{90}\right)$	20,000
Cost of Sales:-	
Gift Shop $\left(6,000 \text{ x} \frac{55}{100}\right)$	(3,300)
Restaurant $\left(8,000 \text{ x} \frac{55}{100}\right)$	(4,400)
Lodge –	
Supplies:-	
Gift Shop $\left(6,000 \text{ x} \frac{5}{100}\right)$	(300)
Rest $\left(8,000 \text{ x} \frac{10}{100}\right)$	(800)
Lodge $\left(20,000 \text{ x} \frac{8}{100}\right)$	(1,600)
Electricity Charges :-	
Gift Shop $(960 - 640) \text{x} \frac{10}{80}$ =	(40)
Restaurant $(3,200 - 1,920) \text{x} \frac{10}{80}$ =	(160)
Lodge $(13,500 - 9,900) \text{x} \frac{10}{90}$ =	(400)
	23,000
Advance Cost	(11,000)
Additional Net Income	**12,000**

Second Option

Incremental Revenues:-	**(₹)**
During Season period for all the three units	Nil
During Off - Season Period:	
Gift – Shop $\left(₹ 48,000 \text{ x } 2 \text{ x} \frac{30}{80} \text{x } \frac{95}{100}\right)$	34,200
Restaurant $\left(₹ 64,000 \text{ x } 2 \text{ x} \frac{30}{80} \text{x } \frac{95}{100}\right)$	45,600
Lodge $\left(₹ 1,80,000 \text{ x } 2 \text{ x} \frac{40}{90} \text{x } \frac{50}{100}\right)$	80,000
Total …(A)	1,59,800

Differential Cost	Gift - Shop	Restaurant	Lodge	Total
	(₹)	(₹)	(₹)	(₹)
Cost of Sales	19,800 $\left(₹\ 36,000 \times \frac{55}{100}\right)$	26,400 $\left(₹\ 48,000 \times \frac{55}{100}\right)$	----	46,200
Supplies	1,800 $\left(₹\ 36,000 \times \frac{5}{100}\right)$	4,800 $\left(₹\ 48,000 \times \frac{10}{100}\right)$	12,800 $\left(₹\ 1,60,000 \times \frac{8}{100}\right)$	19,400
Salaries	9,600 (₹ 4,800 x 2)	9,600 (₹ 4,800 x 2)	40,800 [(₹ 25,200 -0 ₹ 4,800) x 2]	60,000
Electricity (fixed Element)	1,280 (₹ 640 x 2)	3,840 (₹ 1,920 x 2)	13,800 (₹ 6,900 x 2)	18,920
Electricity (variable Element)	240*	960**	3,200***	4,400
Total			….(B)	1,48,920

$(*)\left\{(₹\ 960\ -\ ₹\ 640) \times \frac{30}{80} \times 2\right\}$

$(**)\left\{(₹\ 3,200\ -\ ₹\ 1,920) \times \frac{30}{80} \times 2\right\}$

$(***)\left\{(₹\ 13,500\ -\ ₹\ 9,900) \times \frac{40}{90} \times 2\right\}$

Solution First Option

Incremental Revenue	**(₹)**
Gift - Shop (₹ 48,000 x 10 / 80)	6,000
Restaurant (₹ 64,000 x 10 / 80)	8,000
Lodge (₹ 1,80,000 x 10 / 90)	20,000
Total …(A)	**34,000**

Differential Cost	Gift - Shop	Restaurant	Lodge	Total
	(₹)	(₹)	(₹)	(₹)
Cost of Sales	3,300 $\left(₹\ 6{,}000 \times \frac{55}{100}\right)$	4,400 $\left(₹\ 8{,}000 \times \frac{55}{100}\right)$	---	7,700
Supplies	300 $\left(₹\ 6{,}000 \times \frac{5}{100}\right)$	800 $\left(₹\ 8{,}000 \times \frac{10}{100}\right)$	1,600 $\left(₹\ 20{,}000 \times \frac{8}{100}\right)$	2,700
Electricity Charges	40*	160 **	400***	600
Total			**… (B)**	**11,000**

$(*)\left\{(₹\ 960\ -\ ₹\ 640) \times \frac{10}{80}\right\}$

$(**)\left\{(₹\ 3{,}200\ -\ ₹\ 1{,}920) \times \frac{10}{80}\right\}$

$(***)\left\{(₹\ 13{,}500\ -\ ₹\ 9{,}900) \times \frac{10}{90}\right\}$

Excess of Incremental Revenue Over Differential Cost … [(A) - (B)]	23,000
Less : Advertisement Costs	(12,000)
Additional Net Income	11,000

Supplies :-	**(₹)**
Gift - Shop	
$\left(\frac{48,000}{4 \text{ months}} \text{ x } 8 \text{ mm x } \frac{30}{80} \text{ x } \frac{5}{100}\right) =$	(1,800)
Restaurant	
$\left(\frac{64,000}{4 \text{ months}} \text{ x } 8 \text{ mm x } \frac{30}{80} \text{ x } \frac{10}{100}\right) =$	(4,800)
Lodge	
$\left(\frac{1,80,000}{4 \text{ months}} \text{ x } 8 \text{ mm x } \frac{40}{90} \text{ x } \frac{8}{100}\right) =$	(12,800)
Salaries	
Gift Shop $\left(\frac{48,000}{4 \text{ months}} \text{ x } 8 \text{ mm}\right)$	(9,600)
Restaurant $\left(\frac{48,000}{4 \text{ months}} \text{ x } 8 \text{ mm}\right)$	(9,600)
Lodges $\left(\frac{(25,200 - 4,800)}{(12 \text{ x } 400)} \text{ x } \frac{8 \text{ mm}}{4 \text{ mm}}\right)$	(40,800)
Electricity (Fixed)	
Gift Shop $\left(\frac{640}{4 \text{ months}} \text{ x } 8 \text{ mm}\right) =$	(1,280)
Restaurant $\left(\frac{1,920}{4 \text{ months}} \text{ x } 8 \text{ mm}\right) =$	(3,840)
Lodge $\left(\frac{6,900}{4 \text{ months}} \text{ x } 8 \text{ mm}\right) =$	(13,800)
Electricity (variable)	
Gift Shop $\left(\frac{960 - 640}{4 \text{ months}} \text{ x } 8 \text{ mm x } \frac{30}{80}\right) =$	(240)
Restaurant $\left(\frac{3,200 - 1,920}{4 \text{ months}} \text{ x } 8 \text{ mm x } \frac{30}{80}\right) =$	(960)
Lodge $\left(\frac{13,500 - 9,900}{4 \text{ months}} \text{ x } 8 \text{ mm x } \frac{40}{90}\right) =$	(3,200)
Incremental Revenue	**10,880**

A comparison of the first and second clearly shows that the first option is better as it is more Profitable. Under first option the Earnings are more by ₹ 120 (₹ 11,000 − ₹ 10,880) in comparison with second option.

Suggestion (Other Alternative Option)

Mr. Perfect should go for the Advertisement insertion and also continue to operate all the operations during Off Season period as well. This will give him maximum. Net Earnings based upon the relevant data shown above. The Additional Net Earnings then will be:

	(₹)
Due to Advertisement	11,000
Continuing Business during Off Season too	10,880
Total Additional Earnings	21,880

Hospitals / Health Clinics

Case Study -14

A city health center provides health and other related services to the citizens who are covered under insurance plan. The health care receives a payment from the insurance company each time any patient attends the centre for consultation as under:

Consultations involving	**Payment from insurance company (₹)**
No treatment	60
Minor treatment	250
Major Treatment	500

In addition, the adult patients will have to make a co –payment which is equivalent to the amount of payment for the respective category of treatment made by the insurance company. However, children and senior citizens are not required to make any such co –payment.

The health centre will remain open for 6 days in a week for 52 weeks in a year. Each physician treated 20 patients per day although the maximum number of patients that could have been treated by physician on any working day is 24 patients.

The health centre received a fixed income of ₹ 2,25,280 per annum for promotion of health products from the manufacturers.

The annual expenditure of the health centre is estimated as under:

Materials and Consumable (100% Variable)	₹ 22,32,000
Staff Salaries per annum per Employee (Fixed) :	
Physician	₹ 4,50,000
Assistants	₹ 1,50,000
Administrative Staff	₹ 90,000
Establishment and Other Operating Costs (Fixed)	₹ 16,00,000

The non –financial information is as under:

(i)	Staff:	
	Number of Physicians Employed	6
	Assistants	7
	Administrative Staff	2
(ii)	Patient Mix :	
	Adults	50%
	Children	40%
	Senior Citizens	10%
(iii)	Mix of Patient Appointments (%)	
	Consultation requiring no Treatment	70%
	Minor Treatment	20%
	Major Treatment	10%

Required:

(i) Calculate the Net income of the city health centre for the next year;

(ii) Determine the percentage of maximum capacity required to be utilized next year in order to break even.

Step no. 1 Statement Showing Number of Patients Attended / Patient Mix

20 Patients x 6 Physicians x 6 days x 52 Weeks

37,440

Adults	Children	Senior Citizens
50 % x 37,440	40 % x 37,440	10 % x 37,440
= 18,720	= 14,976	= 3,744

Step no. 2 Statement Showing Patients Appointments

37,440

No Treatment	Minor Treatment	Major Treatment
70 % x 37,440	20 % x 37,440	10 % x 37,440
= 26,208	= 7,488	= 3,744

Step No. 3 Statement Showing Income From Insurance Company

			(₹)
(1)	No Treatment	26,208 x 60 =	15,72,480
(2)	Minor - Treatment	7,488 x 250 =	18,72,000
(3)	Major - Treatment	3,744 x 500 =	18,72,000
			53,16,480

Step No. 4 Statement Showing Co –Payment From –Adult –Patients

18,720

No Treatment	Minor Treatment	Major Treatment
70 % x 18,720	20 % x 18,720	10 % x 18,720
= 13,104	= 3,744	= 1,872
x 60	x 250	x 500
7,86,240	9,36,000	9,36,000

= **26,58,240**

Step No. 5 Statement Showing Net Income

		(₹)
(A) Payment From Insurance Companies		53,16,480
Co - Payment - from Adult- Patients		26,58,240
Other Income		2,25,280
	Total	**82,00,000**
(B) Variable Cost - Material Consumables		(22,32,000)
		59,68,000
Fixed Cost		(55,30,000)
	₹	
Physician Salary	27,00,000	
Assistants Salary	10,50,000	
Admin Staff Salary	1,80,000	
Establishment & Other Operating Cost	16,00,000	
	55,30,000	
	Net Income	**4,38,000**

Step No. 6 Statement Showing Contribution

Fees
(53,16,480 + 26,58,240) = 79,77,720

Variable Cost	Contribution
22,32,000	57,42,720
	Patients ÷ 37,440
	Average Contribution Per Patients = 153.38

Break –Even Points Patients :-

Sales Price

Variable Price	Contribution	
22,32,000	Fixed Cost	Profit
	(55,30,000 - 2,25,280)	0
	= 5,304,720	

$$\text{Break} - \text{Even Point} = \left(\frac{5{,}304{,}720}{153.38}\right) = 34{,}585.47 = 34{,}586$$

3. Percentage of Maximum Capacity Required to be Utilized in Order to Break –Even

Present Utilization $= \dfrac{20 \text{ Patients}}{24 \text{ Patients}}$

= 83.33 %

At 100 % Capacity No. of Patients $= \dfrac{37{,}440 \text{ Patients}}{0.8333}$

= 44,930 Patients

Percentage of Maximum Capacity Required to be utilized in order to Break -Even $= \dfrac{\text{Break} - \text{Even Patients}}{100\ \%\ \text{Patient Capacity}} \text{x } 100$

$= \dfrac{34{,}585 \text{ Patients}}{44{,}930 \text{ Patients}} \text{x } 100$

= 76.98 % say 77%

Assumption

Patient Mix and Mix of Patient Appointments will be same in the next year.

Case Study -15

A hospital operates a 40 bed capacity health care department. The said department levies a charge of ₹ 425 per bed day from the patient using its services. The data relating to fees collected and costs for the year 2013 are as under:

	(₹)
Fees collected during the year	34,95,625
Variable costs based on patient days	13,57,125
Department fixed costs	6,22,500
Apportioned costs of the hospital administration charges	10,00,000

Besides the above, nursing staff were employed as per the following scale at ₹ 48,000 per annum per nurse.

Annual Patient Days	**No. of Nurses Required**
Less than 5,000	3
5,000 - 7,000	4
7,000 - 9,000	6
Above 9,000	8

The projections for the year 2014 are as under:

- ❖ The costs other than apportioned overheads will go up by 10%
- ❖ The apportioned overheads will increase by ₹ 2,50,000 per annum.
- ❖ The salary of the nursing staff will increase to ₹ 54,000 per annum per nurse.

The occupancy of the bed capacity is not likely to increase in 2014 and consequently the management is actively considering a proposal to close down the department. In that event, the department fixed costs can be avoided.

Required:

(i) Present a statement to show the profitability of the department for the years 2013 and 2014.

(ii) Calculate the:

- Break –even bed capacity for the year 2014
- Increase in fee per bed day required to justify continuance of the department.

CVP –Part A (I)

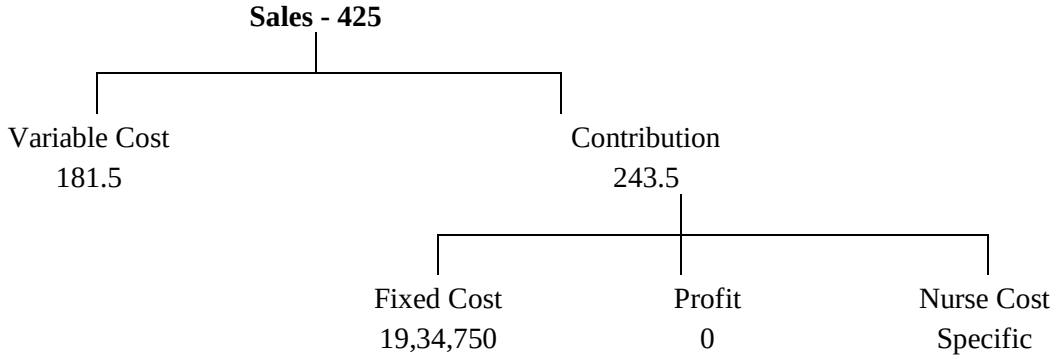
Ans i	**Year**	**2001**		**2002**	
	No. Of Patients	*** 8,225**		**8,225**	
		Total	**Per day**	**Total**	**Per day**
A)	Revenue	* 34,95,625	425	* 34,95,625	425
B)	Variable Cost	(13,57,125)	(165)	(1492837.5)	(181.5) (165 + 10)
C)	Contribution	**21,38,500**	**260**	**20,027,87.5**	**243.5**

D) Fixed Cost

1)	Departmental Cost	6,22,500	6,84,750 (+ 10%)
2)	App Admin Cost	10,00,000	12,50,000
	Total D (Fixed)	**(16,22,500)**	**(19,34,750)**

E)	Specific Cost (Nurse Cost)	(2,88,000) (6 x 48,000)	(3,24,000) (6 x 54,000)
	Profit / Loss	**2,28,000**	**(252,962.5)**

Ans ii **Break –Even Point – 2002**



Break –Even Point (Without Nurse)

$\left(\frac{19,34,750}{243.5}\right)$ 7,945.58 nos.

Break –Even Point (with nurse)

7,000 – 9,000 range

i.e 9,000 – 7,945.58

$= 1,054.42 \left(\frac{6 \text{ x } 54,000}{243.5}\right) = 1,330.59$ nos.

$\text{Break} - \text{Even Point for Additional} = \frac{2 \text{ x } 54,000}{243.5} = 443.53$ nos.

Nurse (8 – 6) 9,719.7

2 nurse –more Required i.e 9,720 nos.

Present Sales Price = 425

Increase by

$\left(\frac{255,962.50}{8,225}\right) = 31.12$ nos.

Revised Price per day 456.12

Verification (Not For Exam)

Sales Price = 456.12

Variable Cost	Contribution
181.5	274.62

Break –Even Point (without nurse)

$\left(\frac{19,34,750}{274.62}\right) = 7,045$

Break –Even Point (with nurse)

$7,000 - 9,000 \text{ range} \left(\frac{6 \text{ x } 54,000}{274.62}\right) = 1,179.82$

8,225

Case Study -16

A Multinational company runs a Public Medical Health Center. For this purpose, it has hired a building at a rent of ₹10,000 per month with 5% of total taking. Health center has three types of wards for its patients namely. General ward, Cottage ward and Deluxe ward. State the rent to be charged to each bed –day for different type of ward on the basis of the following information:

1. The number of beds of each type is General ward 100, Cottage ward 50, Deluxe ward 30.
2. The rent of cottage ward bed is to be fixed at 2.5 times of the General ward bed and that of Deluxe ward bed as twice of the Cottage ward bed.
3. The occupancy of each type of ward is as follows:
   General ward 100%, Cottage ward 80% and Deluxe ward 60%. But, in General ward there were occasions when beds are full, extra beds were hired at a charges of ₹ 20 per bed. The total hire charges for the extra beds incurred for the whole year amount to ₹ 12,000.
4. The Health center engaged a hear specialist from outside and on an average fees paid to him was ₹ 15,000 per trip. He makes three trips in the whole year.
5. The other expenses for the year were as under:

	(₹)
Salary of Supervisors, Nurses, Ward Boys	4,25,000
Repairs and Maintenance	90,000
Salary of Doctors	13,50,000
Food Supplied to Patients	40,000
Laundry Charges for their Bed Linens	80,500
Medicines Supplied	74,000
Cost of Oxygen, X -Ray etc. (other than directly borne for treatment of Patients)	49,500
General Administration Charges	63,000

6. Provide profit @ 20% on total taking.
7. The Health center imposes 8% service tax on rent received.
8. 360 days may be taken in a year.

Takings = 100 +8 % = 108 /Bill Amount

Rent = 2 %
Profit = 20 %
25%

Cost
75%

Step No.1 Statement Showing Total per day / per year / Total no. of days

Assuming = Taking per Day/ per patient/ general ward = *x*

General Ward : 100 beds Occupancy Ratio = 100 %
(No. of Days is a year)

= (100 x 100 % x 360) = 3,60,000
(1,200 ÷ 20) = 600
36,600 x *x* = 3,660

Cottage :- (50 x 80 % x 360) 14,400 x 2.5

x = 36,00,000

Deluxe:- (30 x 50 % *x* x 360 days) = 6,480 x 5*x*

= 32,400 *x*

= 105,000 *x*

Statement Showing Total Takings for the *y*

1) Rent	1,20,000
2) Hire Charges	12,000
3) Doctor's Fees (15,000 x 3)	45,000
4) Salary/ Super Nurses, Ward Boys	4,25,000
5) Repairs & Maintenance	90,000
6) Salary of Doctors	13,50,000
7) Food Supplied	40,000
8) Laundry Charges	80,500
Medicines Supplied	74,000
Cost of Oxygen	49,500
General Admin Charges	63,000
Total Cost	23,49,000
Rent (5 % x 31,32,000)	1,56,600
Profit (20 % x 31,32,000)	6,26,400
Total Taking	**31,32,000**
$\left(23,49,000 \times \frac{100}{75}\right)$	

Step No. 3

$$\text{Taking per patient} - \text{per day} = \frac{31,32,000}{105,000}$$

= **29.83**

Statement Showing Bill amount per patient per day

	General Ward	Cottage	Deluxe
Taking per patient / per day	29.83	74.58	149.15
		(29.83 x 2.5)	(29.83 x 5)
(+) Service Tax / GST (8%)	2.38	5.96	11.93
	32.21	80.54	161.08

CHAPTER – 6
DECISION MAKING USING COST CONCEPTS & CVP ANALYSIS

Case Study – 1

A manufacturing company produces Ball Pens that are printed with the logos of various companies. Each Pen is priced at ₹ 5. Costs are as follows:

Cost Driver	Unit Variable Cost (₹)	Level of Cost Driver
Units Sold	2.5	–
Setups	225	40
Engineering hours	10	250

Other Data

Total Fixed Costs (conventional) ……. ₹ 48,000
Total Fixed Costs (ABC) ……. ₹ 36,500

Required:

(i) Compute the break –even point in units using activity –based analysis.
(ii) Suppose that company could reduce the setup cost by₹ 75 per setup and could reduce the number of engineering hours needed to 215. How many units must be sold to break even in this case?

Sales Price = 5.00

Variable Price 2.50 | Contribution (5 − 2.5) x **19,200** = 48,000

Fixed Cost | Profit 0

A.B.C =	36,500
Setup Cost = (225 x 40)	= 9,000
Engg-Cost (w x 250)	2,500
	48,000

Sales Price = 5.00

Variable Price 2.50 | Contribution (5 - 2.50) x 17,860 = 44,650 (units)

Fixed Cost | Profit 0

	₹
ABC =	36,500
Setup Cost = (225 - 75) x 40	6,000
Engg Cost = (215 x 10)	2,150
	44,650

Case Study – 2

M.K Ltd. manufactures and sells a single product X whose selling price is ₹ 40 per unit and the variable cost is ₹ 16 per unit.

1. If the Fixed Costs for this year are ₹ 4,80,000 and the annual sales are at 60 % margin of safety, calculate the rate of net return on sales, assuming an income tax level of 40 %.
2. For the next year, it is proposed to add another product line Y whose selling price would be ₹ 50 per unit. And the variable cost ₹ 10 per unit. The total fixed costs are estimated at ₹ 6,66,000. The sales mix of X: Y would be 7 : 3. At what level of sales next year, would M.K Ltd. break even? Give separately for both X and Y the break even sales in rupee and quantities.

Rate of net return on sales

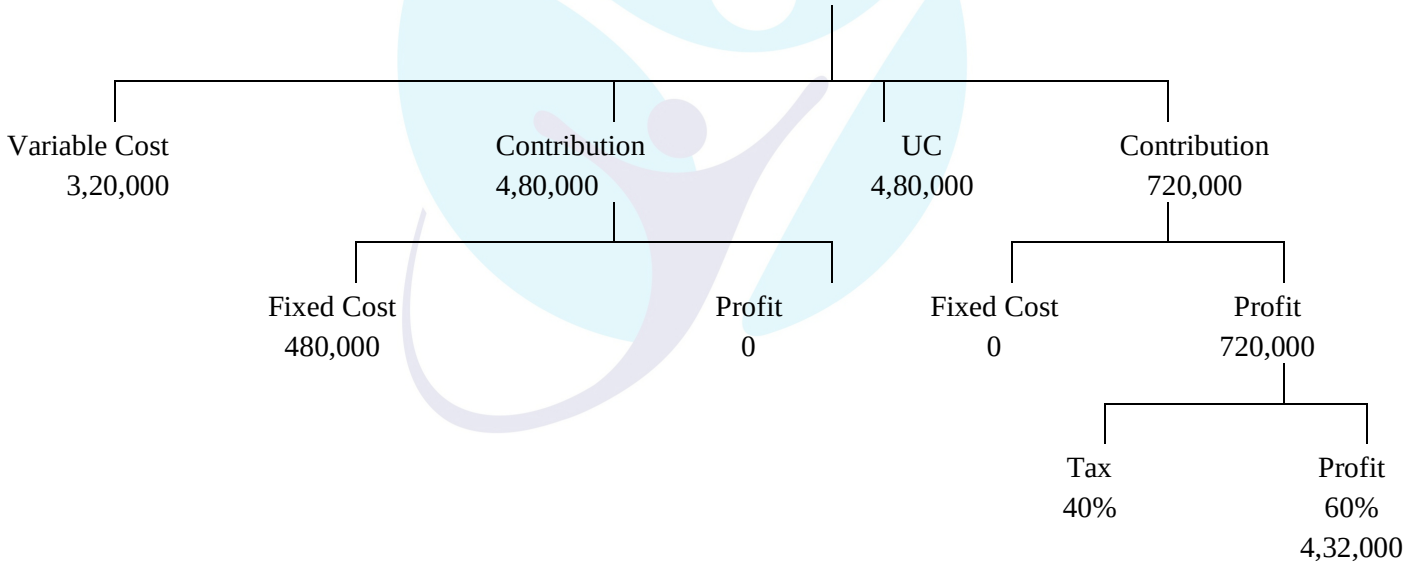
$$\left(\frac{\text{Profit after Tax}}{\text{Sales}} \text{ x } 100\right)$$

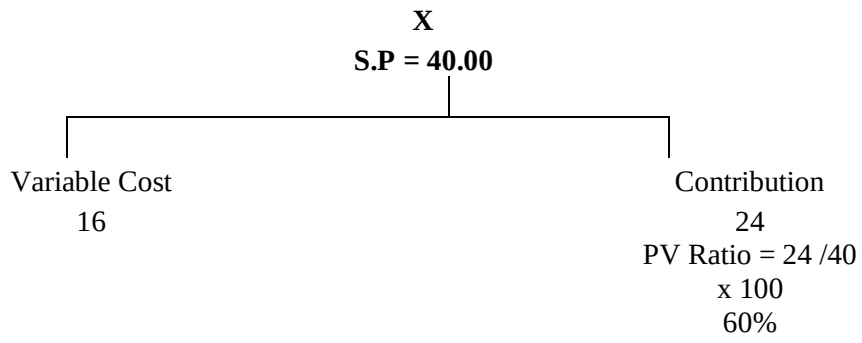
$$= \frac{4,32,000}{2,00,000} \text{ x } 100$$

= 21.60 %

Sales 20,00,000 $\left(\frac{8,00,000}{40} \text{ x } 100\right)$

Break –Even Point (40 %) 8,00,000 $\left(\frac{480,000}{60} \text{ x } 100\right)$ MOS 12,00,000





Average Contribution per unit

	X	Y
Selling Price (per unit)	40	50
Variable Cost (per unit)	16	10
Contribution (per unit)	24	40
Required Ratio	x 7	x 3
Total Contribution	168	120
Break –Even Point	$\frac{666,600}{28.8} = 23,145.83$	

X	Y
7 :	3
16,202.08	6,943.74
16,203	6,944
x 40	x 50
648,120	347,200

Case Study – 3

X Ltd. supplies spare parts to an air craft company Y Ltd. The production capacity of X Ltd. facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of the two different spare parts A and B:

Per unit		Part A	Part B
Alloy usage	……..	1.6 kgs.	1.6 kgs.
Machine Time : Machine A	……..	0.6 hrs.	0.25 hrs.
Machine Time: Machine B	……..	0.5 hrs.	0.55 hrs.
Target Price (₹)	……..	145	115
Total hours available	……..	Machine A 4,000 hours	

Alloy available is 13,000 kgs. @ ₹ 12.50 per kg.

Variable overheads per machine hours : ……. Machine A : ₹ 80

Machine B : ₹ 100

Machine B 4,500 hours

Required :

1. Identify the spare part which will optimize contribution at the offered price.
2. If Y Ltd. reduces target price by 10 % and offers ₹ 60 per hour of unutilized machine hour, what will be the total contribution from the spare part identified above?

Contribution per unit

	Part A	Part B
Target price	145	115
Variable price		
Material	20	20
	(1.6 x 12.5)	(1.6 x 12.5)
Machine T	50	55
	(.50 x 100)	(0.55 x 100)
Machine S	48	20
	(.60 x 80)	(.25 x 80)
Contribution per unit	27	20
Maximum Unit	7,000	9,000

Statement Showing Calculation of limiting factor

	Part A		Part B	
Material	(13,000 ÷ 1.6)	8,125	(13,000 ÷ 1.6)	8,125
Machine S	(4,000 ÷ .6)	6666.67	(4,000 ÷ .25)	16,000
Machine T	(4,500 ÷ 5)	9,000	(4,500 ÷ 55)	8,181.81

Statement Showing Calculation of Maximum Contribution

Products units x Contribution per unit = Total Contribution

A	6,666 x 27	1,79,982
B	8,125 x 20	1,62,500

(a) Part A → maximum contribution

(b) Maximum Contribution = 179,982

No Demand > Production

8,000 > 6,666

Statement Showing Revised Contribution

		Part A	Part B
	Contribution per unit	27.00	20.00
(−)	Reduction in selling price	(14.50)	(11.50)
		(145 x 10 %)	(115 x 10 %)
	Revised Contribution	12.50	8.50

Statement Showing Unused Machine Hours

		Products Machine Hrs. - hours used =	**Balance**
A	S	(4,000 - (6,666 x .6))	= 0.40 hours
	T	(4,500 - (6,666 x .5))	= 1,167
			1,167.40 hours
B	S	(4,000 - (3,125 x .25))	= 1,968.75
	T	(4,500 - (3,125 x .25))	= 31.25
			2,000 hours

Statement Showing Revised Contribution

	Part A	Part B
Contribution	83,325	69,062.50
	(6,666 x 12.5)	(8,125 x 8.5)
Wire Charge	70,044	1,20,000
	(1,167.4 x 60)	(2,000 x 60)
Total Contribution	1,53,369	1,89,062.5

Case Study – 4

The profit for the year of R.J. Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

Sales	…….	₹ 5,00,000
Direct Materials	…….	₹ 2,50,000
Direct Labour	…….	₹ 1,00,000
Variable Overheads	…….	₹ 40,000
Capital Employed	…….	₹ 4,00,000

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

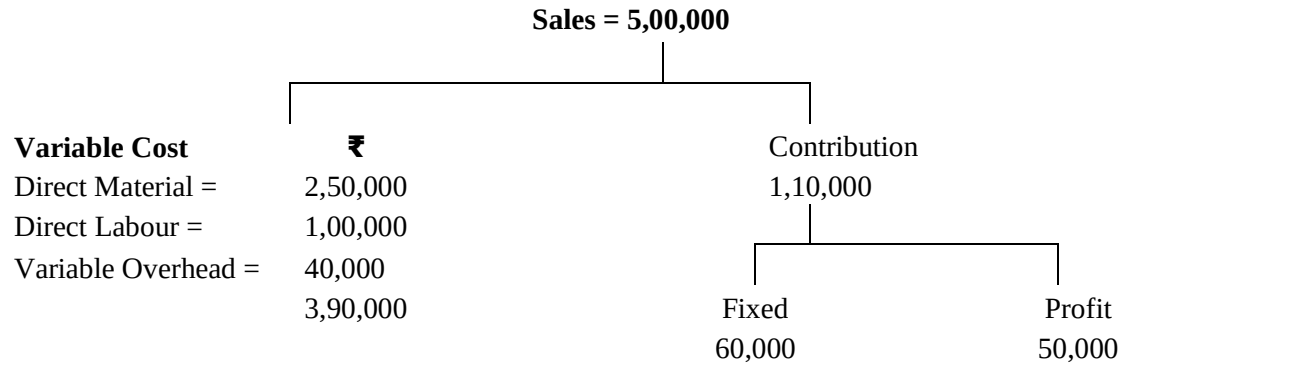
Required:

Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

Since the Profit of ₹ 92,780 is more than 23% of capital employed, the proposal of the Sales Manager can be adopted

Statement Showing Analysis of Profit / Loss

	Existing Volume	Increase↑ 10 %	Estimated
	₹	₹	₹
(A) Sales	5,00,000	5,50,000	5,72,000
		(5,00,000 x 110%)	(5,50,000 x 104%)
(B)Relevant Cost			
(1) Direct - Material	(2,50,000)	(2,75,000)	(2,69,500)
		(2,50,000 x 110%)	(2,75,000 x 98%)
(2) Direct Labour	(1,00,000)	(1,10,000)	(107,800)
		(1,00,000 x 110%)	(1,10,000 x 98%)
(3) Variable Overhead	(40,000)	(44,000)	(43,120)
		(40,000 x 110 %)	(44,000 x 98 %)
Contribution	**1,10,000**	**1,21,000**	**1,51,580**
Fixed Cost	*(60,000)	(60,000)	(60,000 x 98%)
			58,800
Profit / Loss	50,000	61,000	**92,780**
			= 23.19%
			$\left(\frac{92,780}{4,00,000} \text{ x } 100\right)$



Case Study – 5

You have been approached by a friend who is seeking your advice as to whether he should give up his job as an engineer, with a current salary of ₹ 14,800 per month and go into business on his own assembling and selling a component which he has invented. He can procure the parts required to manufacture the component from a supplier.

It is very difficult to forecast the sales potential of the component, but after some research, your friend has estimated the sales as follows:

(i) Between 600 to 900 components per month at a selling price of ₹ 250 per component.
(ii) Between 901 to 1,250 components per month at a selling price of ₹ 220 per component for the entire lot.

The costs of the parts required would be ₹ 140 for each completed component. However if more than 1,000 components are produced in each month, a discount of 5% would be received from the supplier of parts on all purchases.
Assembly cost would be ₹ 60,000 per month up to 750 components. Beyond this level of activity assembly costs would increases to ₹ 70,000 per month.
Your friend has already spent ₹ 30,000 on development, which he would write –off over the first five years of the venture.

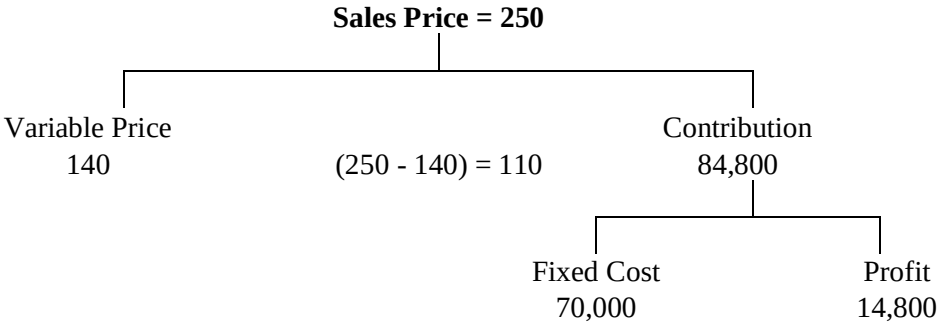
Required:

(i) Calculate for each of the possible sales level at which your friend could expect to benefit by going into the venture on his own.
(ii) Calculate the 'Break –Even Point' of the venture for each of the selling price.
(iii) Advice your friend as to the viability of the venture.

Note that at 600 units and up to 679 units i.e. units below the break –even level the loss would be ₹ 110/- per unit. From 680 units up to 750 units i.e. on additional 70 units the total profit would be ₹ 7,700 (70 units x ₹ 110).
Minimum Sales (units) to recover assembly cost of ₹ 70,000 p.m. and earn a profit of ₹ 14,800 p.m. (Break –even Sales Level)

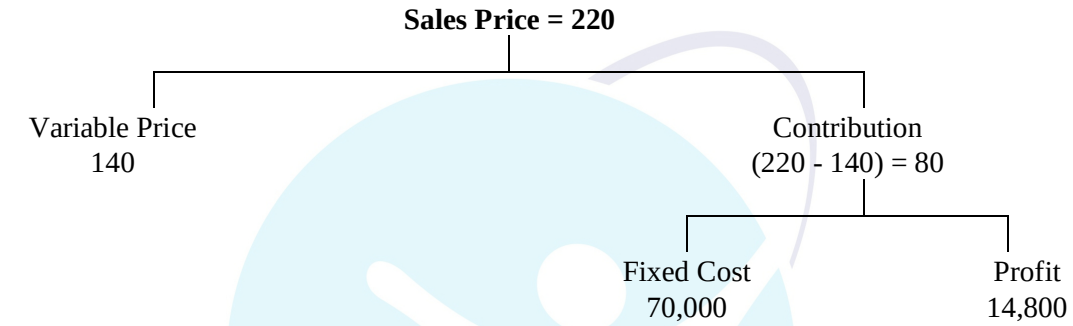
$$\frac{₹\,70{,}000 + ₹\,14{,}800}{₹\,110} = \mathbf{770.909\ units}$$

Option 2



$\left(\frac{84,800}{110}\right) = 770.99$

Option (3)



$\left(\frac{84,800}{110}\right) = 1,060$ units

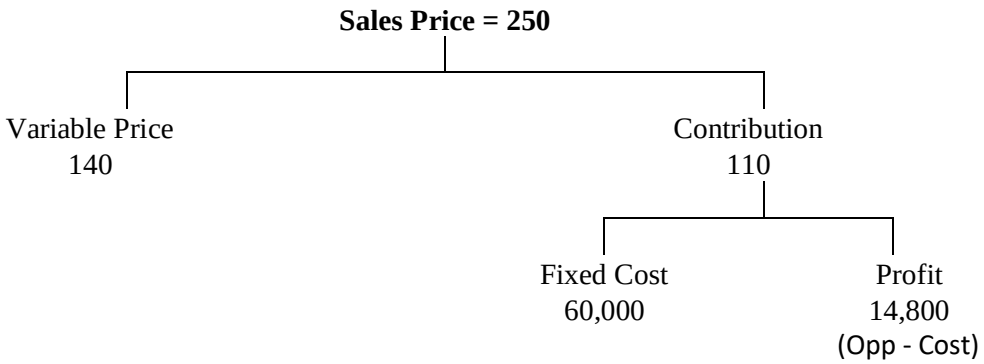
Given

₹ 30,000/- Development Work = Sunk –Cost

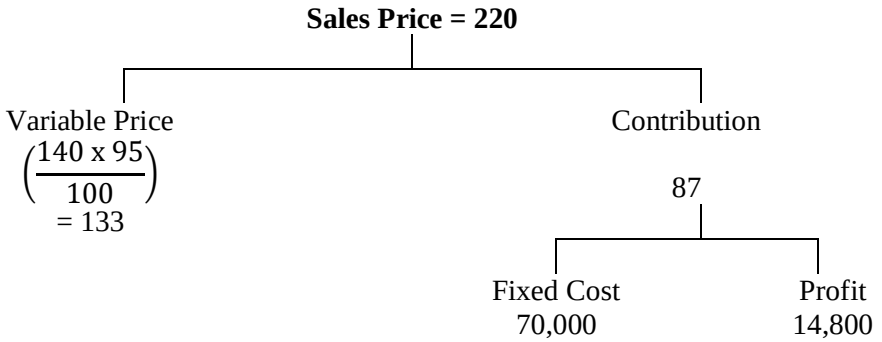
Opportunity Cost = 14,800 (P.M) Salary

IF Demand	**600 to 900**	**901 - 1,250**
Sales Price @	250.00	220.00
Cost of Parts	140.00 ≤ 1,000	(140 x 95 %) = 133 ≥ 1,000
Assembly Cost	60,000 ≤ 750 Components	70,000 ≥ 750 Components

Option (I)



$$\text{Exp} - \text{Units}\left(\frac{60{,}000 + 14{,}800}{110}\right) = \mathbf{680\ Units}$$



$$\left(\frac{70{,}000 + 14{,}800}{87}\right) = 974.12$$

975

Conclusion

It is not worthwhile to sell between 900 and 1,000 units when no discount is available. Also, it is worthwhile selling at ₹ 220 if sales units are in excess of 1,000 units and a discount of 5% is available on the purchase of all components –parts.

Profit on the Sale (1,250 units) ₹ 23,950 (1,250 units x ₹ 87 - ₹ 84,800)

Advice on the viability of the venture

At a selling price of ₹ 250 he will not be at a loss if the demand of the component exceeds 680 units to 750 units and 770.909 units to 900 units.

At a selling price of ₹ 220, it is not worthwhile to sell if the demand is less than 1,000 components without availing a discount of 5%.

Case Study – 6

Mr. Rajesh is quite displeased and frustrated as despite his and his staff's best efforts, although the sales are increasing; the profits are declining over the least three years. He supplies you with the following information:

(₹ in '000's)

	2011 -12	**2012-13**	**2013-14**
Sales (At ₹ 20 per unit)	1,000	1,100	1,200
Cost of Production :			
Variable	260	240	160
Fixed (Applied)	390	360	240
Opening Inventory (Added)	50	200	250
Closing Inventory (Deducted)	200	250	50
	500	550	600
Adjustment for Overheads Applied	(30)	----	120
Actual Cost of goods Sold	470	550	720
Gross Profit	530	550	480
Less: Selling Expense (Semi - Variable)	490	530	570
Net Profit / (Loss)	40	20	(90)

Actual productions for the last three years were 65,000, 60,000 and 40,000 units respectively. 5,000 units were in stock at the beginning of 2011 – 12. Fixed manufacturing overheads are applied to production based on planned activity of 60,000 every year. Actual overheads were₹ 10,80,000 for past three –year period and were evenly incurred.

Required:

Analyse the Profitability of each year

	2011 -12	2012-13	2013-14
Units Sold $\left(\frac{\text{Sales}}{₹20}\right)$	$\left(\frac{10,00,000}{20}\right)$ 50,000 units	$\left(\frac{11,00,000}{20}\right)$ 55,000 units	$\left(\frac{12,00,000}{20}\right)$ 60,000 units
Cost of Production			
Variable			
(P.U)	$\left(\frac{2,60,000}{65,000}\right)$ = 4.00	$\left(\frac{2,40,000}{60,000}\right)$ = 4.00	$\left(\frac{1,60,000}{40,000}\right)$ = 4.00
Variable Selling Expenses			
Variable Cost P.U = $x\rightarrow$	8.00	8.00	8.00
Fixed Cost = $y \rightarrow$	**90,000**	**90,000**	**90,000**
50,000 x + y = 4,90,000			
55,000 x + y = 5,30,000			
5,000 x = 40,000			
x = **8**			
(50,000 x 8) + y = **4,90,000**			
Fixed Overheads $\left(\frac{10,80,000}{3}\right)$	3,60,000 ----------	3,60,000 ----------	3,60,000 ----------

Statement Showing Analysis of Profit / Loss

	2011 -12	2012-13	2013-14
(A) Sales	10,00,000 (50,000 units x 20)	11,00,000 (55,000 x 20)	12,00,000 (60,000 x 20)
Variable Material Cost (Manufacturing)	(2,00,000) (50,000 x 4)	(2,20,000) (55,000 x 4)	(2,40,000) (60,000 x 4)
Variable Selling Expenses	(4,00,000 (50,000 x 8)	(4,40,000 (55,000 x 8)	(4,80,000 (60,000 x 8)
Contribution	**4,00,000**	**4,40,000**	**4,80,000**
Fixed Cost			
Manufacturing	(3,60,000)	(3,60,000)	(3,60,000)
Selling	(90,000)	(90,000)	(90,000)
Profit/Loss	**(50,000)**	**(10,000)**	**30,000**
Break -Even Point	$\left(\frac{3,60,000 + 90,000}{8}\right)$	56,250 units	

The above statement shows that in 2011 − 2012 and 2012 – 13 sales were below the break –even point. Due to which loss occurred during this period. It is only in 2013 – 14 that sales exceeded break – even point resulting in profit. The increasing sales trend really supports Mr. Rajesh's efforts. He need not feel frustrated but should continue the present sales trend.

Production during 2011 – 12 was of 65,000 units. This fell down to 60,000 units in 2012 – 13 and to 40,000 units in 2013 −14. The opening and closing inventories were valued by him at ₹ 10 per unit (including fixed cost of production) for arriving at the results shown under the given statement. This valuation of Mr. Rajesh was based on absorption costing method due to which book profits emerged during 2011– 12 and 2012 – 13.

Mr. Rajesh should adjust his production in such a manner so that the net sales exceed the break –even point of 56,250 units per annum to increase his profits.

Case Study – 7

Gourmet Food Products is a new entrant in the market for chocolates. It has introduced a new product-Sweetee. This is a small rectangular chocolate bar. The bars are wrapped in aluminum foil and packed in attractive cartons containing 50 bars. A carton, is therefore, considered the basic sales unit. Although management had made detailed estimated of costs and volumes prior to undertaking this venture, new projections based on actual cost experience are now required.

Income Statements for the last two quarters are each thought to be representative of the costs and productive efficiency we can expected in the next few quarter. There were virtually no inventories on hand at the end of each quarter. The income statements reveal the following:-

	First Quarter (₹)	Second Quarter (₹)
Sales :		
50,000 x ₹ 24	12,00,000	–
70,000 x ₹ 24	–	16,80,000
Less : Cost of Goods Sold	7,00,000	8,80,000
Gross Margin	5,00,000	8,00,000
Less: Selling & Administration	6,50,000	6,90,000
Net Income/ (Loss) before Taxes	(1,50,000)	1,10,000
Less: Tax	(60,000)	44,000
Net Income/ (Loss)	(90,000)	66,000

The firm's overall marginal and average income tax rate is 40 %. This 40 % figure has been used to estimate the tax liability arising from the chocolate operations.

Required:

i. Management would like to know the breakeven point in terms of quarterly cartons sales for the chocolates.

ii. Management estimates that there is an investment of₹ 30,00,000 in this product line. What quarterly carton sales and total revenue are required in each quarter to earn an after tax return of 20% per annum on investment?

iii. The firm's marketing people predict that if the selling price is reduced by ₹ 1.50 per carton (₹ 0.03 off per chocolate bar) and a ₹ 1,50,000advertising campaign among school children is mounted, sales will increase by 20 % over the second quarter sales.
Should the plan be implemented?

Application of Semi Variable Overheads in Marginal Costing

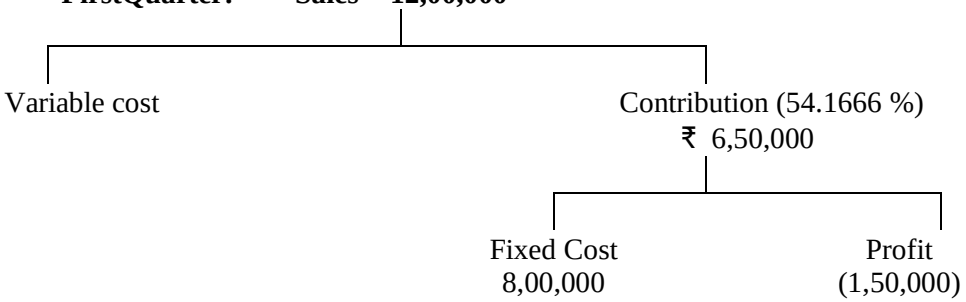
$$\text{Profit Volume Ratio} = \frac{\text{Change in profit}}{\text{Change in Sales}} \quad 1,10,000 - \ (1,50,000)$$

$$= \frac{\{(1,50,000) - 1,10,000\}}{16,80,000 - 12,00,000} \text{x } 100$$

$$\frac{2,60,000}{4,80,000} \text{x } 100$$

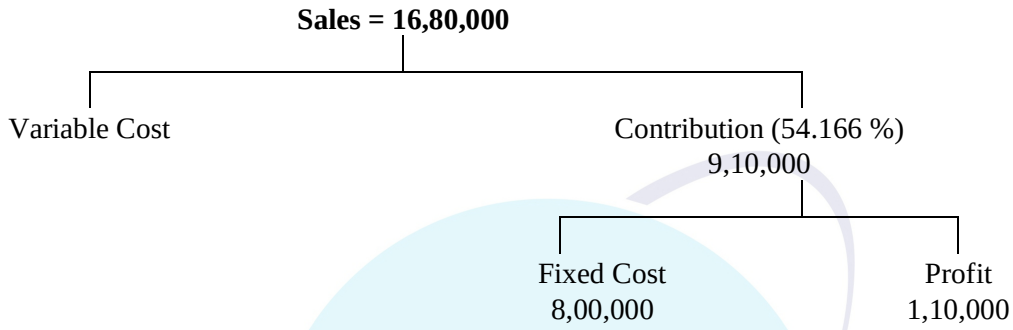
$$= 54.166\ \%$$

FirstQuarter: **Sales = 12,00,000**



Second Quarter:

Sales = 16,80,000



∴ Break Even Point (Sales) = $\frac{\text{Fixed Cost}}{\text{Profit Volume Ratio}}$

$= \frac{8,00,000}{54.166\ \%}$

= **₹ 14,76,923**

÷ Selling price (per unit) 24

Break Even Points (In units) = 61,538.45 units

(II) <u>Question States: Do not use Profit Volume Ratio</u>

Cost of Good Sales is not a Fixed Cost as it is not same.

Not a Variable Cost as per unit is not same.

$\frac{7,00,000}{50,000 \text{ units}} \neq \frac{8,80,000}{70,000}$

∴ Semi Variable Cost

Let Variable Cost = x per unit		Fixed Cost = y
50,000 x + y	=	7,00,000
70,000 x + y	=	8,80,000
− 20,000 x	=	− 1,80,000

$\therefore x = 9$

***y* = 2,50,000**

Even Selling & Admin - Semi Variable

Break Even Points Sales = Selling Price 24.00

Variable Cost
Cost of good sales = ₹ 9
Sales & Admin = ₹ 2
₹ 11

Contribution
₹ 13

Fixed Cost
Cost of goods sales = 2,50,000
Sales & Admin = 5,50,000
8,00,000

Profit
–

∴ Break Even Points (In Units) =

$$\frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{8,00,000}{13} = 61,538.4 \text{ units x } 24 \text{ (Selling Price)}$$

In Rupees = 14,76,923

Calculation of Sales & Admin Expenses

Let Variable Cost = x per unit		Fixed Cost = y
50,000 x + y	=	6,50,000
70,000 x + y	=	6,90,000
⁄ 20,000 x	=	⁄ 40,000

$\therefore x = 2$

∴ 50,000 x 2 + y = 6,50,000

$\therefore y$ **= 5,50,000**

Quarterly

(b) Expected Sales for Required Profit

₹ 19,38,463.92
(100 %)

÷ 24 = **80,769.33 Cartons**

Variable Cost

Contribution
₹ 10,50,000

Profit Volume Ratio
(54.166%)

Fixed Cost
8,00,000

Profit
2,50,000

Note: Profit before tax (100) **10,00,000**
(-) tax (40)
Profit after tax (60) 6,00,000

We want Profit after tax = 30 lakhs x 20 %
= 6 lakhs
But, 10 lakhs is profit per annum
∴ per quarter = 10 lakhs/4
= 2,50,000

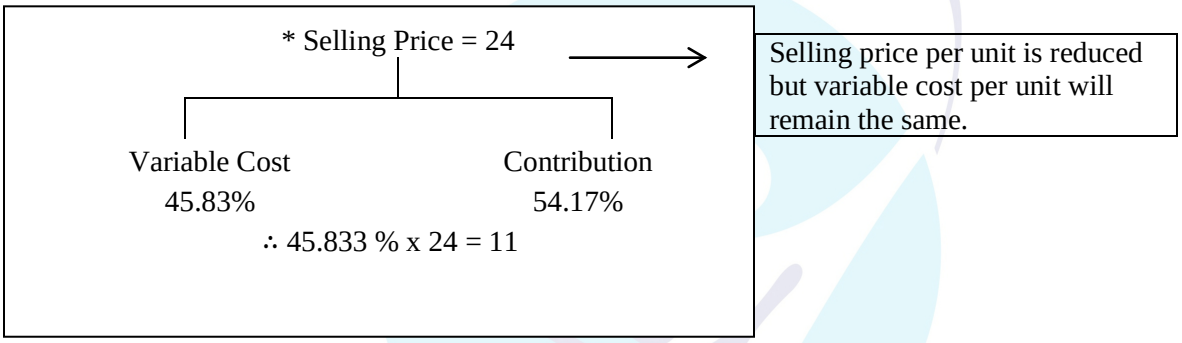
(c) Analysis of Statement Showing Profit/Loss if plan is implemented

Sales Price = 24 (−) 1.5 = ₹ 22.5

Sales Quantity = 79,000 + 20 % = 84,000 units

	Sales (84,000 units x 22.5)	18,90,000
(-) *	Variable Cost (84,000 x 11)	(9,24,000)
	Contribution	9,66,000
(-)	Fixed Cost	(8,00,000)
(-)	Advertisement Cost	(1,50,000)
	Profit before tax	16,000
(-)	tar (40 %)	(6,400)
	Profit after tax	9,600

The above analysis clearly shows that therefore, we should not implement the proposal as the profit is decreasing as compared to the second quarter.



BOSH India Ltd. is a leading Home appliances manufacturer. The company uses just- in-time manufacturing process, thereby having no inventory. Manufacturing is done in batch size of 100 units which cannot be altered without significant cost implications. Although the products are manufactured in batches of 100 units, they are sold as single units at the market price. Due to fierce competition in the market, the company is forced to follow market price of each product. The following table provides the financial results of its four unique products:

	B	**O**	**S**	**H**	
Sales (units)	2,00,000	2,60,000	1,60,000	3,00,000	**Total**
	(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Revenue	26,00,000	45,20,000	42,40,000	32,00,000	145,60,000
Less : Material Cost	6,00,00	18,20,000	18,80,000	10,00,000	53,00,000
Less: Labour Cost	8,00,000	20,80,000	12,80,000	12,00,000	53,60,000
Less: Overheads	8,00,000	7,80,000	3,20,000	12,00,000	31,00,000
Profit/Loss	4,00,000	(1,60,000)	7,60,000	(2,00,000)	8,00,000

Since, company is concerned about loss in manufacturing and selling of two products so, it has approached you to clear picture on its products and costs. You have conducted a detailed investigation whose findings are below:

The overhead absorption rate of ₹ 2 per machine hour has been used to allocate overheads into the above product costs. Further analysis of the overhead cost shows that some of it is caused by the number of machine hours used, some is caused by the number of batches produced and some are product specific

fixed overheads that would be avoided if the product were discontinued. Other general fixed overhead costs would be avoided only by the closure of the factory. Numeric details are summarized below:

	₹	₹
Machine hour related	……..	6,20,000
Batch related	……..	4,60,000
Product specific fixed overhead:		
B	……..	10,00,000
O	……..	1,00,000
S	……..	2,00,000
H	……..	1,00,000 …….. 14,00,001
General fixed overheads	…….. ……..	…….. 6,20,000
		31,00,000

The other in formation is as follows:

	B	O	S	H	Total
Machine Hours	4,00,000	3,90,000	1,60,000	6,00,000	15,50,000
Labour Hours	1,00,000	2,60,000	1,60,000	1,50,000	6,70,000

Required:

1. Prepare a profitability statement that is more useful for decision making than the profit statement prepared by BOSH India Ltd.
2. Calculate the break- even volume in batches and also in approximate units for Product 'B'.

Statement Showing Analysis of Profitability Statement

	B	O	S	H	Total
(A) Sales	2,00,000 units	2,60,000 units	1,60,000 units	3,00,000 units	9,20,000 units
(₹)	26,00,000	45,20,000	42,40,000	32,00,000	1,45,60,000
Direct Material	(6,00,000)	(18,20,000)	(18,80,000)	(10,00,000)	(53,00,000)
Direct Wages	(8,00,000)	(20,80,000)	(12,80,000)	(12,00,000)	(53,60,000)
Overheads Related					
Machine	(1,60,000)	(1,56,000)	-64,000	(2,40,000)	(6,20,000)
Batch	(1,00,000)	(1,30,000)	-80,000	(1,50,000)	(4,60,000)
Contribution	9,40,000	3,34,000	9,36,000	6,10,000	28,20,000
Products Specific Fixed Overhead	10,00,000	1,00,000	2,00,000	1,00,000	14,00,000
Gross profit	(60,000)	2,34,000	7,36,000	5,10,000	14,20,000
					(6,20,000)
				Profit	**8,00,000**

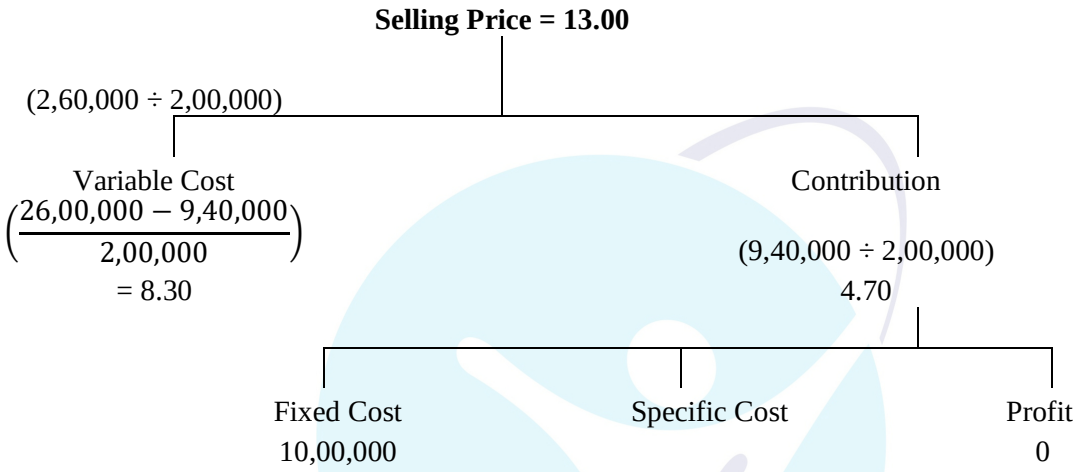
Step No. 1 Statement Showing Cost Driver Rate

Activity	**Cost Driver Used**	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver Used}}\right)$ = Cost Driver Rate
(1) Machine Hrs.	No. of M – Hrs. (4,00,000 + 3,90,000 + 1,60,00 + 6,00,000)	$\left(\frac{6,20,000}{15,50,000}\right)$ = .40
(2) Batch Production	No. of Batch (9,20,000 ÷ 100) = 9,200	$\left(\frac{4,60,000}{9,200}\right)$ = 50

Step No.2 Statement Showing Cost to Product

Product	Activity M - hrs.	Cost Driver Rate Used x Rate Total	No. of Batch	(₹)
B	4,00,000	× .40 = 1,60,000	(2,00,000 ÷ 100 x 50)	1,00,000
O	3,90,000	× .40 = 1,56,000	(2,60,000 ÷ 100 x 50)	1,30,000
S	1,60,000	× .40 = 64,000	(1,60,000 ÷ 100 x 50)	80,000
H	6,00,000	× .40 = 2,40,000	(3,00,000 ÷ 100 x 50)	1,50,000
		4,76,000		4,60,000

Statement Showing Break-Even-Point for Product – B



Break Even Point (10,00,000 ÷ 4.70) = 2,12,766 units

Produce (2,12,800 – 2,12,766) = 34 Extra Units

(34 × 8.30) = 282.20

(₹)	
Sales (2,12,766 + 22) × 13	= 27,66,244
Variable Cost (2,12,800 x 830) =	17,66,240
Contribution	10,00,004
Fixed Cost	10,00,000
Profit	X

Opportunity Cost

Case Study – 9

A company can make any one of the 3 products X, Y or Z in a year. It can exercise its option only at the beginning of each year. Relevant information about the products for the next year is given below:

	X	Y	Z
Selling Price (₹ / unit)	10	12	12
Variable Costs (₹ / unit)	6	9	7
Market Demand (unit)	3,000	2,000	1,000
Production Capacity (unit)	2,000	3,000	900
Fixed Costs (₹)	30,000		

Required:

Compute the opportunity costs for each of the products.

Statement Showing Opportunity Cost For Each of the Products

Products	X	Y	Z
Sales Price (P.U)	10.00	12.00	12.00
Variable Price (P.U)	(6)	(9)	(7)
Contribution (P.U)	**4.00**	**3.00**	**5.00**
Total - Contribution	8,000	6,000	4,500
	(4 x 2,000)	(2,000 x 3)	(5 x 900)
Opportunity Cost	10,500	12,500	14,000

Opportunity cost is the maximum possible contribution forgone by not producing alternative product i.e. if Product X is produced then opportunity cost will be maximum of ₹ 6,000 from Y, ₹ 4,500 from Z).

Incremental Revenue / Differential Cost

Case Study – 10

Maruthi Agencies has received an order from a valuable client for supplying 3,00,000 pieces of a component at ₹ 550 per unit at a uniform rate of ₹ 550 per unit at a uniform rate of 25,000 units a month.

Variable manufacturing costs amount to ₹404.70 per unit, of which direct materials is ₹ 355 per unit. Fixed production overheads amount to₹30 lacs per annum, including depreciation. There is a penalty/reward clause of ₹ 30 per unit for supplying less / more than 25,000 units per month. To adhere to the schedule of supply, the company procured a machine worth ₹ 14.20 lacs which will wear out by the year and will fetch ₹ 3.55 lacs at the year end. After this supply of machine, the supplier offers another advanced machine will cost ₹ 10.65 lacs, will wear out by the year end and not have any resale value. If the advanced machine is purchased immediately, the purchaser will exchange the earlier machine supplied at the price of the new machine. Fixed costs of maintaining the advanced machine will increase by ₹ 14,200/- per month for the whole year. While the old machine had capacity to complete the production in 1 year, the new machine can complete the entire job in 10 months. The new machine will have material wastage of 0.5%. Assume uniform production throughout the year for both the machines.

Required:

Using incremental cost/revenue approach, decide whether the company should opt for the advanced version.

Solution	Old (₹)	New (₹)	Incremental
Depreciation (₹ 14.20 lakhs - ₹ 3.55 lakhs)	10,65,000	10,65,000	
Fixed Cost Increase (12 months x ₹ 14,200)	---	1,70,400	(-) 1,70,400
Resale Value	3,55,000	---	(-) 3,55,000
Material (₹ 355 x 0.5% x 3,00,000 pieces)	---	5,32,500	(-) 5,32,500
Increase in Costs in New Machine Purchased			(-) 10,57,900
Penalty ₹ 30 per unit	---	---	---
Reward ₹ 30 per unit (5,000 units per month x 10 months x ₹ 30) (5,000 units per month x 10 months x ₹ 30)	---	15,00,000	15,00,000
Gain			**4,42,100**

Decision

Buy the advanced version.

Working Note

Old Machine's Production is 25,000 units per month. Hence, no penalty and no reward.

New Machine's Production is 30,000 units $\left(\frac{3,00,000}{10 \text{ months}}\right)$ per month.

Hence, there is reward for 5,000 units (30,000 units -25,000 units) per month.

Case Study – 11

The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System:

	A Manual (₹)	B Semi - Automatic (₹)	C Fully -Automatic (₹)
Monthly fixed costs:			
Occupancy	15,000	15,000	15,000
Maintenance Contract	---	5,000	10,000
Equipment lease	---	25,000	1,00,000
Unit variable costs (per report):			
Supplies	40	80	20
Labour	₹ 200 (5 hrs x ₹ 40)	₹ 60 (1 hr x ₹ 60)	₹ 20 (0.25 hr x ₹ 80)

Required:

(i) Calculate cost indifference points. Interpret your results.

(ii) If the present case load is 600 cases and it is expected to go up to 850 cases in near future, which method is most appropriate on cost considerations?

Solution

	A	B	C
Variable Cost (P.U)			
Supplies -Material	40	80	20
Labour	200 (5 hr. x 40)	60 (1 x 60)	20 (0.25 x 80)
	240	**140**	**40**
Fixed Cost			
Occupancy	15,000	15,000	15,000
M- Cost	–	5,000	10,000
Equipment Lease	–	25,000	1,00,000
	15,000	**45,000**	**1,25,000**

Ans No. (i)
No. of Units Sold = *x*

A & B
240 *x* + 15,000 = 140 *x* + 45,000
100 *x* = 30,000
***x* = 300 units (Cases)**
A & C

240 *x* + 15,000 = 40 *x* + 1,25,000
240 *x* = 1,10,000
***x*= 550 (Cases)**
B & C

140 *x* + 45,000 = 40 *x* + 1,25,000
100 *x* = 80,000
***x*= 800 (Cases)**

	Cases ≤ 300 300 ≥ ≤ 800 ≥ 800	A B C
Ans No. (ii)	600 → B 850 → C	

Case Study – 12

X Ltd. wants to replace of its old machines. Three alternative machines namely M_1, M_2 and M_3 are under its consideration. The costs associated with these machines are as under:

		M_1 ₹	**M_2** ₹	**M_3** ₹
Direct material cost per unit	…….	50	100	150
Direct labour cost per unit	…….	40	70	200
Variable overhead per unit	…….	10	30	50
Fixed cost per annum	…….	2,50,000	1,50,000	70,000

Required:

i) Compute the cost indifference points for these alternatives.
ii) Based on these points suggest a most economical alternative machine to replace the old one when the expected level of annual production is 1,200 units.

	M_1	**M_2**	**M_3**
Direct Material	50.00	100.00	150.00
Direct Labour	40.00	70.00	200.00
Variable Overhead	10.00	30.00	50.00
Variable Cost	100	200	400
Fixed Cost	2,50,000	1,50,000	70,000

Statement Showing In Difference Points M_1& M_2

No. of units = x
100 x + 2,50,000 = 200 x + 1,50,000
− 100 x = − 1,00,000

***x* = 1,000 units**

M_2 and M_3
200 x + 1,50,000 = 400 x + 70,000
− 200 x = − 80,000
− ***x* = 400 units**

$M_1$and M_3

100 x + 2,50,000 = 400 x + 70,000
− 300 x = − 1,80,000

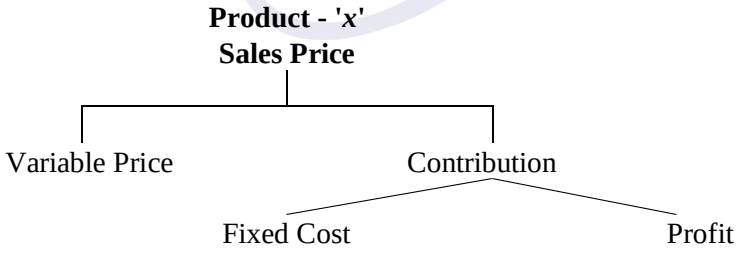
***x* = 600 units**

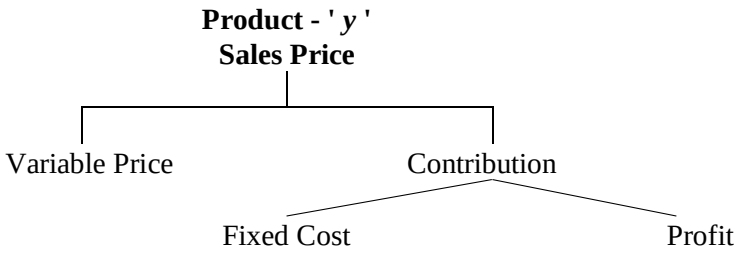
Ans No. (ii) **Decision**
If Production = 1,200 units - **M_1**

Case Study – 13

XY Ltd. makes two products X and Y, whose respective fixed costs are F_1 and F_2. You are given that the unit contribution of Y is one. Fifth less than the unit contribution of X, that the total of F_1 and F_2 is ₹ 1,50,000, that the BEP of X is 1,800 units (for BEP of X F_2 is not considered) and that 3,000 units is the indifference point between X and Y. (i.e. X and Y make equal profits at 3,000 unit volume, considering their respective fixed costs). There is no inventory buildup as whatever is produced is sold.

Required:
Find out the values F_1 and F_2 and units contributions of X and Y.
Given
(*x*) → Break –Even Point 1,800 Units





($F_1 + F_2$) = **1,50,000**
Break –Even Point '*x*' = 1,800 Units / Indifference Points = 3,000
F_1 = 1,800 $\mathbf{C}_x$
F_2 = 1,50,000 – 1,800 $\mathbf{C}_x$

Equal Profit = 3,000 Units

3,000 $\mathbf{C}_x$ – F_1 = 3,000 x 0.8 $\mathbf{C}_x$ – F_2
3,000 $\mathbf{C}_x$ – F_1 = 2,400 $\mathbf{C}_x$ – F_2

Contribution - Fixed Cost	=	Contribution - Fixed Cost
3,000 $\mathbf{C}_x$ – 1,800 $\mathbf{C}_x$	=	2,400 $\mathbf{C}_x$ – (1,50,000 – 1,800 *x*)
3,000 $\mathbf{C}_x$ – 1,800 $\mathbf{C}_x$	=	2,400 $\mathbf{C}_x$ – 1,50,000 – 1,800 *x*
1,200 $\mathbf{C}_x$	=	4,200 *x* – 1,50,000
– 3,000 *x*	=	– 1,50,000
x	=	50.00

Fixed Cost = (1,800 x 50) = 90,000
Fixed Cost = (1,50,000 - 90,000) = 60,000

x = 50.00
y = (50 x 80 %) = **40**

Case Study – 14

XL Polymers, located in Sahibabad Industrial Area, manufactures high quality industrial products. AT Industries has asked XL Polymers for a special job that must be completed within one week.

Raw material R_1 (highly toxic) will be needed to complete the AT Industries' special job. XL Polymers purchased the R_1 two weeks ago for ₹ 7,500 for a job 'A' that recently was completed. The R_1 currently in stock is the excess from that job and XL Polymers had been planning to dispose of it. XL Polymers estimates that it would cost them₹ 1,250 to dispose of the R_1. Current replacement cost of R_1 is ₹ 6,000.

Special job will require 250 hours of labour G_1 and 100 hours of labour G_2. XL Polymers pays their G_1 and G_2 employees ₹ 630 and ₹ 336 respectively for 42 hours of work per week.

XL Polymers anticipates having excess capacity of 150 [G_1] and 200 [G_2] labour hours in the coming week. CLL Polymers can also hire additional G_1 and G_2labour on an hourly basis; these part- time employees are paid and hourly wage based on the wages paid to current employees.

Suppose that material and labour comprise XL Polymer's only costs for completing the special job.

Required:

CALCULATE the 'Minimum Price' that XL Polymers should bid on this job?

Statement Showing Minimum Price (As Per Relevant Cost)

Particulars	₹	Reasons
Raw Material – R_1	1,250	(No - use)
(Saving in Disposal Cost)		(opportunity gain)
Labour G_1		
Hrs. Required 250	(1,500)	Future out flow
Hrs. Available (150)		
100		
Hourly rate X		
(630 ÷ 42 hrs.) = 15		
G_2	–	Capacity
Minimum Price	**(250)**	Available

Case Study – 15

A company has to decide whether to accept a special order or not for a certain product M in respect of which the following information is given:

Material A required	5,000 Kg	Available in stock. It was purchased 5 years ago at ₹ 35 per kg. if not used for M, it can be sold as scrap @ ₹ 15 per kg.
Material B required	8,000 Kg	This has to be purchased at ₹ 25 per kg from the market.
Other hardware items	₹ 10,000	To be incurred
Dept X - Labour oriented	5 men for 1 month @ ₹ 7,000 per month per man	Labour to be freshly hired. No spare capacity available.
Dept Y - Machine Oriented	3,000 machine hours @ ₹ 5 per machine hour	Existing spare capacity may be used.
Pattern and Specification	₹ 15,000	To be incurred for M, but after the order, it can be sold for ₹ 2,000

Required:

Considering relevant costs, find out the minimum value above which the company may accept the order.

Statement Minimum Price (As Per –Relevant Cost)

Particulars	₹	Reasons
(1) Material 'A'	75,000	No -Use
	(5,000 kg x 15)	Real - Value
(2) Material 'B'	2,00,000	Future Out Flow
	(8,000 kg x 25)	
(3) Other Hardware Item	10,000	Future Out Flow
(4) Dept - X	35,000	Future Out Flow
	(5 Men x 1 Month x 7,000)	
(5) Dept - Y		Fixed (Idle - Capacity)
(6) Pattern & Specification	13,000	Net - future outflow
	(15,000 - 2,000)	

Case Study – 16

S Limited is engaged in manufacturing activities. It has received a request from one of its important customers to supply a product which will require conversion of material 'M', which is a non – moving item.

The following details are available:

Book value of material M …….. ₹ 60

Realizable value of material M …….. ₹ 80

Replacement cost of material M …….. ₹ 100

It is estimated that conversion of one unit of 'M' into one unit of the finished product will require one labour hour. At present,labour is paid at the rate of ₹ 20 per hour. Other costs are as follows:

Out-of-pocket expenses …….. ₹ 30 per unit

Allocated overheads …….. ₹ 10 per unit

The labour will be re-deployed from other activities. It is estimated that the temporary redeployment will not result in loss of contribution. The employees to be re-deployed are permanent employees of the company.

Required:

Estimate the minimum price to be charged from the customer so that the company is not worse off executing the order.

Statement Showing Analysis of Minimum Cost As Per Relevant Cost (∵Existing Business)

	₹	Reasons
1. Material M	₹ 80	Nonmoving house ∴ realizable value
2. Out of Pocket Expenses	₹ 30	Out of pocket ∴ Future Cost
3. Allocated Overheads	0	(fixed in nature) (These overheads already existed. They are only being allocated now. ∴ Not Relevant Sunk Cost)
4. labour	fixed	Permanent Nature (∴ Irrelevant)
Minimum Cost	**110**	

Case Study – 17

Golden Bird Airlines Ltd. operates its services under the brand 'Golden Bird'. The 'Golden Bird' route network spans prominent business metropolis as well as key leisure destinations across the Indian subcontinent. 'Golden Bird', a low –fare carrier launched with the objective of commoditizing air travel, offers airline sears at marginal premium to train fares across India.

Profits of the 'Golden Bird' have been decreasing for several years. In an effort to improve the company's performance, consideration is being given to dropping several flights that appear to be unprofitable.

Income statement for one such flight from 'New Delhi' to 'Leh' (GB -022) is given below per flight):

	₹	₹
Ticket Revenue (175 seats x 60 % Occupancy x ₹ 7,000 ticket price)		7,35,000
Less: Variable Expenses (₹ 1,400 per person)		1,47,000
Contribution Margin		5,88,000
Less: Flight Expenses:		
Salaries, Flight Crew	1,70,000	
Salaries, Flight Assistants	31,500	
Baggage Loading and Flight Preparation	63,000	
Overnight Costs for Flight Crew and Assistants at destination	12,600	
Fuel for Aircraft	2,38,000	
Depreciation on Aircraft	49,000*	
Liability Insurance	1,47,000	
Flight Promotion	28,000	
Hanger Parking Fee for Aircraft at destination	7,000	7,46,100
Net Gain / (Loss)		(1,58,100)

(*) Based on obsolescence

The following additional information is available about flight GB -022.

1. Members of the flight crew are paid fixed annual salaries, whereas the flight assistants are paid by the flight.
2. The baggage loading and flight preparation expense is an allocation of ground crew's salaries and depreciation of ground equipment.
3. One third of the liability insurance is a special charge assesses against flight is in a "high –risk area.
4. The hanger parking fee is a standard fee charged for aircraft at all airports.
5. If flight GB -022 is dropped, 'Golden Bird' Airlines has no authorization at present to replace it with another flight.

Required:

Using the data available, prepare an analysis showing what impact dropping flight GB -022 would have on the airline's profit.

Solution **Statement Showing Impact on Airline's Profit if Flight GB-022 is Discontinued**

	₹	₹
Contribution Margin lost if the flight is discontinued		(5,88,000)
Less: Flight Costs which can be avoided if the flight is discontinued:		
Flight Promotion	28,000	
Fuel for Aircraft	2,38,000	
Liability Insurance (1/3 x ₹ 1,47,000)	49,000	
Salaries, Flights Assistants	31,500	
Overnight Costs for Flight Crew and Assistants	12,600	3,59,100
		(2,28,900)

If Golden Bird Airlines Ltd. goes for discontinuation of flight GB -022, its profit will go down by ₹ 2,28,900.

Following costs are not relevant to the decision:

- ✓ Salaries, flight crew –Fixed annual salaries which will not change
- ✓ Baggage loading and flight preparation –This is an allocated cost, which will continue even if the flight is discontinued.
- ✓ Depreciation of aircraft –Sunk Cost
- ✓ Liability insurance (two third) –Sunk Cost
- ✓ Hanger parking fee –This cost will be incurred regardless of whether the flight is made.

Case Study – 18

A company had nearly completed a job relating to construction of specialized equipment, when it discovered that the customer had gone out of business. At this stage, the position of the job was as under

	(₹)
Original cost estimate	1,75,200
Costs incurred so far	1,48,500
Costs to be incurred	29,700
Progress payment received from original customer	1,00,000

After searches, a new customer for the equipment has been found. He is interested to take the equipment, if certain modifications are carried out. The new customer wanted the equipment in its original condition,

but without its control device and with certain other modifications. The costs of these additions and modifications are estimated as under:

Direct Materials (at cost)	₹ 1,050
Direct Wages Department : A	15 men days
Department : B	25 men days
Variable Overheads	25 % of Direct Wages in each Department
Delivery Costs	₹ 1,350

Fixed overheads will be absorbed at 50% of direct wages in each department.

The following additional information is available:

1) The direct materials required for the modification are in stock and if not used for modification of this order, they will be used in another job in place of materials that will now cost ₹ 2,250.
2) Department A is working normally and hence any engagement of labour will have to be paid at the direct wage rate of ₹ 120 per man day.
3) Department B is extremely busy. Its direct wages rate is ₹ 100 per man day and it is currently yielding a contribution of ₹ 3.20 per rupee of direct wages.
4) Supervisory overtime payable for the modification is ₹ 1,050.
5) The cost of the control device that the new customer does not require is ₹ 13,500. If it is taken outit can be used in another job in place of a different mechanism. The latter mechanism has otherwise to be bought for ₹ 10,500. The dismantling and removal of the control mechanism will take one man day in department A.
6) If the conversion is not carried out, some of the materials in the original equipment can be used in another contract in place of materials that would have cost ₹ 12,000. It would have taken 2 men days of work in department A to make them suitable for this purpose. The remaining materials will realize ₹11,400 as scrap. The drawings, which are included as part for the job can he sold for ₹1,500.
7) **Required:**

Calculate the minimum price, which the company can afford to quote for the new customer as stated above.

Statement Showing Minimum Price

Relevant Cost		
1. Cost to be Incurred	29,700	Future outflow
2. Direct Material	2,250	Opposition Cost
3. Direct Wages		
Department A: (Dept. A is working normally and engagement is paid @120 this line directly means that only if they are engaged they are paid. If not engaged: not paid	1,800 (15 days x 120)	Future outflow
Department B: is extremely busy. This line means workers will have to be got from outside	2,500 (25 days x 100)	Future outflow
Department B	8,000 (2,500 x 3.20)	Opposition Cost
4. Variable Overhead	1,075 25 % (1,800 + 2,500)	Future outflow
5. Delivery Cost	1,350	Future outflow
6. Fixed Overhead	–	Sunk Cost
7. Supervisor	1,050	Future outflow
8. Control Device	(10,350)	note 1
9. If the convention is not carried out	24,600	Opposition Cost
	61,975	

Note No. 1:	Cont Device
	Opportunity Gain
Control Device	10,500
Relevant Cost	(120
1. Department A (120 x 1)	(30
2. Variable Overhead (120 x 25%)	10,350

Note No. (ii) If Convention is not Carried Out

Material	12,000	
Department A (2 x 120)	(240)	
Variable Overhead (25 % x 240)	(60)	11,700
Material		11,400
D & D		1,500
		24,600

∴ Since we carried out it

Case Study – 19

B Ltd. is Company that has, in stock, Materials of type XY that cost ₹ 75000 but those are now obsolete and have a scrap value of only ₹ 21000. Other than selling the material for scrap, there are only two alternative uses for them.

Alternative-1

Converting the obsolete materials in to a specialized product, which would require the following additional work and materials:

Material A	600 units
Material B	1,000 units
Direct Labour	
5,000 hours unskilled	
5,000 hours semi-skilled	
5,000 hours highly skilled	
Extra selling and delivery expenses	₹ 27,000
Extra advertising	₹ 18,000

The conversion would produce 900 units of saleable product and these could be sold for₹ 300 per unit.

Material A is already in stock and is widely used within the firm. Although present stocks together with orders already planned, will be sufficient to facilitate normal activity and extra material used by adopting this alternative will necessitate such materials being replaced immediately. Material B is also in stock, stock, but is unlikely that any additional supplies can be obtained for some considerable time, because of an industrial dispute. At the present time material B is normally used in the production of product Z, which sells ₹390 per unit and incurs total variable cost (excluding Material B) of ₹ 210 per unit. Each unit of product Z uses four units of Material B. The details of Materials A and B are as follows:

	Material A (₹)	**Material B (₹)**
Acquisition cost at the time of purchase	100 per unit	₹ 10 per unit
Net realizable value	85 per unit	₹ 18 per unit
Replacement cost	90 per unit	

Alternative -2

Adopting the obsolete materials for use as a substitute for a sub –assembly that is regularly used within the firm. Details of the extra work and materials required are as follows:

Material C 1,000 units

Direct Labour :

4,000 hours unskilled

1,000 hours semi -skilled

4,000 hours highly skilled

1,200 units of sub –assembly are regularly used per quarter at a cost of ₹ 900 per unit. The adaptation of material XY would reduce the quantity of the sub –assembly purchased from outside the firm to 900 units for the next quarter only. However, since the volume purchased would be reduced, some discount would be lost and the price of those purchased from outside would increase to ₹ 1,050 per unit for that quarter.

Material C is not available externally thought 1,000 units required would be available from stocks, it would be produced as extra production. The standard cost per unit of Material C would be as follows:

	(₹)
Direct labour, 6 hour unskilled labour	18
Raw materials	13
Variable Overhead : 6 hours at ₹ 1	6
Fixed Overhead : 6 hours at ₹ 3	18
	55

The wage rate and overhead recover rates for B Ltd. are:

Variable Overhead	₹ 1 per direct labour hour
Fixed Overhead	₹ 2 per direct labour hour
Unskilled labour	₹ 3 per direct labour hour
Semi -skilled labour	₹ 4 per direct labour hour
Highly skilled labour	₹ 5 per direct labour hour

The unskilled labour is employed on a casual basis and sufficient labour can be acquired to exactly meet the production requirements. Semi –skilled labour is part of the permanent labour force, but the company has temporary excess supply of this type of labour at the present time. Highly skilled labour is in short supply and cannot be increased significantly in the short –term, this labour is presently engaged in meeting the, demand for product L, which requires 4 hours of highly skilled labour. The contribution from the sale of one unit of product L is ₹ 24.

Required:

Present cost information advising whether the stocks of Material XY should be sold, converted into a specialized product (Alternative 1) or adopted for use as a substitute for a sub –assembly (Alternative 2).

Alternative -1Statement Showing Analysis of Proposal
(As Per –Relevant Cost) Conversion V/s Immediate Sale

	(₹)	Reasons
(A) Sales Revenue	2,70,000	Future Inflow
(900 x 300)		
(B) Relevant Cost		
Material X,Y	(21,000)	Opp -Cost
Material A	(54,000)	Regular
	(600 x 9)	Use -Rep
Material B	(45,000)	Cost
		(Note No.1)
Direct Labour	(15,000)	Future Outflow
(Unskilled -Labour)	(5,000 x 3)	
Direct Labour		
(Semi -skilled)	Nil	
Direct Labour (Highly - Skilled)	(55,000)	(Note No.2)
Variable Overheads	(15,000)	Future Outflow
	(15,000 hrs. x 1)	
Extra Selling And Delivery Expenses	(27,000)	Future Outflow
Extra Advertising Expenses	(18,000)	Future Outflow
Advertising Expenses	–	Fixed
Net Savings	**20,000**	

Note No. 1 Material 'B'
Diversion of Material B For the Product of Product '**₹**'
Excess of Relevant Revenues:-
(390 – 210) = 180

Input 'B'	**Output '₹'**
4	1
1,000	250
(250 x 180)	= **45,000**

Note No.2

Unskilled labour can be matched exactly to the company's production requirements. Hence acceptance of either alternative 1 or 2 will cause the company to incur additional unskilled labour cost at ₹ 3 for each hour. It is assumed that the semi –skilled labour will be able to meet the extra requirements of either alternatives at no extra cost to the company. Hence, cost of semi –skilled labour will not be relevant. Skilled labour is in short supply and can only be obtained by reducing the production of product L, resulting in a loss of contribution of ₹24(given) or ₹6 per hour of skilled labour. Hence the relevant labour cost will be ₹ 6 (contribution lost per hour) + ₹5 (hourly rate of skilled labour) i.e. ₹11 per hour.

Alternative -2 Adaptation

Particulars	(₹)	Reasons
Normal Spending = 10,80,000		
(1,200 x 900)		
Revised Spending		
(900 x 1,050) **9,45,000**	1,35,000	(Note No. 1)
(Note No.1)		
Relevant Cost		
Material XY	(21,000)	Opposition Cost
Material 'C'	(37,000)	(Note No. 2)
Direct Labour (Unskilled)	(12,000)	
(4,000 hrs. x 3)		
Direct Labour (Semi -skilled)	–	
Direct Labour (Highly -skilled)	(44,000)	(Note No.3)
(4,000 x 11)		
Variable Overheads	(9,000)	(Note No.4)
(9,000 x 1)		
Net Relevant Saving	**12,000 ₹**	

Note No.1

The cost of purchasing the sub –assembly will be reduced by ₹1,35,000 if the second alternative is chosen and so these savings are relevant to the decision.

Note No.2

The company will incur additional variable costs of ₹37 for each unit of material C that is manufactured, so the fixed overheads of material C viz. ₹18 per unit is not a relevant cost.

Note No. 3

Unskilled labour can be matched exactly to the company's production requirements; Hence acceptance of either alternative 1 or 2 will cause the company to incur additional unskilled labour cost at ₹3 for each hours. It is assumed that the semi –skilled labour will be able to meet the extra requirements of either alternative at no extra cost to the company. Hence, cost of semi –skilled labour will not be relevant. Skilled labour is in short supply and can only be obtained by reducing the production of product L, resulting in a loss of contribution of ₹24 (given) or ₹6 per hour of skilled labour. Hence the relevant labour cost will be ₹6 (contribution lost per hour) + ₹5 (hourly rate of skilled labour) i.e. ₹11 per hour.

Note No. 4

It is assumed that for each direct labour of input, variable overhead will increase by ₹1 hence for each alternative using additional direct labour hours, variable overheads will increase.

Sale or Further Processing Decision

Case Study – 20

A process industry unit manufactures three joint products: A, B and C. C has no realizable value unless it undergoes further processing after the point of separation. The cost details of C are as follows:

		p.u ₹
Upto point of separation		
Marginal Cost	……	30
Fixed Cost	……	20
After point of separation		
Marginal Cost	……	15
Fixed Cost	……	5
		70

C can be sold at ₹ 37 per unit and no more.

i) Would you recommend production of C?

ii) Would your recommendation be different if A, B and C are not joint products?

Statement Showing Analysis of Proposal

	₹
Sales Price At (P_2) =	37
Variable Price At (P_2) =	(20)
Fixed Cost (P_2) =	(5)
Inc - Profit	12

Decision - P_2

Ans No. (ii) Statement Showing Analysis

Selling Price	37
Variable Price (30 + 15)	(45)
	(8)

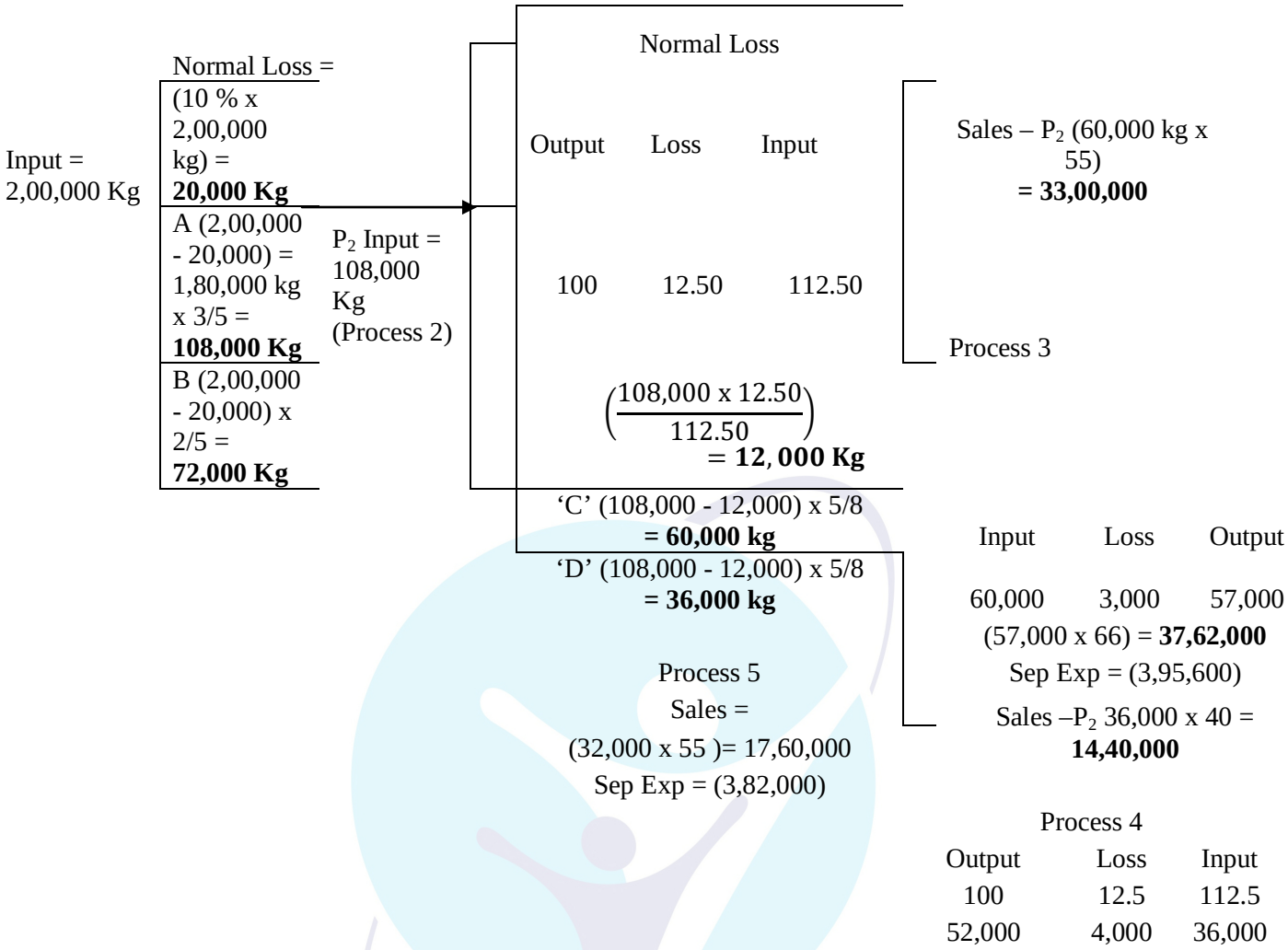
Decim–No

Case Study – 21

A company processes different products from a certain raw material. The raw material is processed in process 1(where normal loss is 10% of input) to give products A and B in the ratio 3:2. B is sold directly. A is processed further in process 2 (where normal loss is 12.5% of output) to give products C and D in the ratio 5:3. At this point C and D have sales values ₹55 and ₹40 per kg respectively.C can be processed further in process 3 with processing cost ₹3,95,600 and normal wastage 5% of input and then be sold at ₹66 per kg. D can be processed further in process 4 with processing cost ₹3,82,500 and normal wastage 12.5% of output and then be sold at ₹ 55 per kg. the normal wastage of each process has no realizable value. During the production period, 2,00,000kgs of raw material is to be introduced into Process 1.

Required:

Using incremental cost –revenue approach, advise whether sale at split off or further processing is better for each of the products C and D.



Statement Showing Analysis of Proposal

Products	'C'	'D'
	₹	₹
Sales at	37,62,000	17,60,000
	Process 3	Process 4
Sales at P_2	(33,00,000)	(14,40,000)
Inc - Sales	4,62,000	3,20,000
Sep Exp	(3,95,600)	(3,82,500)
Inc-Profit/Loss	66,400	(62,500)
	Process	P
	Further	Sales at
	Process	Split off

Decision on Accepting / Quoting an Order

Case Study – 22

PQR Ltd., a manufacturer of tool kits has just completed XY's domestic order of 100 kits at a price of ₹ 1,650 per kit. The details of cost for XY's order are:

	Cost (₹)
Direct Material	90,000
Direct Labour	32,000
Tools and Consumables	16,400
Variable Overheads	9,600
Fixed Overheads (allocated)	15,000
Total	1,63,000

The company wishes to evaluate a special export order from Expo Ltd. of similar 300 kits at ₹ 1,600 per kit. For the export order, special packing has to be done at ₹ 20 per kit. An additional fixed inspection cost specific to this export order has to be incurred. The allocation of fixed overheads will be revised to increase by ₹ 25,000. Tools and Consumables above include special purpose tool costing ₹ 10,000 incurred for XY's order and these can be reused for the export order and the remaining portion is variable. PQR Ltd. wishes to accept the export order at 10% profit on the selling price.

Required:

i) What should be the maximum amount that can be incurred as inspection cost for making such an acceptance possible?

ii) If Expo Ltd. offers to take the products without inspection, what is the maximum discount (as a percentage of the existing export price) that PQR Ltd. can offer to retain its 10% profit on the revised selling price? (Round off calculations to two decimal places).

Statement Showing Permissible Cost Per Kit

1,600 = Export -Price Per Kit (Offer)

- Variable Cost (1,600 - 160) 1,440
  - Variable Cost
    - P.U
    - Direct Material $\left(\frac{90,000}{100\ \text{Kit}}\right) = 900$
    - Direct Labour $\left(\frac{32,000}{100}\right) = 320$
    - Tools Con $\left(\frac{16,400}{100}\right) - 10,000 = 64$
    - Variable Overhead $\left(\frac{9,600}{100}\right) = 96$
    - Special Packing = 20
    - **1,400**
  - Maximum Inspection Cost Per Kit For making Export Offer Acceptable
    - (1,440 - 1,400) = 40
- Contribution 160
  - Fixed Cost (Not - Relevant)
  - Profit 160 (10 % x 1,600)

As Total Cost excluding Inspection Cost is ₹1,400 so the Selling Price will be ₹1,555.56

$$\ldots\left(₹\,1{,}400 \times \frac{100}{90}\right)$$

Maximum Possible Discount on the Revised Selling price is ₹44.44

$$\ldots (₹1{,}600 - ₹1{,}555.56)$$

Percentage of Discount is 2.77%

$$\ldots\left(\frac{₹\,44.44}{₹1{,}600} \times 100\right)$$

Hence **Maximum Discount of 2.78 per cent** can be offered to retain 10% Profit on the Revised Selling Price.

Allocated Fixed Overheads amounting to ₹25,000 and Reusable Special Tools amounting to ₹10,000 are irrelevant and hence ignored in the decision making process.

Case Study – 23

HTM Ltd., by using 12,00,000 units of a material M produces jointly 2,00,000 units of H and 4,00,000 units of T. The costs and sales details are as under:

		₹
Direct Material M @ ₹ 5 per unit	……	60,00,000
Other variable costs	……	42,00,000
Total fixed costs	……	18,00,000
Selling price of H per unit	……	25
Selling price of T per unit	……	20

The company receives an additional order for 40,000 units of T at the rate of ₹15 per unit. If this order has been accepted, the existing price of T will not be affected. However, the present price of H should be reduced evenly on the entire sale of H to market the additional units to be produced.

Required:

Find the minimum average unit price to be charged on H to sustain the increased sales.

Note No. 1 (Given)

	₹
'H' 2,00,000 Units x 25 = 50,00,000	
20, 000 Units	
$(10{,}20{,}000 - 6{,}00{,}000) = \left(\frac{4{,}20{,}000 + 50{,}00{,}000}{2{,}20{,}000}\right)$	
= 2,464	

Material 'M'

Input = **12,00,000 Units** 'T' 4,00,000 Units x 20 = 80,00,000

40,000 x 15 = 6,00,000

	₹
Direct Material =	60,00,000
Other Variable Cost	42,00,000
	102,00,000
Fixed Cost =	**18,00,000**
Additional Input =	1,20,000

Additional Variable Cost

$$\left(\frac{102,00,000}{12,00,000} \text{ x } 1,20,000\right)$$

= 10,20,000

Case Study – 24

A company has prepared the following budget for the forthcoming year:

	(₹ in lakhs)
Sales	20.00
Direct materials	3.60
Direct labour	6.40
Factory overheads	
Variable	2.20
Fixed	2.60
Administration overheads	1.80
Sales commission	1.00
Fixed selling overheads	0.40
Profit	**2.00**

The policy of the company is fixing selling prices is to charge all overheads other than the prime costs on the basis of percentage of direct wages and to add a mark –up of one –ninth of total costs for profit.

While the company is confident of achieving the budget drawn up as above, a new customer approached the company directly for execution of a special order. The direct materials and direct labour costs of the special order are estimated respectively at ₹ 36,000 and ₹ 64,000. This special order is in excess of the budgeted sales as envisaged above. The company submitted a quotation of ₹ 2,00,000 for the special order based on its policy. The new customer is willing to pay a price of ₹ 1,50,000 for the special order. The company is hesitant to accept the order below total cost as, according to the company management, it will lead to a loss.

Required:

State your arguments and advise the management on the acceptance of the special order.

Statement Showing Analysis of Cost & Profit

		(₹ lakhs)
Prime Cost		
(1) Direct Material		3.60
(2) Direct Labour		6.40
	Prime Cost	**10.00**
Indirect Cost (Overheads)		8.00
(1) Variable Factory Overhead =	2.20	
(2) Fixed Factory Overhead =	2.60	
(3) Administration Overhead =	1.80	
(4) Selling Overheads (Commission) =	1.00	
(5) Fixed Selling Overhead =	0.40	
	8.00	
	Total Cost	**18**
Profit $\left(18 \text{ x} \frac{1}{9}\right)$		2
		20

Statement Showing Overheads Absorption Rate

$$\text{Absorption Rate} = \left(\frac{\text{Overheads}}{\text{Wages}} \text{ x } 100\right)$$

$$125\ \% = \left(\frac{8}{6.40}\right) \text{ x } 100$$

Statement Showing Break Up of New –Order

		₹
Direct Cost :-		
(1) Direct Material		36,000
(2) Direct Labour		64,000
	Prime Cost	**1,00,000**
Indirect Cost :-		
Overheads Administration (125% x 64,000) =		80,000
	Total Cost	**1,80,000**
	Profit $\left(1{,}80{,}000 \text{ x} \frac{1}{9}\right)$	20,000
	Selling Price	**2,00,000**

The following points emerge:

i. Factory overheads only are to be recovered on the basis of direct wages.
ii. The special order is a direct order. Hence commission is not payable.
iii. The budgeted sales are achieved. Hence all fixed overheads are recovered. Hence, no fixed overheads will be chargeable to the special order.

Based on the above, the Factory Variable Overheads recovery rate may be calculated as under-

Total Variable Factory Overheads	₹ 2.20 lakhs
Direct Wages	₹ 6.40 lakhs
Factory Overhead Rate (₹ 2.20 / ₹ 6.40 x 100)	34.375%

Applying this rate the Cost of the Special Order will be as under –

	₹
Direct Materials	36,000
Direct Labour	64,000
Overheads (34.375% of Direct Wages)	22,000
Total Costs	1,22,000
Price offered	1,50,000
Margin (More than 1/9)	28,000

Hence, the order is acceptable at the price of ₹ 1,50,000.

Case Study – 25

Satish Enterprises is a leading exporter of Kid's Toys. J Ltd. of USA has approached Satish Enterprises for exporting a special toy named "Jumping Monkey". The order will be valid for next three years at 3,000 toys per month. The export price of the toy will be $ 4.

Cost data per toy is as follows:

Materials	……	₹ 60
Labour	……	₹ 25
Variable Overheads	……	₹ 20
Primary packing of the toy	……	₹ 15

The toys will be packed in lots of 50 each. For this purpose a special box, which will contain the 50 toys will have to be purchased, cost being ₹ 400 per box.

Satish Enterprises will also have to import a special machine for making the toys. The cost of the machine is₹ 24,00,000 and duty thereon will be at 12%. The machine will have an effective life of 3 years and depreciation is to be charged on straight-line method. Apart from depreciation, annual fixed overheads is estimated at₹ 4,00,000for the first year with 6% Increase in the second year. Fixed overheads are incurred uniformly over the year.

Assuming the average conversion rate to be ₹ 50 per $.

Required:

i. Prepare monthly and yearly profitability statements for the first year and the second year assuming the production at 3,000 toys per month.
ii. Compute monthly and yearly break- even units in respect of the first year.
iii. In what contingency can there be a second break – even point for the month and for the year as a whole?
iv. Have you any comments to offer on the above?

Expenses Production Sales/3,000 units (per month)

Sales price (per unit) = 50 x $ U = ₹ 200

Variable Cost		Contribution
Material	60	₹ 80
Labour	25	
Variable Overhead	20	
Packing	15	
	120	

Cost (1-50 toys) = ₹ 400 → specific cost

Depreciation is a Fixed Cost

Fixed Cost	Year 1	Year 2
Fixed Overhead	4,00,000	4,24,000 (4 lakhs + 6 %)
Depreciation	8,96,000	8,96,000
	12,96,000	13,20,000

Cost of Machine

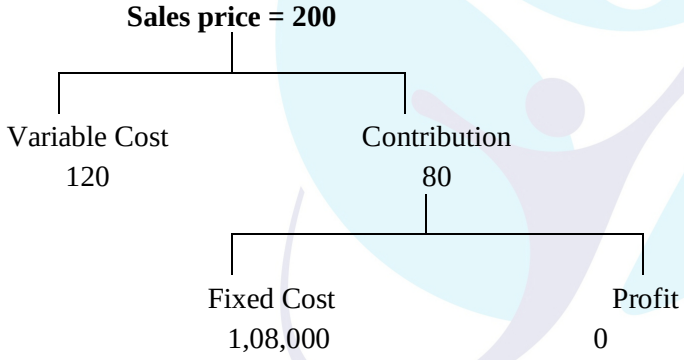
Depreciation (per annum) 24,00,000 + 12 % duty = 26,88,000
÷ Life = 3
∴ Depreciation per annum = 8,96,000

(i) Statement Showing Analysis of Profit & Loss

	Year 1		Year 2	
	Monthly 3,000 Nos.	**Yearly 36,000 Nos.**	**Monthly 3,000 Nos.**	**Yearly 36,000 Nos.**
Sales @ ₹ 200	6,00,000	72,00,000	6,00,000	72,00,000
Variable Cost @ 120	(3,60,000)	(43,20,000)	(3,60,000)	(43,20,000)
Contribution	2,40,000	28,80,000	2,40,000	28,80,000
Fixed Cost	(1,08,000)	(12,96,000)	(11,10,000)	(13,20,000)
Box Cost :	(24,000) $\left(\frac{3,000}{50} \text{ x } 400\right)$	(2,88,000) $\left(\frac{3,600}{50} \text{ x } 400\right)$	(24,000) $\left(\frac{3,000}{50} \text{ x } 400\right)$	(2,88,000) $\left(\frac{3,600}{50} \text{ x } 400\right)$
Profit/Loss	1,08,000	12,96,000	1,06,000	12,72,000

(ii) Monthly & Yearly Break-Even-Point for year 1

Monthly



Break Even Point (without box) = 1,08,000 ÷ 80 = 1,350 toys

$$\text{Break Even Point (Box)} = \frac{1,350}{50} = 27 \text{ boxes} = \frac{27 \text{ x } 400}{80} = 135 \text{ toys}$$

$$\text{Break Even Point (Box)} = \frac{135}{50} = 2.7 \text{ boxes} = 3 \text{ boxes}$$

3 × 50 = 150 toys we have 135 toys
∴ Balance = 15

$$\text{Cost of 3 Boxes} = \frac{3 \text{ x } 400}{80} = 15 \text{ toys}$$

1,500 toys

Yearly very very important: - for yearly you cannot calculate x12, you have to calculate it again

Break-Even-Point (without box) = 12,96,000 ÷ 80 = 16,200 toys.

$$\text{Break} - \text{even point(box)} = \frac{16{,}200}{50} = 324 \text{ boxes}$$

$$= \frac{324 \text{ x } 400}{80} \qquad = 1{,}620 \text{ toys}$$

Break Even Point (Box):

$$\frac{1{,}620}{50} = 3{,}204 \cong 33 \text{ boxes}$$

Capital : 33 x 50 = 1,650 (-) 1,620 = Balance 30

$$\text{Cost}\left(\frac{33 \text{ x } 400}{80}\right) \qquad = 165 \text{ toys}$$

Pending toy

165 toys we have (-) 30 = 135

$$\text{Box} : \frac{135}{50} = 2.7 \cong 3 \text{ boxes}$$

Capital : 3 x 50 = 150 (-) 135 = Balance 15 toys

$$\text{Cost} : \frac{3 \text{ x } 400}{80} \qquad 15 \text{ toys}$$

18,000 toys

> **Remember:**
> For yearly again you have to calculate the full Break-Even-Point.
>
> **Important :**
> In normal question after break-even point you start making profits. In these type of question that is not the case.

(iii) Statement Showing IInd Break-Even-Point

	Monthly	Yearly
Sales (Assume)	1,501	18,001
Break Even Point (In Units)	1,500	18,000
Incremental Sales	1	1
Inclusive Contribution	80	80
	(1 x 80)	(1 x 80)
Inclusive Cost (Box Cost) 1 - 50 Nos.	(400)	(400)
	(320)	(320)
	÷ 80	÷ 80
	= 4 toys	= 4 toys
∴ Break-Even-Point	= 1,500 + 1+4	= 18,000+1+4
	= 1,505 toys	= 18,005 toy

(iv) **Comments:** The above break-even point is only possible if all the actual figures area same as per budget.

Case Study – 26

Souvenir Ltd. manufactures medals for winners of athletic events and other contests. Its manufacturing plant has the capacity to produce 10,000 medals each month. The company has current production and sales level of 7,500 medals per month. The current domestic market price of the medal is ₹ 150.

The cost data for the month of March, 2013 is as under:

	(₹)
Variable Costs (that vary with units produced):	
Direct Materials	2,62,500
Direct Manufacturing Labour	3,00,000
Variable Costs (that vary with number of batches):	
Set -ups; Materials Handling; Quality control (150 batches x ₹ 500 per batch)	75,000
Fixed Costs:	
Manufacturing Costs	2,75,000
Marketing Costs	1,75,000

Souvenir Ltd. has received a special one –time only order for 2,500 medals at ₹ 100 per medal. Souvenir Ltd. makes medals for its existing customers in batch size of 50 medals (150 batches x 50 medals per batch = 7,500 medals).

The special order for 2,500 medals requires Souvenir Ltd. to manufacture the medals in 25 batches of 100 each.

Required:

i) Should Souvenir Ltd. accept the special order? Why? Explain briefly.

ii) Suppose the plant capacity was 9,000 medals instead of 10,000 medals each month. The special order must be taken either in full or rejected totally. Should Souvenir Ltd. accept the special order? Why? Explain briefly.

Ans No. (i)

Statement Showing Contribution Margin

Accepting - the Special Order - 2,500 Nos.	
	(₹)
Sales (2,500 Nos. x 100) =	2,50,000
Variable Cost :-	
Direct Material = $\left(\frac{2,62,500}{7,500} \text{ x } 2,500\right)$	(87,500
Direct Manufacturing Labour Cost $\left(\frac{3,00,000}{7,500} \text{ x } 2,500\right)$	(1,00,000)
Setup Material Handling	(12,500)
Quality Control (25 Batches x 500)	

Decision

The above computations show that Souvenir Ltd. should accept the special order since its acceptance would increase the operating profit of the concern by₹50,000.

Ans No. (ii)

Statement Showing "Acceptance of Special Order by Souvenir Ltd."
(When the Plant Capacity was 9,000 Medals)

	(₹)
Gain in Contribution Margin because of Special Order	50,000
Less: Loss of Contribution Margin on Reduction of 1,000 Medals Sales in the Internal Market (Note No. 1)	(65,000)
Loss of Contribution Margin	(15,000)

Decision

The above computations show that the special order of 2,500 medals (when the plant capacity was reduced to 9,000 medals) should not be accepted since this decision will result in a loss of contribution margin by ₹15,000.

Contribution Margin →			**50,000**
Note No. 1	**7,500 Nos.**	**6,500 Nos.**	**1,000 Nos.**
(A) Sales	11,25,000 (7,500 x 150)	9,75,000 (6,500 x 150)	1,50,000
(B) Variable Cost			
Direct - Material	(2,62,500) (7,500 x 35)	(2,27,500) (6,500 x 35)	(35,000)
Direct Manufacturing Labour	(3,00,000) (7,500 x 40)	(2,60,000) (6,500 x 40)	(40,000)
Setup Cost			
Material Handling	(75,000)	(65,000)	(10,000)
Quality Control	(150 x 500)	(130 x 500)	
Profit / Loss	**4,87,500**	**4,22,500**	**65,000**

Make or Buy

Case Study – 27

X is a multiple product manufacturer. One product line consists of motors and the company produces three different models. X is currently considering a proposal from a supplier who wants to sell the company blades for the motors line.

The company currently produces all the blades it requires. In order to meet customer's needs, X currently produces three different blades for each motor model (nine different blades).

The supplier would charge ₹25 per blade, regardless of blade type. For the next year X has projected the costs of its own blade production as follows (based on projected volume of 10,000 units):

Direct materials	……	₹ 75,000
Direct Labour	……	₹ 65,000
Variable Overhead	……	₹ 55,000
Fixed Overhead		
Factory supervision	……	₹ 35,000
Other fixed cost	……	**₹ 65,000**
Total production costs	……	₹ 2,95,000

Assume (1) the equipment utilized to produce the blades has no alternative use and no market value, (2) the space occupied by blade production will remain idle if the company purchases rather than makes the

blades, and (3) factory supervision costs reflect the salary of a production supervisor who would be dismissed from the firm if blade production ceased.

Required:

(i) Determine the net profit or loss of purchasing (rather than manufacturing), the blades required for motor production in the next year.
(ii) Determine the level of motor production where X would be in different between buying and producing the blades. If future volume level were predicted to decrease, would that influence the decision?
(iii) For this part only, assume that the space presently occupied by blade production could be leased to another firm for₹ 45,000 per year. How would this affect the make or buy decision?

Ans No. (i)

Statement Showing In Diff Point

No. of units = x
Manufacture V/s Purchase
$19.5x + 35{,}000 = 25x$
$5.5x = 35{,}000$
x **= 6,364 Units.**

If the space presently occupied by blade production could be leased to another firm for ₹ 45,000 per year, 'X' would face an opportunity cost associated with in house blade production for the 10,000 units of ₹ 4.50 per unit.

New Cost to Make = ₹ 23.00 + ₹ 4.50
= ₹ 27.50

Now 'X' should buy because the cost to make, ₹ 27.50, is higher than the cost to buy, ₹ 25.00.

Given

X - (Multiple Product Manufacturing)
↓

Motor Line -	Blade
Purchase Price =	25.00 Per - Blade
Own -Cost →	10,000 units

	₹
Direct Material =	75,000
Direct Labour =	65,000
Variable Overhead =	55,000
	1,95,000

Fixed Overheads

Factory Supervision	35,000 (Variable)
Other Fixed Cost	65,000 (Fixed)
	1,00,000

Ans No. (i) Statement Showing Analysis of Proposal

	₹
Purchase Cost :- (25 x 10,000)	2,50,000

Manufacturing :- Variable Cost		₹	
Direct Material	(V)	75,000	÷ 10,000 = 7.5
Direct Labour	(V)	65,000	÷ 10,000 = 6.5
Variable Overhead	(V)	55,000	÷ 10,000 = 5.5
Supervision		**35,000**	**19.5**
		2,30,000	

Loss on Purchase (2,30,000 - 2,50,000) = **20,000**

Case Study – 28

Agro caps Ltd., engaged in manufacturing agricultural machinery, and is preparing its annual budget for the coming year. The company has a metal pressing capacity of 20,000 hours, which will be insufficient for manufacture of all requirements of components A, B, C and D.

The company has the following choices -

a) Buy the components entirely from outside suppliers.
b) Buy from outside suppliers and/or use a partial second shift.

The data for the current year are given below:

Standard Production Cost per unit-

	A (₹)	**B (₹)**	**C (₹)**	**D (₹)**
Requirement (in units)	2,000	3,500	1,500	2,800
Variable Cost				
Direct Materials	37	27	25	44
Direct Wages	10	8	22	40
Direct Expenses	10	20	10	60
Fixed Overhead	5	4	11	20
Total Production Cost	62	59	68	164

Direct expense relate to the use of the metal presses which cost ₹ 10 per hour, to operate. Fixed overheads are absorbed as a percentage of direct wages.

Supply of all or any part of the total requirement can be obtained following prices, each delivered to the factory-

Component		**(₹)**
A	……..	60
B	……..	59
C	……..	52
D	……..	168

Second Shift operations would increase direct wages by 25 percent over the normal shift and fixed overhead by ₹ 500 for each 1,000 (or part thereof) second shift hours worked.

Required:

i. Which component, and in what quantities should be manufactured in the 20,000 hours of press time available?
ii. Whether it would be profitable to make any of the balance of components required on a second shift basis instead of buying them from outside suppliers.

Note: It is an existing co-engaged in manufacturing business.

Fixed Cost is not Relevant.

Hours required per unit:

Product	Direct Expenses	
A	10 ÷ 10	1 hour
B	20 ÷ 10	2 hours
C	10 ÷ 10	1 hour
D	60 ÷ 10	6 hours

Statement Showing Loss on Purchase per unit/ per hour & Rank for production:-

		A	B	C	D
	Purchase Price (per unit)	60	59	52	168
(-)	Mfg. Cost (per unit) variable	57	55	57	144
		(62 - 5)	(59-4)	(68 - 11)	(164 - 20)
Hrs. are a limiting factor	Loss on purchase per unit	(3)	(4)	(5)	(24)
				Purchase	
	÷ hours	1	2	1	6
	Loss on purchase per hour	(3)	(2)		(4)
	Rank	II	III		I so that we can save that much loss

Ans (a) Statement Showing Production Plan for Minimum Cost

Hrs. Available	Product	Units	x hours per unit	Total	Balance Hours
20,000	D	2,800	x 6	= 16,800	(20,000 - 16,800)= 3,200
	A	2,000	x1	= 2,000	(3,200 - 2,000) = 1,200
	B	600	x 2	= 1,200	(1,200 - 1,200) = 0

Required of D & A is already met C is being purchased from outside ∴ only product B needs to be looked into i.e. whether to buy or manufactured.

Ans (b)

Statement Showing Analysis

Option I:B: 3,500 - 600
= 2,900 units Purchase
x 59
Purchase Cost: 1,71,100

Option II: Mfg. 2,900 units
Direct Material : 27
Direct Wages : 10 (8 + 25%)
Direct Expenses: 20
57 x 2,900 units
= ₹ 1,65,300
+
Total duets 2nd Shift
100 hrs. worked
₹ 500
₹ 3,000 6,000 hours

2,900 units
x 2
= 5,800 hrs.
= 6,000 hours
∴ Total Cost : 1,65,300
+ 3,000
1,68,300

∴ we should manufacture

Case Study – 29

A firm needs a component in an assembly operation. If it wants to do the manufacturing itself, it would need to buy a machine for ₹4 lakhs which would last for 4 years with no salvage value. Manufacturing costs in each of the four years would be ₹6 lakhs, ₹7 lakhs, ₹8 lakhs and ₹ 10 lakhs respectively. If the firm had to buy the component from a supplier the component would cost ₹9 lakhs, ₹10 lakhs, ₹11 lakhs and ₹14 lakhs respectively in each of the four years.

However, the machine would occupy floor space which could have been used for another machine. This letter machine could be hired at no cost to manufacture an item, the sale of which would produce net cash flows in each of the four years of ₹2 lakhs; it is impossible to find room for both the machines and there are no other external effects. The cost of capital is 10% and P/V factor for each of the 4 years is 0.909, 8.826, 0.751 and 0.683 respectively. Should the firm make the component or buy from outside?

Solution

Year	Present Value Factory at 10%	When the Component is Manufactured		When the Component is Bought	
		Cash Outflows *	Present Value of Cash Outflows	Cash Outflows (Cost of Buying)	Present Value of Cash Outflows
0	1.000	4	4	–	–
1	0.909	6 + 2	7.272	9	8.181
2	0.826	7 + 2	7.434	10	8.26
3	0.751	8 + 2	7.51	11	8.261
4	0.683	10 + 2	8.196	14	9.562
			34.412		34.264

Cash Outflows * means Capital Cost plus Manufacturing Cost plus Opportunity Cost.
The above statement shows that there is a saving in buying the component amounting to ₹ 0.148 lakh (i.e.₹ 34.412 lakhs –34.264 lakhs).
Hence, it is beneficial to buy the component from outside.

Note

It may be noted that the loss of ₹ 2 lakhs of cash inflow for each of the 4 years due to inability of the firm to operate another machine when it manufactures the component has to be treated as an opportunity cost.

Case Study – 30

A company manufactures four products. The annual demand for products, selling prices and variable production costs are as follows:

Products	P	Q	R	S
Demand (Units)	1,20,000	1,86,000	1,71,000	99,000
	₹	₹	₹	₹
Selling Price/Unit	23.88	28.68	55.08	47.88
Direct Material/unit	10.08	13.20	30.48	24.96
Direct Labour/unit	4.08	4.08	6.72	6.36
Variable Overheads/unit	1.44	1.44	2.40	2.16

Other Data:

(i) The variable overheads are absorbed on a machine hour basis at a rate of ₹ 1.20 per machine hour.
(ii) Fixed overheads total ₹ 46,84,000 per annum.
(iii) Production capacity available 8,15,000 machine hours per annum.
(iv) Products P,Q and R can be bought –in at ₹ 21.36 per unit, ₹ 24 per unit and ₹ 48 per unit respectively.

Required:

Calculate the best product mix for the year and the resulting optimal profit.

Statement Showing Analysis of Proposal

Products	Units	x Contribution P.U (Note No.1)	=	Contribution
P	1,20,000	x 8.28	=	9,93,600
Q	1,86,000	x 9.96	=	18,52,560
R	1,71,000	x 15.48	=	2,647,080
S	99,000	x 14.40		14,25,600
		Total Contribution	=	69,18,840
		Fixed Cost		(46,84,000)
		Purchase Cost		–
				(304,080)
		Net Profit		**19,30,760**

Contribution Per Unit

	P	Q	R	S
(A) Sales Price (P.U)	23.88	28.68	55.08	47.88
Variable Price (P.U)				
Direct Material	10.08	13.2	30.48	24.96
Direct Labour	4.08	4.08	6.72	6.36
Variable Overhead	1.44	1.44	2.40	2.16
	15.60	**18.72**	**39.60**	**33.48**
Contribution	8.28	9.96	15.48	14.40

Statement Showing Total Hrs. Required

Products	Variable Overhead (P.U)	Units
P	1.44 ÷ 120 = 1.20 x 1,20,000 =	1,44,000
Q	1.44 ÷ 120 = 1.20 x 1,86,000 =	2,23,200
R	2.40 ÷ 120 = 2.00 x 1,71,000 =	3,42,000
S	2.16 ÷ 120 = 1.80 x 99,000 =	1,78,200
		8,87,400
	Hrs. Available	(8,15,000)
	Shortage	**72,400**

Statement Showing Hrs. P.U/ Per Hr./ Rank

	P	Q	R
Purchase Price (P.U)	(21.36)	(24)	(48)
Variable Price (P.U)	15.6	18.72	39.6
Loss on Purchase (P.U)	5.76	5.28	8.4
	÷ 1.20	÷ 1.20	÷ 2
Loss on Purchase Per Hr.	(4.80)	(4.40)	(4.20)
	I	II	III

Purchase 36,200 units of 'R' From Outside & Save (36,200 x 2) = **72,400**

Purchase Cost = (8.400 x 36,200)=**304,080**

Case Study – 31

Aditya Ltd. manufactures four products A-1, B-2, C-3 and D-4 in Gurgaon and one product F-1 in Faridabad. Aditya Ltd. operates under Just –in –time (JIT) principle and does not hold any inventory of either finished goods or raw materials.

Company has entered into an agreement with M Ltd. to supply 10,000 units per month of each product produced from Gurgaon unit at a contracted price. Aditya Ltd. is bound to supply these contracted units to M Ltd. without any fail. Following are the details related with non-contracted units of Gurgaon unit.

				(Amount in ₹)
	A-1	**B-2**	**C-3**	**D-4**
Selling Price per unit	260	285	290	210
Direct Labour @ ₹ 45 per hour	112.5	67.5	135	67.5
Direct Material M-1 @ ₹ 50 per kg.	50	100	---	75
Direct Material M-2 @ ₹ 30 per litre	90	45	60	---
Variable Overhead (varies with labour hrs.)	12.5	7.5	15	7.5
Variable Overhead (varies with machine hrs.)	9	12	9	15
Total Variable Cost	274	232	219	165
Machine hours per unit	3 hours	4 hours	3 hours	5 hours
Maximum Demand per month (units)	90,000	95,000	80,000	75,000

The products manufactured in Gurgaon unit use direct material M-1 and M-2 but product F-1 produced in Faridabad unit is made by a distinct raw material Z. Material Z is purchased from the outside market at ₹ 200.00 per unit. One unit of F-1 requires one unit of material Z.

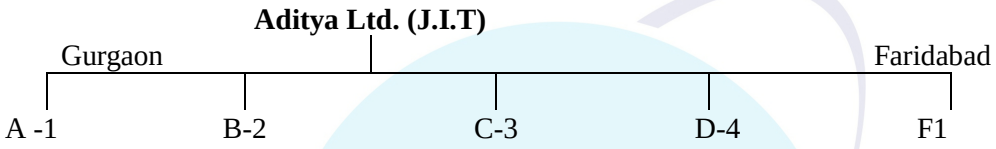
Material Z can also be manufactured at Gurgaon unit but for this 2 hours of direct labour, 3 hours of machine time and 2.5 litres of material M-2 will be required.

The Purchase manager has reported to the production manager that material M-1 and M-2 are in short supply in the market and only 6,50,000 Kg. of M-1 and 6,00,000 litre of M-2 can be purchased in a month.

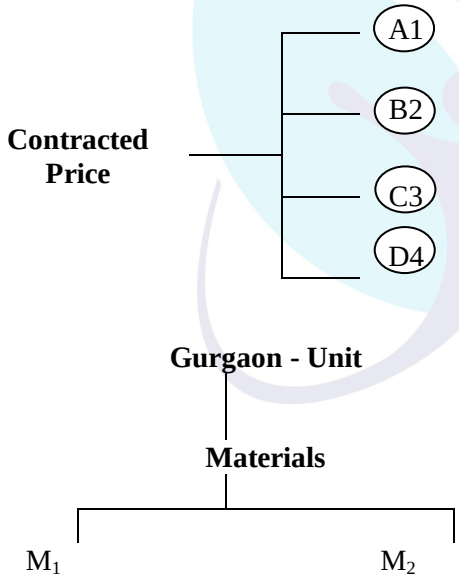
Required:

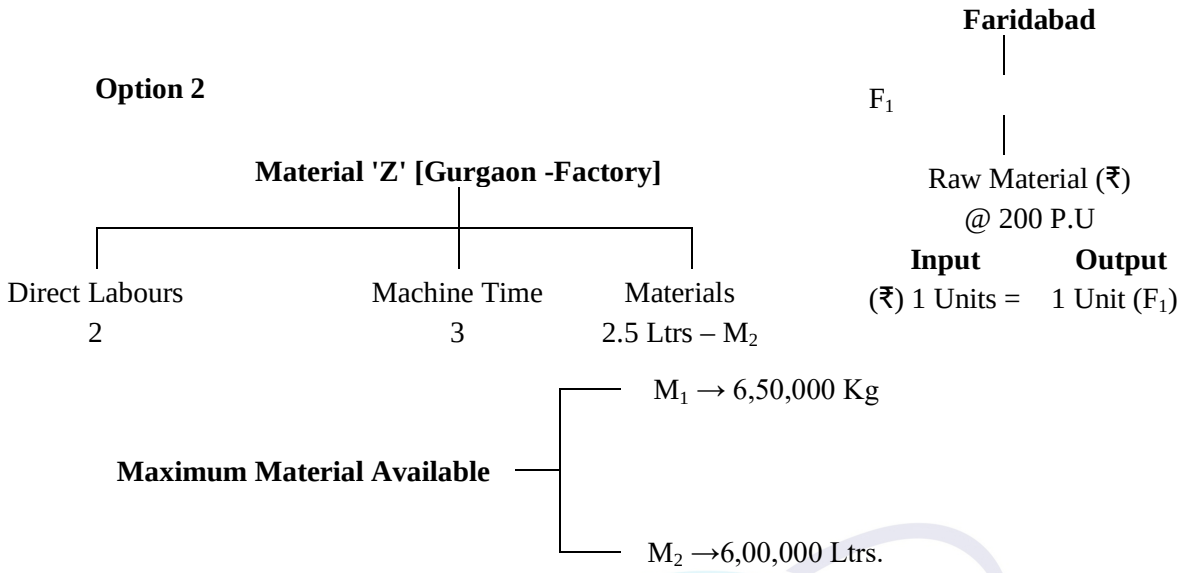
(i) Calculate whether Aditya Ltd. should manufacture material Z in Gurgaon unit or continue to purchase it from the market and manufacture it in Faridabad unit.
(ii) Calculate the optimum monthly usage of Gurgaon unit's available resources and make decision accordingly.
(iii) Calculate the purchase price of material Z at which your decision in (i) can be sustained.

Given:



Agreement –M Ltd. -10,000 Units -Gurgaon





Statement Showing Cost of Material '₹' If Manufactured in Gurgaon Unit

	₹
Direct Labour (2 hrs. x 45)	90
Direct Material - M (2.5 Ltrs x 30)	75
Variable Overhead (2 labour hrs. x 5) =	10
Variable Overhead (3 Machine hrs. x 3) =	9
	184
Out -Sider -Price	**200**

The Purchase Cost of Material '₹' from the outside market is ₹ 200/- Which is more than the cost to manufacture it in Gurgaon Unit Hence, it will be beneficial for the Aditya Ltd. to Manufacture Material '₹' In Gurgaon Unit it Sell

Ans No. (ii) Statement Showing Requirement of Direct –Material M_1 –M_2 For –Contracted Units

	A_1	B_2	C_3	D_4
Units to be Supplied TOM -Ltd	10,000 Units	10,000 Units	10,000 Units	10,000 Units
Direct Material M_1 =	(10,000 x 1) = 10,000 $\left(\frac{50}{50} = 1\text{Kg}\right)$	(10,000 x 2) = 20,000 $\left(\frac{100}{50} = 2\text{ Kg}\right)$	–	(10,000 x 1.5) = 15,000 $\left(\frac{75}{50} = 1.50\right)$
Direct Material – M_2 (Ltr)	(10,000 x 3) = 30,000 $\left(\frac{90}{30}\right) = 3$ ltrs	(10,000 x 1.5) = 15,000 $\left(\frac{45}{30}\right) = 1.5$ ltrs	(10,000 x 2) = 20,000 $\left(\frac{60}{30}\right) = 2$ ltr	

For Non –Contracted Units

	A_1	B_2	C_3	D_4
Demands	90,000	95,000	80,000	75,000
Direct Material M_1 (Kg)	90,000	1,90,000	–	1,12,500
	(90,000 x 1)	(95,000 x 2)	–	(75,000 x 1.5)
Direct Material M_2	2,70,000	1,42,500	1,60,000	–
	(90,000 x 3)	(95,000 x 1.50)	(80,000 x 2)	–

Statement Showing Availability and Demand Comparison

	Direct Material M_1	**Direct Material M_2**
	(Kg)	**Ltrs.**
Contrated Units		
A_1	10,000	30,000
B_2	20,000	15,000
C_3	–	20,000
D_4	15,000	–
Non - Contrated Units		
A_1	90,000	2,70,000
B_2	1,90,000	1,42,500
C_3	–	1,60,000
D_4	1,12,500	
	4,37,500	**6,37,500**
Available	**6,50,000 Kg**	**6,50,000 Kg**
		Shortage Limiting
		Factor (M_2)

Statement Showing Contribution Per Ltr - M_2

	A_1	B_2	C_3	D_4	Z	
Contribution (Per -Unit)	360	285	290	210		
Selling Price (P.U)	(274)	(232)	(219)	(165)	(200)	Purchase Price
Variable Price (P.U)					(184)	Variable Price
$M_2\rightarrow$	86 ÷ 3 = 28.67 **III**	53 ÷ 1.5 = 35.33 **II**	71 ÷ 2 = 35.50 **I**	45 ÷ =	16 ÷ 2.5 = 6.40 **IV**	Saving

Statement Showing Production Plan

Qty Material 2-Available	**Product**	
60,000 (Kg)	90,000 units x 2	(6,00,000 + 80,000)
	$C_3\rightarrow$= 1,80,000 Kg	
		(4,20,000 - 1,57,500)
	$B_2\rightarrow$ (105,000 x 1.50) = 1,57,500	
		(2,62,500 - 2,62,500)
	$A_1\rightarrow$ (87,500 x 3)	0

(iii)Decision in –Requirement (1) will be charged as Material 'Z' cannot be manufactured In Gurgaon Units As noted in requirement (ii) the Minimum purchase price of Material 'Z' At which decision Taken (i) Above can be sustained is calculated as below

Existing Purchase Price	200
Loss of Cont 'A' (III Rank)	
(28.67 - 6.40) x 2.5 Ltrs	55.68
Minimum price =	**255.68**

Case Study – 32

Jupiter Ltd. a 'Fast –Moving Consumer Goods (FMCG)' company intends to diversify the product line to achieve full utilization of its plant capacity. As a result of considerable research made, the company has been able to develop a new product called 'EXE'.

'EXE' is packed in cans of 100 ml capacity and is sold to the wholesalers in cartons of 24 cans at ₹120 per carton. Since the company uses its spare capacity for the manufacture of 'EXE', no additional fixed expenses will be incurred. However accountant has allocated a share of ₹ 1,12,500 per month as fixed expenses to be absorbed by 'EXE' as a fair share of the company's present fixed costs to the new product for costing purposes.

The company estimates the production and sale of 'EXE' at 1,50,000 cans per month and on the basis the following cost estimates (per carton) have been developed:

		₹
Direct Materials	……..	54
Direct Wages	……..	36
All Overheads	……..	27
Total Costs	……..	**117**

After a detailed market survey the economy is confident that the production and sales of 'EXE' can be increased to 1,75,000 cans per month and ultimately to 2,25,000 cans per month.

The company at present has a capacity for the manufacture of 1,50,000 empty cans and the cost of the empty cans if purchases from outside will result in a saving of 20% in material and 10% in other costs of 'EXE'. The price at which the outside firm is willing to supply the empty cans is ₹0.675 per empty can. If the company desires to manufacture empty cans in excess of 1,50,000 cans, a machine involving an additional fixed overhead of ₹7,500 per month will have to be installed.

Required:

(i) State by showing your workings whether the company should make or buy the empty cans at each of the three volumes of production of 'EXE' namely, 1,50,000,1,75,000 and 2,25,000 cans.
(ii) At what volume of sale will it be economical for the company to install the additional equipment for the manufacture of empty cans?
(iii) Evaluate the profitability on the sale of 'EXE' at each of the aforesaid three levels of output based on your decision and showing the cost of empty cans as a separate element of cost.

Note No.1

Jupiter Ltd. → (Fast -Moving Consumer Goods)

↓

Product - EXE (100 ml)

1 Cartoon = 24 Cans

1 Cartoon = ₹120

Fixed Cost = 1,12,500

Fixed Cost Per (Can) = (1,12,500 ÷ 1,50,000)

= 0.75

All Overheads -Per Cartoon = ₹ 27.00

Per Can (27 ÷ 24) **= 1.125**

Fixed Per Can 0.75

Variable 0.375

Note No.2 Direct Wages (36 ÷ 24) = 1.50

Note No. 3 Direct Material (54 ÷ 24) = 2.25

Statement Showing Cost of Making One Empty Can

	Direct Material	**Direct Wages**	**Variable Overheads**	**Total**
Cost -Per Can	2.25	1.5	375	4.125
Cost % Empty Can	(0.45) (20 % x 2.25)	(0.15) (10 % x 1.50)	(0.375) (10 % x 375)	(0.6375)
Cost of Per Can of Exe Without Can	**1.8**	**1.35**	**0.3375**	**3.4875**
Note No. 5 Cost for 1,50,000 Nos. If Empty Can Made	67,500 (1,50,000 x 0.45)	22,500 (1,50,000 x 0.15)	5,625 (1,50,000 x 0.375)	95,625
If Purchases				101,250 (1,50,000 x 0.6750)

Decision: - Manufacture

Note -6	**Fixed Overhead**	**Direct Materials**	**Direct Wages**	**Variable Overhead**	**Total**
$\left(\frac{25,000}{\text{Nos.}}\right)$ Manufacturing Cost (Make)	7,500	= 11,250 (0.45 x 25,000)	= 3,750 (0.15 x 25,000)	938 (0.375 x 25,000)	23,437.50
Purchase (Buy) 75,000	–	–	–	–	16,875.00 (0.6750 x 25,000)
(Make) Purchase	7,500	337,550 (75,000 x 0.45)	11,250 (75,000 x 0.15)	2,812.50 (0.0375 x 75,000)	55,312.50
	–	–	–	–	50,625 (75,000 x 0.6750)

Ans No. (i) Statement Showing Analysis of Proposal

Decision		
Volume	**Make**	**Buy**
1,50,000 (Nos.)	95,625 (Make) 1,50,000 Nos.	–
1,75,000 (Nos.)	95,625 (Make - 1,50,000)	16,875 (25,000 Nos.)
2,25,000	95,625 (Make - 1,50,000)	50,625 (75,000 Nos.)

Ans No. (ii) Statement Showing In Diff Point

No. of units = *x*

Manufacture Cost = Purchase

0.6375 *x* + 7,500 = 0.6750 *x*

0.0375 *x*= 7,500

***x* = 2,00,000 (Empty - Cans)**

Installation of the new machine for the manufacture of empty cans will be economical at production level of 3,50,000 cans per month.

Ans No. (iii) Statement Showing Analysis of Profit / Loss

	1,50,000 (Cans)	**1,75,000 (Cans)**	**2,25,000 (Cans)**
(A) Sales	7,50,000 (1,50,000 x 5)	8,75,000 (1,75,000 x 5)	11,25,000 (2,25,000 x 5)
Relevant Cost			
(1) Direct Material	(2,70,000 (1,50,000 x 1.80)	(3,15,000 (1,75,000 x 1.80)	(405,000 (2,25,000 x 1.80)
(2) Direct Wages	(202,500 (1,50,000 x 1.35)	(2,36,250 (1,75,000 x 1.35)	(303,750 (2,25,000 x 1.80)
(3) Variable Overhead	(50,625 (1,50,000 x 0.3375)	(59062.50 (1,75,000 x 0.3375)	(75,937.50 (2,25,000 x 0.3375)
(4) Empty Can (Made)	(95,625 (1,50,000 x 0.6375)	(95,625 (1,50,000 x 0.6375)	(95,625 (1,50,000 x 0.6375)
(5) Empty Can (Purchase)		(16,875 (25,000 x 0.6750)	(50,625 (75,000 x 0.6750)
Net Gain	**1,31,250**	**1,52,187.50**	**1,94,062.50**

Determination of Production Mix/ Production Planning

Case Study – 33

A company is producing three products X, Y & Z. Relevant information is given below:

Product	**X**	**Y**	**Z**
Raw material per unit (kg)	20	12	30
Machine hours per unit (hours)	3	5	4
Selling price per unit (₹)	500	400	800
Maximum limit of production Unit	1,500	1,500	750

Only 9,200 hours are available for production at a cost of ₹ 20 per hour and maximum 50,000 kgs. Of material @ ₹ 20 per kg., can be obtained.

(Only product mix quantities are to be shown, calculation of total profit at that product mix not required to be shown)

Required:

On the basis of the above information determine the product –mix to give the highest profit if at least two products are produced.

Solution Computation of Contribution per Key Factor (s) for Various Products

Particulars	Products		
	X	Y	Z
Selling Price p.u. (₹)	500	400	800
Variable Cost p.u. (₹)			
Material	400	240	600
	(₹ 20 x 20 kg.)	(₹ 20 x 12 Kg.)	(₹ 20 x 30 Kg.)
Material Charge	60	100	80
	(₹ 20 x 3 hrs.)	(₹ 20 x 5hrs.)	(₹ 20 x 4 hrs.)
Total Variable Cost p.u. (₹)	460	340	680
Contribution p.u. (₹)	40	60	120
Ranking	III	II	I
Requirement of Material (Kg.)	20	12	30
Contribution per Kg. (₹)	2.00	5.00	4.00
Ranking	III	I	II
Requirement of Machine Hours (Hrs.)	3	5	4
Contribution per hour (₹)	13.33	12.00	30.00
Ranking	II	III	I

It is clear from the above ranking (s):-

I. Contribution per Unit is maximum in case of product Y & Z.
II. Contribution per Kg. of Raw Material also maximum in case of product Y & Z.
III. Contribution per Machine Hour is maximum in case of product X & Y.

So product Z is common in all cases and priority shall be given for production of 'Z'. Balance resources, should be divided between other two products X & Y.

Statement Showing Balance Resources for Product X & Y

Resources	Maximum Availability (a)	Maximum Production Z (b)	Consumption of Resources p.u. (c)	Total Cons. (d) = (b) x (c)	Balance (a) - (d)
Material	50,000 Kg.	750	30 Kg.	22,500 Kg.	27,500 Kg.
Machine Hrs.	9,200 Hrs.	750	4 Hrs.	3,000 Hrs.	6,200 Hrs.

The production of X & Y may be calculated with the help of following equations by utilizing balance resources :-

20 X + 12 Y = 27,500 ….(i)
3X + 5Y = 6,200 ….(ii)

Then,

~~30 X~~ + 18 Y = 41,250 … equation (i) multiplied by 1.5

~~30 X~~ + 50 Y = 62,000 … equation (ii) multiplied by 10

\- - -

-32 Y = - 20,750

Y = 648.43 i.e. 648 units

Putting the value of Y in equation (ii)

3 X + (5 x 648) = 6,200
Or 3X = 2,960
Or X = 986 units

So the Product Mix is

X = 986 units
Y = 648 units
Z = 750 units

Case Study – 34

An agro –products Producer Company is planning its production for next year. The following information is relating to the current year:

Products / Corps	A_1	A_2	B_1	B_2
Area occupied (acres)	250	200	300	250
Yield per acre (ton)	50	40	45	60
Selling price per ton (₹)	200	250	300	270
Variable cost per acre (₹)				
Seeds	300	250	450	400
Pesticides	150	200	300	250
Fertilizers	125	75	100	125
Cultivations	125	75	100	125
Direct wages	4,000	4,500	5,000	5,700

Fixed overhead per annum ₹ 53,76,000.

The land that is being used for the production of B_1 and B_2 can be used for either crop, but nor for A_1&A_2. The land that is being used for A_1&A_2 can be used for either crop, but not for B_1 and B_2. In order to provide adequate market service, the company must produce each year at least 2,000 tons each of A_1&A_2 and 1,800 tons each of B_1 and B_2.

Required:

(i) Prepare a statement of the profit for the current year.
(ii) Profit for the production mix by fulfilling market commitment.
(iii) Assuming that the land could be cultivated to produce any of the four products and there was no market commitment, calculate: Profit amount of most profitable crop and break –even point of most profitable crops in terms of acres and sales value.

Step No.1 Statement Contribution Per Acre & Rank For Production

				₹
	A_1	**A_2**	**B_1**	**B_2**
Selling Price (Per -Acre)	10,000 (50 ton x 200)	10,000 (40 ton x 250)	13,500 (45 ton x 300)	16,200 (60 ton x 270)
Variable Price				
Seeds	(300)	(250)	(450)	(400)
Pesticides	(150)	(200)	(300)	(250)
Fertilizers	(125)	(75)	(100)	(125)
Cultivations	(125)	(75)	(100)	(125)
Direct Wages	(4,000)	(4,500)	(5,000)	(5,700)
Contribution (Per -Acre)	**5,300**	**4,900**	**7,550**	**9,600**
Rank	**I**	**II**	**II**	**I**

Step No. 2 Statement Showing Production Plan

	Plant	**Production**	**Balance**
(Acres) (250 + 200) = 450	A_1 A_2 A_1	2,000 Tons ÷ 50 = 40 2,000 Tons ÷ 40 = 50 18,000 Tons ÷ 50 = 360	(450 - 40) (410 - 50) (360 - 360)
(300 + 250) = 550	B_2 B_1 B_2	1,800 ÷ 60 = 30 1,800 ÷ 45 = 40 28,800 ÷ 60 = 480	(550 - 30) (520 - 40) (480 - 480)

Statement Showing Analysis of Profit / Loss

	Current Profit Ans No. (i)	**Min - Profit Ans No. (ii)**
	₹	**₹**
A_1	= 13,25,000 (250 Tons x 5,300)	= 21,20,000 (400 x 5,300)
A_2	= 9,80,000 (200 Tons x 4,900)	= 2,45,000 (50 x 4,900)
B_1	= 22,65,000 (300 Tons x 7,550)	= 302,000 (40 x 7,550)
B_2	= 24,00,000 (250 Tons x 9,600)	= 48,96,000 (510 x 9,600)
Total	69,70,000	75,63,000
Fixed Cost	(15,94,000)	(53,76,000)
Profit / Loss	**15,94,000**	**21,87,000**

Break -Even Point = (560 Tons x 16,200)
= 90,72,000

Variable Cost

Contribution
9,600 x 560 Tons = 53,76,000

Fixed Cost
53,76,000

Profit
–

Case Study – 35

A company manufactures and sells a product, the price of which is controlled by the Government. Raw material required for this product is also made available at a fixed controlled price. The following figures have been called for the previous two accounting years of the company:

	Year - I	Year - II
Quantity Sold (tones)	1,26,000	1,44,000
Price per tone	₹ 185	₹ 185
		(₹ in thousands)
Sales Value	23,310	26,640
Raw Materials	11,340	12,960
Direct Labour	1,512	1,872
Factory, Administration and Selling Expenses	9,702	11,232
Profit	756	576

During the year II direct labour rates increased by 8 1/3%. Increases in factory, administration and selling expenses during the year were₹ 8,10,000 on account of factors other than the increases quantities produced and sold.

Required:

The managing director desires to know, what quantity if they had produced and sold would have given the company the same net profit per tonne in Year II as it earned during the Year I Advise him.

Statement Showing Quantity Required In – Tonnes

Selling Price = 185.00

Variable Cost

	₹
(1)Material $\left(\frac{12,960,000}{144,000}\right)$	= 90.00
(2)Labour $\left(\frac{18,72,000}{144,000}\right)$	= 13.00
(3) Variable Overhead (Note No.1)	40.00
	143

Contribution

(185 - 143) = 42

Profit

$\left(\frac{7,56,000}{1,26,000}\right) = 6.00$

Fixed Cost

(42 - 6) = 36.00

(54,72,000 ÷ 36)

= 1,52,000 Tonnes

Factory/Admin/Selling Expenses

Variable Cost (P.U) = *x* **Fixed Cost = *y***

1,26,000 *x* + *y*=	9,702,000
1,44,000 *x* + *y* + 8,10,000 =	1,12,32,000
1,44,000 *x* + *y* =	104,22,000
−18,000 *x*=	−7,20,000

***x* = 40.00**

Factory/Admin/Selling = 112,32,000

Variable Expenses (40 x 1,44,000) = 57,60,000	54,72,000

Case Study – 36

Fairbilt Furniture Ltd. manufactures three products: Tables, Chairs and Cabinets. The company is in the process of finalizing the plans for the coming year; hence the executives though it would be prudent to have a look at the product –wise performance during the current year. The following information is furnished.

	Tables	**Chairs**	**Cabinets**
Unit Selling Price	80	60	36
Direct Material	28	24	16
Direct Labour	20	12	12
Factory Overheads:			
Variable	8	6	4
Fixed	8	6	1.28
Selling, Distribution and General Administration Expenses :			
Variable	4	2	2
Fixed	4	6	1.52
Unit Cost	72	56	36.8
Unit Profit / Loss	8	4	(0.80)
Sales Volume (units)	10,000	15,000	15,000
Profit / Loss	80,000	60,000	(12,000)

For the coming period, the selling prices and the cost of three products are expected to remain unchanged. There will be an increase in the sales of tables by 1,000 units and the increase in sales of cabinets is expected to be 8,000 units. The sales of chairs will remain to be unchanged. Sufficient additional capacity exists to enable the increased demands to be met without incurring additional fixed costs. Some among the executives contend that it will be unwise to go for additional production and sales of cabinets, since it is already making losses at ₹ 0.80 per unit. The suggestion is that cabinets should be eliminated altogether.

Required:

Do you agree? Substantiate with necessary analysis and determine the product wise and overall profits for the coming year.

FairBilt –Furniture Ltd. **Statement Showing Analysis of Profit / Loss**

Sales	Tables		Chairs		Cabinets		Total
	10,000 Units		15,000 Units		15,000 units		
	Total	P.U	Total	P.U	Total	P.U	Total
(A) Sales	8,00,000	80	9,00,000	60	5,40,000	36	22,40,000
(B) Relevant Cost							
Direct Cost							
Direct Materials	(2,80,000)	(28)	(3,60,000)	(24)	(2,40,000)	(16)	(8,80,000)
Direct Labour	(2,00,000)	(20)	(1,80,000)	(12)	(1,80,000)	(12)	(5,60,000)
Indirect Cost							
Variable Factory Overhead	(80,000)	(8)	(90,000)	(6)	(60,000)	(4)	(2,30,000)
Variable Selling Distribution & Administration Overhead	(40,000)	(4)	(30,000)	(2)	(30,000)	(2)	(1,00,000)
Contribution	2,00,000	20	2,40,000	16	30,000	2	4,70,000
Fixed Factory Overhead	(80,000		(90,000)		(19,200)		(1,89,200)
Fixed Selling & Distribution Overhead	(40,000)		(90,000)		(22,800)		(1,52,800)
Total Profit	**80,000**		**60,000**		**(12,000)**		**12,80,000**

The above analysis shows the cabinets make a contribution of ₹ 2 per unit. The loss sustained in the previous year is because of the falling sales volume below breakeven level.

Fairbilt Furniture Ltd. Budgeted Performance for the Coming Year

	Tables	Chairs	Cabinets
Unit Contribution (₹)	20	16	2
Sales Volume units	11,000	15,000	23,000
Total Contribution(₹)	2,20,000	2,40,000	46,000
Less : Fixed Cost (₹)	1,20,000	1,80,000	42,000
Profit (₹)	1,00,000	60,000	4,000

The company makes a total profit of ₹ 1,64,000 if all the products are continued. However, if the production of cabinets is discontinued, there will be an adverse effect on the overall profit of the company. This is because cabinets also contribute toward meeting the fixed costs of the company.

Case Study – 37

Jaya –Surya Ltd. (JSL) manufactures and sells two products 'Jaya' and 'Surya'. Both Jaya and Surya use a regular machine while Surya uses another high –precision machine as well. The following information is available for the next quarter.

	Jaya	Surya
Selling Price per unit (₹)	1,500	2,000
Variable Manufacturing Cost per unit (₹)	900	1,600
Variable Marketing Cost per unit (₹)	250	150
Budgeted Allocation of fixed Overhead Costs (₹)	18,00,000	85,00,000
Regular Machine Hours per unit	2	1

Further information is available as follows:

- JSL faces a capacity constraint of 60,000 hours on the regular machine for the next quarter and there is no constraint on the high precision machine for the next quarter.
- Out of ₹ 85,00,000 budgeted allocation of fixed overhead costs to product Surya, ₹ 60,00,000 is payable for hiring the high precision machine. This cost is charged entirely to product Surya. The hiring agreement can be cancelled at any time without penalties.
- All other overhead costs are fixed and cannot be changed.
- A minimum quantity of 12,500 units per quarter of Jaya must be produced to fulfill a commitment to a customer.
- Any quantity of any product can be sold at the given prices.

Required:

(i) Calculate the product mix of Jaya and Surya which would maximize the relevant operating profit of JSL in the next quarter.

(ii) JSL can double the quarterly capacity of regular machine at a cost of ₹ 28,00,000. Calculate the new product mix and the amount by which the relevant operating profit will increase.

Statement Showing Contribution –Per –Machine Hour

		(₹)
	Jaya	**Surya**
Selling Price (P.U)	1,500	2,000
Variable Man -Cost (P.U)	(900)	(1,600)
Variable -Marketing Cost (P.U)	(250)	(150)
Contribution (P.U)	350	250
÷ Machine Hrs. (P.U)	÷ 2	÷ 1
Contribution Per Hr.	175	250
Rank	**II**	**I**

Ans No. (i) Option (I) Statement showing Production Plan

Hrs.	**Products**	**Units x hrs. (P.U)**	**Total**	**Balance**
60,000	Surya (Balancing Figure)	35,000 x 1	= 35,000	(3,500 - 35,000)
	Jaya (Minimum)	12,500 x 2	= 25,000	(60,000 - 25,000)

Statement Showing Analysis of Profit/Loss

Products	**Units x Contribution (P.U)**	**Total**
Jaya	12,500 x 350 =	43,75,000
Surya	35,000 x 250 =	87,50,000
		1,31,25,000
	Fixed Cost	**(60,00,000)**
	Net -Profit	**71,25,000**

Statement Showing Production Plan

Hrs.	Products	Units x hrs. (P.U)	Total	Balance
60000 x 2 = 1,20,000	Surya (Balancing Figure)	95,000 x 1 =	95,000	(95,000 - 95,000)
	Jaya (Minimum)	12,500 x 2 =	25,000	(1,20,000 - 25,000)

Statement Showing Analysis of Profit/ Loss

Products	Units x Contribution (P.U)	Total
Jaya	12,500 x 350 =	43,75,000
Surya	95,000 x 250 =	2,37,50,000
	Hire Charges	(60,00,000)
	Capacity Enhancement Cost	(28,00,000)
	Profit	**1,93,25,000**

Ans No. (i) Option (2)
Produce Only Jaya

Product	Units x hrs. P.U =	Total
Jaya	30,000 x 2 =	60,000

Statement Showing Analysis of Profit/Loss

Product	Units x Contribution P.U =	₹
Jaya	30,000 x 350 =	105,00,000

Ans No. 2 Part (1)
Produce Only Jaya

Product	Units x Hrs. P.U =	Total
Jaya	60,000 x 2 =	1,20,000

Statement Showing Analysis of Profit / Loss

Product	Units x Contribution P.U =	Total
Jaya	60,000 x 350 =	2,10,00,000
	Capacity Enhancement	(28,00,000)
	Profit	**1,82,00,000**

When capacity of the regular machine is doubled, the optimum product mix will be 12,500 units of Jaya and 95,000 units of Surya.
Increase in operating profit will be ₹ 88,25,000 (₹ 1,93,25,000 − ₹ 1,05,00,000).

Case Study – 38

The following is the trading summary of a manufacturing concern which makes two products, X and Y.

Trading Summary For the 4 Months Period 30th April, 2013

	X (₹)		Y (₹)		Total (₹)
Sales		10,000		4,000	14,000
Less : Cost of Sales					
Direct Cost *					
Labour	3,000		1,000		
Materials	1,500	4,500	1,000	2,000	6,500
Indirect Costs					
Variable Expenses *		2,000		1,000	3,000
Fixed Expenses **					
Common to Both X and Y		1,250		1,250	2,500
		2,250		(250)	2,000

*These costs tend to vary in direct proportion to physical output.

**These costs tend to remain constant irrespective of the physical outputs of X and Y.

It has been the practice of the concern to allocate these costs equally between X and The following proposals have been made by the Board of Directors for your consideration as financial adviser:

(i) Discontinue Product –Y.

(ii) As an alternative to (i), reduce the price of Y, by 20 per cent. It is estimated that the demand will then increase by 40 per cent.

(iii) Double the price of X. (It is estimated that this will reduce the demand by the three fifths.)

Required:

Recommend the proposals to be taken after evaluating each of these three proposals.

Statement Showing Analysis of Profit/Loss

(1) When Product Y is Discontinued

(2)

	₹
Incase Product Y is Discontinued Products X will have to Bear Expenses Previously Born By Product 'Y' The Final Position Will be As Follows	
	₹
Exiting Net Profit 'X'	2,250
Fixed Expenses of Y	(1,250)
Final Net Profit	**1,000**

Ans No. (ii) Statement Showing Analysis of Profit & Loss
(When the Price of Y Reduced By 20% & Demand Increase By 40%)

(A) Sales		**₹**
$\left(4{,}000 \times \frac{80}{100} \times \frac{140}{100}\right)$	=	4,480
(B) Direct Cost		
$\left(2{,}000 \times \frac{140}{100}\right)$		(2,800)
(C) Indirect Cost -Variable		(1,400)
(1,000 x 140 %)		
Fixed Expenses		(1,250)
Net Loss		**(970)**
Profit of X (Old)		**2,250**
Final New Profit		**1,280**

Ans No.(iii) Statement Showing Analysis of Revised Profit & Loss

(When the Price of X is Doubled & Demand Will Remove by $\left(\frac{3}{5}\right) = 60\%$)

	₹
(A) Sales	
(10,000 x 2 x 40%) =	8,000
(B) Direct Cost(4,500 x 40%) =	(1,800)
(C) Indirect Cost	(1,400)
Variable Expenses (2,000 x 40%)	(800)
Contribution	**5,400**
Fixed Expenses (Old)	**(1,250)**
Net Profit - 'X'	**4,150**
Net Loss 'Y'	**(250)**
Final Net -Profit	**3,900**

he above analysis shows that the Net Profit is maximum under alternative (3) i.e. when the Price of X is doubled and the Demand reduces by three –fifths. This alternative will increase the present level of Net Profit from ₹ 2,000 to ₹ 3,900 for a four month period. It is, therefore, suggested that the concern should adopt alternative (3).

Case Study – 39

E Ltd. is engaged in the manufacturing of three products in its factory. The following budget estimates are prepared for 2014 -15:

	Products		
	A	**B**	**C**
Sales (units)	10,000	25,000	20,000
Selling Price per unit (₹)	40	75	85
Less: Direct Materials per unit (₹)	10	14	18
Direct Wages per unit @ ₹ 2 per hour	8	12	10
Variable Overhead per unit (₹)	8	9	10
Fixed Overhead per unit (₹)	16	18	20
Profit/Loss	(2)	22	27

After the finalization of the above manufacturing schedule, it is observed that presently only 80% capacity being utilized by these three products. The production activities are made at the same platform and it may be interchangeable among products according to requirement. In order to improve the profitability of the company the following three proposals are put for consideration:

a) Discontinue product A and capacity released may be used for either product B or C or equally shared. The fixed cost of product A is avoidable. Expected changes in material cost and selling price subject to the utilization of product A's capacity are as under:

Product B: Material cost increased by 10% and selling price reduced by 2%

Product C: Material cost increased by 5% and selling price reduced by 5%.

b) Discontinue product A and divert the capacity so released and the idle capacity to produce a new product D for meeting export demand whose per unit cost data are as follows:

	(₹)
Selling Price	60
Direct Material	28
Direct Wages @ ₹ 3 per hour	12
Variable Overheads	6
Fixed Cost (Total)	1,05,500

c) Product A, B and C are continuously run and hire out the idle capacity fixing a price in such a way that the same rate of profit per direct labour hour is obtained in the original budget estimates.

Required:

i) Prepare a statement of profitability of products A, B and C in existing situation.
ii) Evaluate the above proposals independently and calculate the overall profitability of the company under each proposal.
iii) What proposal should be accepted, if the company wants to maximize its Profit?

Ans No. (i) **Statement Showing Analysis of Profit / Loss**

	A	**B**	**C**	**Total**
Units	**10,000**	**25,000**	**20,000**	**55,000**
Selling Price (P.U)	40	75	85	
Variable Price (P.U)				
Direct Material	(10)	(14)	(18)	
Direct Wages	(8)	(12)	(10)	
Variable Overhead	(8)	(9)	(10)	
Contribution	**14**	**40**	**47**	
Total Contribution	1,40,000 (10,000 x 14)	10,00,000 (25,000 x 40)	9,40,000 (20,000 x 47)	20,80,000
Fixed Cost	(1,60,000) (16 x 10,000)	(4,50,000) (18 x 25,000)	(4,00,000) (20 x 20,000)	(10,10,000)
Profit/Loss	**(20,000)**	**5,50,000**	**5,40,000**	**10,70,000**

Ans No. (ii) Proposal –(a) Statement Showing Analysis of Proposal (Alternative Use of A's Capacity For Products B or C Equally

$\text{Hrs. Saved } 'A' \left(10{,}000 \text{ units x} \frac{8}{2}\right) = 40{,}000 \text{ hrs.}$

Statement Showing Possible Production

Product 'B' $\left(\frac{40{,}000 \text{ hrs.}}{6 \text{ hrs.}}\right) = 6{,}666.666 \text{ units}$

Product 'C' $\left(\frac{40{,}000 \text{ hrs.}}{5 \text{ hrs.}}\right) = 8{,}000 \text{ units}$

Product B & C Equally $'B' \left(\frac{20{,}000 \text{ hrs.}}{6 \text{ hrs.}}\right) = 3{,}333 \text{ units}$

$'C' \left(\frac{20{,}000 \text{ hrs.}}{5 \text{ hrs.}}\right) = 4{,}000 \text{ units}$

Statement Showing Revised Contribution Of Products B & C

	B	C
Selling Price (P.U)	73.5	80.75
	(75 x 98%)	(85 x 95%)
Direct Material (P.U)	(14 x 110%) = (15.40)	(18 x 105%) = (18.90)
Direct Labour (P.U)	(12.00)	(10.00)
Variable Overhead (P.U)	**37.10**	**41.85**
÷ Hrs.	÷ 6	÷ 5
Contribution Per Hour	6.18	8.37

It's better to produce 'C'

Statement Showing Analysis of Profit/Loss

	Option (I)	Option (II)
	Change for Entire Production	**Change for Incremental Production**
Sales Volume	28,000	8,000
	(20,000 + 8,000)	(28,000 - 20,000)
x Contribution (P.U)	x 41.85	41.85
Total Contribution	11,71,800	3,34,800
Fixed Cost	(4,00,000)	–
Profit	**7,71,800**	**3,34,800**
Existing Profit 'B'	5,50,000	5,50,000
Existing Profit 'C'	–	5,40,000
Total Profit	**13,21,800**	**14,24,800**

Proposal (b)

Products	**Units x Hrs. P.U =**	**Total Hrs.**
A	$10{,}000 \times \left(\frac{8}{2}\right) =$	40,000
B	$25{,}000 \times \left(\frac{12}{2}\right) =$	1,50,000
C	$20{,}000 \times \left(\frac{10}{2}\right) =$	1,00,000
		$\left(\frac{100}{80} \times 2{,}90{,}000\right)$ = 3,62,500

(3,62,500 - 2,90,000) = 72,500

Balance Hrs. Available

Spare Capacity =	72,500 hrs.
A - Spare Capacity =	40,000 hrs.
	1,12,500 hrs.

Possible Production of 'D'

$$\left(\frac{1{,}12{,}500}{4 \text{ hrs.}}\right) = 28{,}125 \text{ units}$$

Statement Showing Analysis of Profit/Loss

	₹
Selling Price (P.U)	60.00
Direct Material (P.U)	(28.00)
Direct Wages (P.U)	(12.00)
Variable Overhead (P.U)	(6.00)
Contribution (P.U)	**14**
Total Contribution (28,125 x 14) =	3,93,750
Fixed Cost	(105,500)
Profit 'D'	**2,88,250**
Existing Profit B & C (5,50,000 + 5,40,000)	10,90,000
Total Profit	**13,78,250**

Proposal (c)

Idle Hrs.	72,500
$\left(\frac{(20{,}000) + 5{,}50{,}000 + 5{,}40{,}000}{2{,}90{,}000 \text{ hrs.}}\right) =$	3.69
Revenue From Hire Out = (72,500 x 3.69)	2,67,500
Existing Profit (20,000 + 5,50,000 + 5,40,000) =	10,70,000
Existing Profit	**13,37,500**

Profit Summary of Alternatives (₹)

Existing	Proposal (a) Option -1	Proposal (a) Option -2	Proposal (b)	Proposal (c)
10,70,000	13,21,800	14,24,800	1,378,250	13,37,500

Decision on Option on the basis of Profitability

i) If price and cost under proposal (a) is for entire production of C: Proposal (b) of Export, should be accepted.
ii) If price and cost under proposal (a) is for incremental production C only: Proposal (a) –Option 2, should be accepted.

Case Study – 40

E Ltd. manufactures and sells four types of products under the brand names A, B, C and D.on a turnover of ₹ 30 crores in 2009, company earned a profit of 10% before interest and depreciation which are fixed. The details of product mix and other information are as follows:

Products	Mix % to Total Sales	PV Ratio (%)	Raw Material as % on Sales Value
A	30	20	35
B	10	30	40
C	20	40	50
D	40	10	60

Interest and depreciation amounted to ₹ 225 lakhs and ₹ 115.50 lakhs respectively. Due to increase in prices in the international market, the company anticipates that the cost of raw materials which are imported will increase by 10% during 2010. The company has been able to secure a license for the import of raw materials of a value of ₹ 1,535 lakhs at 2010 prices. In order to counteract the increase in costs of raw materials, the company is contemplating to revise its product mix. The market survey report indicates that the sales potential of each of the products: 'A','B' and 'C' can be increased upto 30% of total sales value of 2009. There was no inventory of finished goods or work in progress in both the year.

Required:

Set an optimal mix for 2010 and find the profitability.

Given:

	₹ - Lacs
E.B.I. Tax/Dep (10% x 3,000)	300
Interest	(225)
Depreciation	(115.50
	(40.5)

	Sales	Mix	P.V Ratio	Contribution
A	3,000 x	30% x	20% =	180
B	3,000 x	10% x	30% =	90
C	3,000 x	20% x	40% =	240
D	3,000 x	40% x	10% =	120
				630

Fixed Cost	Loss
670.5	(40.5)

Maximum Material Available = 1,535

A 3,000 x 30% = 900
B 3,000 x 30% = 900
C 3,000 x 30% = 900
D (Any Amount)

	A	B	C	D
Selling Price (P.U)	100	100	100	100
x P.V Ratio	x 20%	x 30%	x 40%	x 10%
Contribution	20	30	40	10
Raw Material (%)	x 35%	x 40%	x 50%	x 60%
Raw Material (P.U)	35	40	50	60
Inc - By 10%	3.5	4	5	6
Revised	**38.5**	**44**	**55**	**66**
Revised Contribution	(20 - 3.50)	(30 - 4)	(40 - 5)	(10 - 6)
	16.5	26	35	4
÷ R. Mat (P.U)	÷ 38.5	÷ 44	÷ 55	÷ 66
$\left(\frac{\text{Contribution}}{\text{R. M}}\right)$	0.43	0.59	0.64	0.06
	III	II	I	IV

Statement Showing Production Plan For Maximum Profit

Material	Products	Sales	Material Used	Balance
1,535	C	900 x	$\frac{55}{100} = 495$	(1,535 - 495)
	B	900 x	$\frac{44}{100} = 396$	(1,040 - 396)
	A	900 x	$\frac{38.5}{100} = 346.5$	(644 - 346.5)
	D	450.75 x	$\frac{66}{100} = 297.5$	(297.5 - 297)

Statement Showing Analysis of Profit/Loss

Products	Sales	Revised P.V Ratio	₹
A	900 x	16.5 % =	148.5
B	900 x	26 % =	234.00
C	900 x	35 % =	315
D	451 x	4% =	18.04
			715.54

Fixed Cost	Profit
670.50	45.04

Case Study – 41

V.C. Ltd. makes and sells two products, P and Q. The budgeted selling price of P is ₹ 1,800 and that of Q is ₹ 2,160. Variable costs associated with producing and selling the P are ₹ 900 and with Q ₹ 1,800. Annual fixed production and selling costs of V.C. Ltd. are ₹ 88,000.
The company has two production/ sales options. The P and Q can be sold either in the ratio of two P to three Q or in the ratio of one P to two Q.

Required:

What will be the optimal mix and why?

(a) Average Contribution per unit	V.C Ltd.	Q
Selling price per unit	1,800	2,160
Variable labour per unit	900	1,800
Contribution per unit	900	360
Required ratio	2	3
Total Contribution	1,800	1,080

$$\text{Average Contribution} = \frac{1{,}800 + 1{,}000}{2 + 3} = 576$$

$$\text{Break Even Point} = \frac{88{,}000}{576} = 152.77$$

Conclusion: the above analysis clearly shows that option I is better than II.

V	I
2	: 3
61.11	91.67
62	92

(b) Average Contribution per unit	V.C Ltd.	Q
Selling Price per unit	1,800	2,160
Variable Cost per unit	900	1,800
Contribution per unit	900	360
Required Ratio	1	2
	900	720

$$\text{Average Contribution} = \frac{900 + 720}{5} = 540$$

$$\text{Break Even Point} = \frac{88{,}000}{540} = 162.96$$

V	S
1	: 2
54.32	108.64
55	109

Case Study – 42

N.P. Ltd. produces two products P and Q. the draft budget for the next month is as under:

	P	Q
Budgeted Production and Sales (units)	40,000	80,000
Selling Price ₹/ unit	25	50
Total Costs ₹ / unit	20	40
Machine Hours / unit	2	1
Maximum Sales Potential (units)	60,000	1,00,000

The fixed expenses are estimated ₹ 9,60,000 per month. The company absorbs fixed overheads on the basis of machine hours which are fully utilized by the budget production and cannot be further increased.

When the budget was discussed, the Managing Director stated that the product mix should be altered to yield optimum profit.

The Marketing Director suggested that he would introduce a new Product –C, each unit of which will take 1.5 machine hours. However, a processing vat involving a capital outlay of ₹ 2,00,000 is to be installed for processing Product-C. The additional fixed overheads relating to the processing vat was estimated at ₹60,000 per month. The variable cost of Product-C was estimated at ₹ 21 per Unit.

Required:

1) Calculate the profit as per draft budget for the next month.
2) Revise the product mix based on data given for P and Q to yield optimum profit.
3) The company decides to discontinue either Product-P or Q whichever is giving lower profit and proposes to substitute Product-C instead. Fix the selling price of product-C in such a way as to yield

15% return on additional capital employed besides maintaining the same overall profit as envisaged in (ii) above.

Note 1: Calculation of Total Machine Hours

Product	Units x Hours per unit	= Total
P	40,000 x 2	= 80,000
Q	80,000 x 1	= 80,000
		1,60,000

Note 2:Fixed overhead are absorbed on basis of machine hours

$$\therefore \text{Recovery Rate} = \frac{9,60,000}{1,60,000} = ₹6$$

Note 3:

Product	Total Cost	Variable Cost	Fixed Cost
P	20	8	12
Q	40	34	6

Given: -Max DD

P 60,000 units Total ₹9,60,000

Q 1,00,000 units Fixed cost =

Suggesting: New product = C Machine hours: 1 -5
Capital Outlay = 2,00,000
Additional Fixed Overhead = ₹ 60,000
Variable Cost = ₹ 21
Step 1:

Statement Showing Contribution per unit, per hour and Rank

	P	Q
Selling Price (per unit)	25	50
Variable Price (per unit)	(8)	(34)
Contribution per unit	17	16
÷ Machine hours	2	1
Contribution per unit/per hour	8.5	16
Rank	II	I

Step 2: Statement Showing Production Plan for Maximum Profit

Hrs. Available	Products	Units x Hours per unit	= Total	Balance Hrs.
1,60,000	Q	1,00,000 x 1	= 1,00,000	1,60,000 - 1,00,000 = 60,000
	P	30,000 x 2	= 60,000	(60,000 - 60,000) = 0

Ans (i) & (ii)

Statement Showing Analysis of Profit & Loss

	Ans (i) Budgeted Profit	Ans (ii) Maximum Profit
P	6,80,000 (40,000 x 17)	5,10,000 (30,000 x 17)
Q	12,80,000 (80,000 x 16)	16,00,000 (1,00,000 x 16)
Total Contribution	19,60,000	21,10,000
Fixed Cost	(9,60,000)	(9,60,000)
Profit/Loss	10,00,000	11,50,000

Ans (iii) Statement Showing Selling Price per unit of C

Cut down Product 'P' [minimum contribution per hour]
& Save the hours (30,000 units x 2 hours) →60,000 hours
= 40,000 units

$\therefore$ Possible Production of $C = \frac{60,000}{1.5}$

Calculation of Total Sales Value:

Variable Cost :	Q (1,00,000 x 34)	34,00,000
	C (40,000 x 21)	8,40,000
Fixed Cost :		9,60,000
Additional Cost		60,000
Profit (ii)		11,50,000
Additional Int Cap (2 hour x 15% x 1/2)		2,500
		64,12,500

Q	C
1,00,000 x ₹ 50	14,12,500
50,00,000	÷ 40,000
	∴ 35.3125 per unit

Case Study – 43

Venus Ltd. is engaged in the manufacture of four products in its factory. The production and sales volume is much lower than the normal volume and so there is a substantial unfavorable variance in the recovery of overheads. The sales and cost data for a year are as under:-

(₹ in lakhs)

	A	B	C	D	Total
Sales	400	500	200	100	1,200
Direct Materials	64	70	32	7	173
Direct Wages	88	105	60	18	271
Factory Overheads	128	172	120	24	444
Selling & Admin Overheads	80	100	40	20	240
Profit/Loss	40	53	(52)	31	72
Unabsorbed Overheads					48
Net Profit					24

50 percent of the factory overheads are variable at normal operating volume and the variable selling and administration overheads account for 5% of sales.

Of the total sales of product 'C' half of the volume is used in the market for applications in which product 'D' can be substituted. Thus if product 'C' is not available the sales of product 'D' can be increased by₹100 lakhs without any change in the fixed selling expenses.

Of the total sales of product 'C' about 25% is sold in conjunction with product 'A'. the customers will not be able to substitute product 'D' and so the sales of product 'A' will be reduced by 12.5% of the present level if product 'C' is withdrawn.

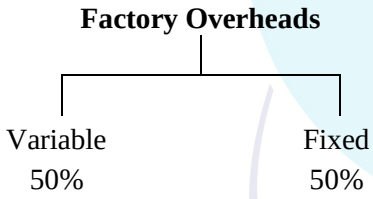
In the event of total discontinuance of product 'C', the fixed factory and selling and administration overheads will be reduced by₹20 lakhs. Alternatively if the production and sales of product 'C' is maintained to the extent of 25% of the present level as service to product 'A', there will be a reduction in the fixed costs to the extent of ₹ 10 lakhs.

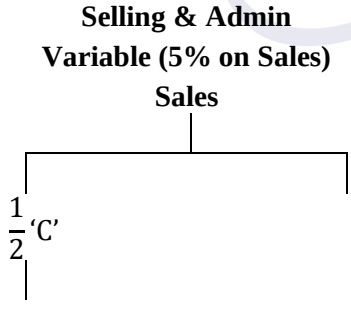
Required:

i) Prepare statements to show the financial implications of:
   a) Continuance of Product 'C'
   b) Total discontinuance of product 'C'
   c) Continuance of product 'C' only as service to customers using product 'A' whose business will otherwise be lost.

ii) Make your recommendations on the course of action to be taken by the company with such comments as you may like to offer.

(Given)





If 'C' is not Available Sales of Products 'D' can be increased by 100 lacs without any change in Fixed Selling Expenses.

Note No. 1 Statement Showing Computation of Fixed Overheads

Factory Overheads = 444

Variable	Balancing figure
(50 % 444)	(50 % 444)
= 222	= 222

Selling & Admin Overheads = 240

Variable	Balancing figure
(5% on Sales)	= 180
(1,200 x 5%)	
= 60	

Under Absorbed Overheads (Fixed)
= 48
Total Fixed Overheads = (222 + 180 + 48)
= **450**

Ans No. 1 (a)

Statement Showing Implication of Continuance of Product 'C'

₹ lacs

	A	**B**	**C**	**D**	**Total**
Sales	400	500	200	100	1,200
Direct - Material	(64)	(70)	(32)	(7)	(173)
Direct - Wages	(88)	(105)	(60)	(18)	(271)
Variable Factory Overhead (50%)	(64) (50% 128)	(86) (50 % x 172)	(60) (120 x 50%)	(12) (24 x 50%)	(222)
Variable Selling & Admin (5% on Sales)	(20) (400 x 5%)	(25) (500 x 5%)	(10) (200 x 5%)	(5) (100 x 5%)	(60)
Contribution	**164**	**214**	**38**	**58**	**474**
Fixed Overheads (Note No.1)					(450)
				Profit	**24**

Ans No. 1(b)

Total Discontinuance of Product 'C'

Saving in Fixed Factory and Selling and Administration Overheads by **20 –lacs**
Revised Fixed Overheads (450 – 20) = 430
Sales of Products 'A' (400 x 12.5%) = 50
(400 – 50) = **350**
Revised Sales 'D' (100 + 100) = 200

	A	B	D	Total
(A) Sales	350 (400 - 50)	500	200 (100 + 100)	1,050
(B) Variable Cost				
Direct - Material	(56) $\left(\frac{64}{400} \text{x } 350\right)$	(70)	(14) $\left(\frac{7}{100} \text{x } 200\right)$	(140)
Direct - Wages	(77) $\left(\frac{88}{400} \text{x } 350\right)$	(105)	(36) $\left(\frac{18}{100} \text{x } 200\right)$	(218)
Factory Overhead (Variable)	(56) $\left(\frac{64}{400} \text{x } 350\right)$	(86)	(24) $\left(\frac{12}{100} \text{x } 200\right)$	(166)
Selling Overhead (Variable)	(17.50) $\left(\frac{20}{400} \text{x } 350\right)$	(25)	(10) $\left(\frac{5}{100} \text{x } 200\right)$	(52.50)
Contribution	**143.50**	**214**	**116**	**473.50**
Fixed Overheads				(430.00)
				43.50

Saving in Fixed Overheads = 10

Revised Fixed Cost (450 -10) = **440**

Statement Showing Financial Implication Of Continuance of Product 'C' As Service of Product

	A	B	C	D	Total
Sales	400	500	50 (200 x 25%)	200	1,150
Variable Cost					
Direct - Material	(64)	(70)	(8) $\left(\frac{32 \text{ x } 50}{200}\right)$	(14) $\left(\frac{7}{100} \text{x } 200\right)$	(156)
Direct - Wages	(88)	(105)	(15) $\left(\frac{60 \text{ x } 50}{200}\right)$	(36) $\left(\frac{18}{100} \text{x } 200\right)$	(244)
(Variable) Factory Overhead	(64)	(86)	(15) $\left(\frac{60 \text{ x } 50}{200}\right)$	(24) $\left(\frac{12}{100} \text{x } 200\right)$	(189)
(Variable) Selling Overhead	(20)	(25)	(2.5) $\left(\frac{10 \text{ x } 50}{200}\right)$	(10) $\left(\frac{5}{100} \text{x } 200\right)$	(57.50)
Contribution	164	214	9.5	116	503.50
Fixed Overheads					(440)
				Profit	**63.50**

The above statements show that continuance of product 'C' as service to product 'A' increases the profitability to ₹ 63.5 lakhs because of the increase in sales of product 'D' which is the highest contribution yielding product. Therefore, the company should adopt this course i.e. producing product 'C' only as service to customers using product 'A' whose business will otherwise be lost. However, the company should ensure that the market will be able to absorb increased production of 'D' at the prevailing prices and the available machine capacity will be adequate for manufacture of increased volume of product 'D'.

Case Study – 44

Bloom Ltd. makes three products A, B and C. the following information is available:

	(Figures in ₹ per unit)		
	A	**B**	**C**
Selling price (peak -season)	550	630	690
Selling price (off - season)	550	604	690
Material Cost	230	260	290
Labour (peak -season)	110	120	150
Labour(off - season)	100	99	149
Variable Production Overhead	100	120	130
Variable selling overhead (only for peak -season)	10	20	15
Labour hours required for one unit of production	8	11	7 (hours)

Material cost and variable production overheads are the same for the peak –season and off –season. Variable selling overheads are not incurred in the off –season. Fixed costs amount to ₹ 26,780 for each season, of which ₹ 2,000 is towards salary for special technician, incurred only for product B, and ₹ 4,780 is the amount that will be incurred on after –sales warranty and free maintenance of only product C, to match competition.

Labour force can be interchangeably used for all the products. During peak –season, there is labour shortage and the maximum labour hours available are 1,617 hours. During off –season, labour is freely available, but demand is limited to 100 units of A, 115 units of B and 135 units of C, with production facility being limited to 215 units for A, B and C put together.

Required:

(i) Advise the company about the best product mix during peak –season for maximum profit.
(ii) What will be the maximum profit for the off –season?

Step No.1 Statement Showing Contribution Per Unit / Per Hour / Rank (Peak –Seasons)

	A	B	C	Total
Selling Price (P.U)	550	630	690	
Variable Price (P.U)				
Direct Material	(230)	(260)	(290)	
Direct Labour	(110)	(120)	(150)	
(Production) Variable Overhead	(100)	(120)	(130)	
(Selling) Variable Overhead	(10)	(20)	(15)	
Contribution (P.U)	**100**	**110**	**105**	
÷ Direct Labour Hrs. - P.U	÷ 8	÷ 11	÷ 7	
Contribution Per Hour	12.5	10	15	
Rank	II	III	I	
General Overhead				20,000
Specific Overhead		2,000	4,780	
Break -Even -Point (Units)				
For only one product At a Time	$\left(\frac{20,000}{100}\right)$	$\left(\frac{22,000}{110}\right)$	$\left(\frac{24,780}{105}\right)$	
	200	200	236	
Possible Production	202.125	147	231	
	$\left(\frac{1,617}{8}\right)$	$\left(\frac{1,617}{11}\right)$	$\left(\frac{1,617}{7}\right)$	
Contribution	202 x 100	147 x 110	231 x 105	
	20,200	14,700	24,255	
Fixed Cost	(20,000)	(22,000)	(24,780)	
Profit Loss	**200**	**(7,300)**	**(525)**	

Ans No. (ii) Statement Showing Contribution P.U/ P.H Rank For Production

	A	B	C
Selling Price (P.U)	550	604	690
Variable Price (P.U)			
Direct Material	(230)	(260)	(290)
Direct Labour	(100)	(99)	(149)
Production Variable Overhead	(100)	(120)	(130)
	120	**125**	**121**
	III	I	II
Maximum Demand	100	115	135

Statement Showing Analysis of Options

	A	B	C	Total Contribution	Net Profit Contribution Fixed Cost
Option (I)	14,375 (115 x 125)	12,100 (100 x 121)		26,475	26,475 - 26,780 = (305)
Option (II)	(115 x 125) = 14375		(100 x 120) = 12,000	26,375	26,375 - 22,000 = 4,375
Option (III)	9,600 (80 x 120)		16,335 (135 x 129)	25,935	(25,935 - 24,780) = 1,155

Best strategy is to produce 100 units of product A and 115 units of product B during off season. Maximum profit is ₹ 4,375.

Case Study – 45

Dyal Dairies Ltd. has two processing and bottling plants, Danida and Danima, in adjoining districts. The comparative cost and revenue budget per month are as below:-

	Danida	**Danima**
Production (Litres)	1,00,000	75,000
Variable Costs:	**(₹)**	**(₹)**
Bottles	1,00,000	79,000
Closures	90,000	71,500
Crates	14,000	12,500
Milk Loss	30,000	47,000
Electricity	14,000	14,000
Fuel	40,000	46,000
Water	10,000	11,250

Fixed Costs:	**(₹)**	**(₹)**
Electricity	13,500	11,000
Salaries & Wages	90,000	60,000
Depreciation	50,000	20,000
Total Costs (₹)	4,51,500	3,72,250
Sales Realisation (₹)	7,00,000	5,25,000
Profit (₹)	2,48,500	1,52,750

Danima's high cost, low margin status drawn management's attention. It is also observed that Danida can increase its production by 50 per cent with the existing plant capacity and without additional manpower.

Two proposals are under consideration:

(i) Cut down Danima's production by 25,000 litres and increase Danida's production by 25,000 litres.
(ii) Cut down Danima's production by 50,000 litres and increase Danida's production by 50,000 litres.

For the additional quanity produced in excess of 1,00,000 litres, Danida will incur₹ 0.40 per litre towards group incentive. Transporting the additional output from Danida to Danima's region for sale will cost ₹ 10,000 in both cases.

Required:

(i) Prepare a statement to show the contribution and the profit for Danida, Danima and for the company as a whole, for each proposal. Comment on the results.
(ii) The management is keen that the cut in Danima's production should not result in its reporting loss, as that would demoralize its employees. If break –even production is to be retained in Danima and the balance alone is to be transferred to Danida. Show the contribution and the profit for Danida, Danima and the company as a whole.

Ans No. (i) Statement Showing Contribution Per Unit

	Danida	Danima
	P.U	**P.U**
Selling Price (Ltr)	7.00 (7,00,000 ÷ 1,00,000)	7.00 (5,25,000 ÷ 75,000)
Variable Price (Ltr)	2.98 (2,98,000 ÷ 1,00,000)	(3.75 (2,81,250 ÷ 75,000)
Contribution (Ltr)	**4.02**	**3.25**

Statement Showing Analysis of Proposals

	Danida	Danima	Danida	Danima
	1,25,000	50,000	1,50,000	25,000
Contribution	502,500 (1,25,000 x 4.02)	1,62,500 (50,000 x 3.25)	603,000 (1,50,000 x 4.02)	81,250 (25,000 x 3.25)
Group Incentive	(10,000) (25,000 x 0.40)	–	(20,000) (50,000 x 0.40)	–
Fixed Cost	(1,53,500)	(91,000)	(1,53,500)	(91,000)
Transport Cost	(10,000)		(10,000)	
Profit	**3,29,000**	**71,500**	**4,19,500**	**(9,750)**
Total Profit				
Danida	3,29,000		4,19,500	
Danima	71,500		(9,750)	
	400,500		**409,750**	
Budget Profit	**401,250**		**401,250**	
	(750)		**8,500**	

Ans No. (ii)

Break -Even Point

Variable Cost

Contribution
3.25 x 28,000 Ltr = 91,000

Fixed Cost
1,53,500

Profit
0

Statement Showing Analysis of Profit/Loss

	Danida	Danima	Total
	1,47,000	28,000	1,75,000
Contribution	5,90,940 (1,47,000 x 4.02)	91,000 (28,000 x 3.25)	6,81,940
Group Incentive	(18,800 (47,000 x 0.40)	–	
Fixed Cost	(1,53,500)	(91,000	(2,44,500)
Transport Cost	(10,000)	–	(10,000)
Profit	**408,640**	**–**	**408,640**
Budget Profit	**(2,48,500)**	**(1,52,750)**	**(401,250)**
		Inc -By	**7,390**

Case Study – 46

Future Ltd. manufactures product N using one unit each of three components named P, Q & R and sells it at ₹ 37.50 per unit. It has two divisions. In production division it produces all the types of components by using its full capacity of 42,000 machines hours. In assembly division the remaining job is performed by the workers manually before N is ready for the sale:

Product N is manufactured in batches of 100 units and the data relating to the current production per batch are:

	Machine Hours	Variable Cost (₹)	Fixed Cost (₹)	Total Cost (₹)
Production Division :				
Component - P	15	375	150	525
Component - Q	25	450	175	625
Component - R	30	450	450	900
Assembly Division:				
Assembly---		800	325	1,125
		2,075	1,100	3,175

For the next year the company has estimated that its sale would go up by 50% more than the present sales and probably even by 75% if the production capacity is made available.

The machine capacity cannot be increased during the next year even though the workers in the assembly division can be increased as per requirement without any increase in fixed costs. To meet the increased demand, production can be taken up and processed in assembly division by procuring the components from the open market. The company has received the following price quotations for the purchase of components:

	P	**Q**	**R**
Price offered per component (₹)	5.55	7.00	8.40

Required:

a) Determine the production and profits being earned at present.
b) Indicate which of the component (s) should be purchased and in what quantities at the two estimated levels of output viz. increase by 50 % and 75% of existing production.
c) Prepare statement the company's profitability at both the estimated levels of output.

Note no. (I) Given N (100 units = 1 Batch)

	P	**Q**	**R**
	15 hours	25 hours	30 hours
Sales Price	(per batch)	(375 x 100)	3,750
Variable Price	(per batch)		(2,075)
Contribution per batch			1,675

$$\text{Present Production} = \left(\frac{42{,}000}{15+25+20}\right) = 600 \text{ Batches}$$

Present Fixed Cost = (600 x 1,100) = 6,60,000
Demand (600 x 150 %) = 900 Batches
(600 x 175 %) = 1,050 Batches

Statement Showing loss on purchase payback method, PH/Rank

	P	Q	R
Purchase price (per batch)	555	700	0.84
	(5.55 x100)	(7 x 100)	(8.4 x 100)
Manual Variable Cost	375	450	450
Loss on purchase payback	180	250	390
Hours per batch	÷ 15	÷ 25	÷ 30
Loss on purchase payback	12	10	13
Rank	II	III	I

(a) Statement Showing Profit & Loss (At Present)

'N'	₹
Contribution (600 Batches x 1,675)	10,05,000
Fixed Cost	(6,60,000)
Profit	3,45,000

(b) Statement Showing Production & Purchase Plan for Minimum Cost

Hours Available	Products	Production x hours per batch = Total	Balance hours
(1) 42,000	R	900 x 30 = 27,000	(4,200 - 27,000)
Demand 900 Batches			
	P	900 x 15 = 13,500	(15,000- 13,500)
	Q	60 x 25 = 1,500	(1,500 - 1,500)
Purchase	Plan Q	(900 -60) = 840 x 100 units	= 84,000 units
(2) 42,000	R	1,050 x 30 = 31,500	(42,000 - 31,500)
Demand 1,050 Batch	P	700 x 15 = 10,500	(10,500 - 10,500)
Purchase	Plan P	(1,050 - 700) = 350 x 100 units	= 35,000 units
	Q	1050 x 100 units	= 105,000 units

Statement Showing Analysis of Profit & Loss

	If Demand	900 Batches	1,050 Batches
	Contribution	15,07,500	17,58,750
		(900 x 1,675)	(1,050 x 1,675)
(-)	Fixed Cost	(6,60,000)	(6,60,000)
	Additional Purchase Cost Q	(2,10,000)	(2,62,500)
		(250 x 840)	(250 x 1,050)
	P		(63,000)
		–	(350 x 180)
	Profit/Loss	6,37,500	7,73,250

900 Batches

Sales Price	3,750	3,750	
P	(375)	(375)	
Q	(700)	(450)	
R	(450)	(450)	
Assembly	(800)	(800)	
	1,425	1,675	
	x 840	x 60	
	11,97,000	+ 100,500	= 12,97,500
Fixed Cost			(6,60,000)
			6,37,500

Case Study – 47

Gemini Publishers Ltd. is considering launching a new monthly magazine at a selling price of ₹ 10 per copy. Sales of the magazine are expected to be 5,00,000 copies per month, but it is possible that the actual sales could differ quite significantly from this estimate.

Two different methods of producing the magazine are being considered and neither would involve any additional capital expenditure. The estimated production cost for each of the two methods of manufacture, together with the additional marketing and distribution costs of selling the new magazine, are given below:

	Method A	**Method B**
Variable Costs	₹ 5.50 per copy	₹ 5.00 per copy
Specific Fixed Costs	₹ 8,00,000 p.m.	₹ 12,00,000 p.m.
Semi - Variable Costs :		
3,50,000 Copies	₹ 5,50,000 p.m.	₹ 4,75,000 p.m.
4,50,000 Copies	₹ 6,50,000 p.m.	₹ 5,25,000 p.m.

The following estimates have been available:

It may be assumed that the fixed cost content of the semi –variable cost will remain constant throughout the range of activity shown.

The company currently sells a magazine covering related topics to those that will be included in the new publication, and consequently, it is anticipated that sales of this existing magazine will be adversely affected. It is estimated that for every ten copies sold of the new publication, sales of the existing magazines will be reduced by one copy.

Sales and cost data of the existing magazines are as shown below:

Sales	……	₹ 2,20,000 copies p.m.
Selling Price	……	₹ 8.50 per copy
Variable Costs	……	₹ 3.50 per copy
Specific Fixed Costs	……	₹ 8,00,000 p.m.

Required:

i) Calculate for each production the net increase in company profits which will result from the introduction of the new magazine, at each of the following levels of activity:

5,00,000 Copies p.m.
4,00,000 Copies p.m.
6,00,000 Copies p.m.

ii) Calculate, for each production method, the amount by which sales volume of the new magazine could decline from the anticipated 5,00,000 copies per month, before the company makes an additional profit from the introduction of the new publication.
iii) Briefly identify any conclusions which may be drawn from your calculation.

Ans No.1 Statement Showing Analysis of Profit & Loss

	Method - A Level Of Activity			**Method - B Level Of Activity**		
	5,00,000	4,00,000	6,00,000	5,00,000	4,00,000	6,00,000
x Contribution P.U (Note - A)	x 3	x 3	x 3	x 4	x 4	x 4
Total Contribution	15,00,000	12,00,000	18,00,000	20,00,000	16,00,000	24,00,000
Fixed Cost (Note No. 2)	(10,00,000)	(10,00,000)	(10,00,000)	(15,00,000)	(15,00,000)	(15,00,000)
Net Profit	**5,00,000**	**2,00,000**	**8,00,000**	**5,00,000**	**1,00,000**	**9,40,000**

(ii) Break -Even Point = Fixed Cost ÷ Contribution per unit
Method A = ₹ 10,00,000 ÷ ₹ 3
= 3,33,333 Copies
Method B = ₹ 15,00,000 ÷ ₹ 4
= 3,75,000 Copies

The margin of safety or the amount by which sales volume of the new magazine could decline is the difference between the anticipated sales and the breakeven point sales.

This is calculated below -

Method A = 5,00,000 Copies − 3,33,333 Copies
= 1,66,667 Copies
Method B = 5,00,000 Copies − 3,75,000 Copies
= 1,25,000 Copies

(iii) The above calculations show that Method B has a higher breakeven point and a higher contribution per copy sold. Therefore, profits from method B are more vulnerable to a decline in sales volume. However, higher profits are obtained with method B.

The contribution per copy of the existing magazine is₹ 5. Therefore, the breakeven point from the sales of the existing magazines is 1,60,000 copies (₹ 8,00,000 ÷ ₹ 5.00).

The current level of monthly sales is 2,20,000 copies. Therefore, sales can drop by 60,000 copies before breakeven point is reached. For every 10 copies sold of the new magazine, sales of the existing magazine will be reduced by one copy. Consequently, if more than 6,00,000 copies of the new magazine are sold, the existing magazine will make a loss. Therefore, if the sales of the new magazine are expected to consistently exceed 6,00,000 copies, then the viability of the existing magazine must be questioned.

Note No. (A)(Given) Statement Showing Contribution Per Copy –New –Magazine

	Method A	Method B
Selling Price	10.00	10.00
Variable Price	(5.50)	(5.00)
Variable Price (Semi -Variable) (Note No.1)	(1.00)	(0.50)
Lost Contribution From existing magazine (Note No.2)	(0.50)	(0.50)
Contribution (P.U)	**3.00**	**4.00**

Note No.1

Analysis of Semi –Variable Cost

Method –A

Variable Cost (P.U) = x	Fixed Cost = y
3,50,000 x + y=	5,50,000
4,50,000 x + y=	6,50,000
1,00,000 x=	1,00,000

***x* = 1.00**

(3,50,000 x 1) + y = **5,50,000** y = **2,00,000**

Note No. 2 Method –B

Variable Cost (P.U) = x	Fixed Cost = y
3,50,000 x + y=	4,75,000
4,50,000 x + y =	5,25,000
1,00,000 x=	50,000

***x* = 0.50**

(3,50,000 x 0.5) + y = **4,75,000** y = **3,00,000**

Statement Showing Total Fixed Cost

	Method - A	Method - B
Specific Cost Fixed	8,00,000	12,00,000
(Semi - Variable)	2,00,000	3,00,000
Total	**10,00,000**	**15,00,000**

Note –(2)

It's estimated that for every ten copies sold of the new publication sales of Existing magazines will be reduced by one copy.

10 – 1

Selling Price	=	8.50
Variable Price	=	(3.50)
Contribution	=	5.00
		÷ 10
Contribution Cost	=	**0.50**

Case Study – 48

Apex Limited manufacturer two products, P and Q, using the same production facility. The following information is available for a production period:

Particulars	**Product P**	**Product Q**
Demand (units)	2,20,000	1,75,000
Contribution (₹ / unit)	10	12
Machine hours required per 100 units	15	25

P and Q can be produced only in batches of 100 units, and whatever is produced has to be sold or discarded. Inventories build –up is not possible from one production period to another. The total fixed costs for each level of production and directly attributable to P and Q are given below:

Level of Output	**Total Fixed Costs (₹)**	
	Product P	**Product Q**
Upto 1,00,000 units	6,00,000	5,50,000
1,00,001 to 2,00,000 units	13,50,000	12,20,000
2,00,001 to 3,00,000 units (maximum possible level)	18,70,000	15,50,000

75,000 machine hours are available in the production period.

Required:

i) Calculate the quantities of P and Q in the best product mix to achieve the maximum profit and compute the maximum profit.
ii) What will be the opportunity cost of meeting P's demand fully?

Statement Showing Contribution PB/P.H Rank

	P	**Q**
Contribution (Per Batch)	1,000	1,200
	(100 units x 10)	(100 units x 12)
÷ Machine Hrs. Required P.U	÷ 15	÷ 25
Contribution Per Hour	66.67	48
	(1,000 ÷ 15)	(1,200 ÷ 25)
Rank	**I**	**II**

Statement Showing Production Plan

Hours	**Products**	**Production x Hrs. P.U =**	**Total**	**Balance**
75,000	P	2,200 Batches x 15 =	33,000	(75,000 - 33,000)
	Q	1,680 Batches x 25 =	42,000	(42,000 - 42,000)

Statement Showing Maximum Profit/Loss

Products	**Units / Batches**	**Contribution P.B**	**₹**
P	2,200 x	1,000	22,00,000
Q	1,680 x	1,200	20,16,000
			42,16,000

Statement Showing "Incremental Fixed Cost"

	'P'	'Q'
	(₹)	(₹)
Up to 1,000 batches	6,00,000	5,50,000
Next 1,000 batches	7,50,000	6,70,000
Next 1,000 batches	5,20,000	3,30,000

For producing additional batches above 2,000 batches of Product 'P' Apex Limited have to incur additional fixed cost of ₹ 5,20,000 to earn additional contribution of ₹ 2,00,000 (200 batches x ₹ 1,000) which is not beneficial. However, hours saved on 200 batches i.e. 3,000 hrs. (200 batches x 15 hrs.) can be utilized for production of 'Q' to the extent of 70 batches (1,750 batches i.e. maximum demand of 'Q' - 1,680 batches).

The contribution from producing additional 70 batches of Product 'Q' will be ₹ 84,000 (70 batches x ₹ 1,200). Accordingly best product mix will be 2,000 batches of 'P' and 1,750 batches of 'Q'.

Statement Showing "Maximum Profit"

Product	Batches	Cont./Batch	Total
'P'	2,000	1,000	20,00,000
'Q'	1,750	1,200	21,00,000
Contribution			41,00,000
Less : Fixed Cost - 'P'			13,50,000
Less : Fixed Cost - 'Q'			12,20,000
Net Profit			15,30,000

Ans No. (ii) Statement Showing "Opportunity Cost" [Benefit Denied in the Next Best Alternative i.e. (i)]

Particulars	Total
Additional Fixed Cost Not Covered by Producing 'P' in the Maximum Range (₹ 5,20,000 - ₹ 2,00,000)	3,20,000
Add : Loss of Contribution (Not Producing 70 batches of 'Q')	84,000
Total Opportunity Cost	4,04,000

Case Study – 49

Lee Electronic manufactures four types of electronic products, A, B, C and D. All these products have a good demand in the market. the following figures are given to you:

	A	B	C	D
Material Cost (₹/ u)	64	72	45	56
Machining Cost (₹/u @ ₹ 8 per hour)	48	32	64	24
Other Variable Costs (₹ / u)	32	36	44	20
Selling Price (₹ / u)	162	156	173	118
Market Demand (Units)	52,000	48,500	26,500	30,000

Fixed overhead at different levels of operation are:

Level of Operation (in production hours)		**Total Fixed Cost (₹)**
Upto 1,50,000	……..	10,00,000
1,50,000 - 3,00,000	……..	10,50,000
3,00,000 - 4,50,000	……..	11,00,000
4,50,000 - 6,00,000	……..	11,50,000

At present, the available production capacity in the company is 4,98,000 machine hours. This capacity is not enough to meet the entire market demand and hence the production manager wants to increase the capacity. The company wants to retain the customers by meeting their demands through alternative ways. One alternative is to sub -contract a part of its production.The sub -contract offer received as under:

	A	**B**	**C**	**D**
Sub -contract Price (₹ / u)	146	126	155	108

Required:

The company seeks your advice in terms of products and quantities to be produced and/or sub - contracted, so as to achieve the maximum possible profit. Also compute the profit expected from your suggestion.

Step No.1

Statement Showing Contribution Per Unit / Per Hour / Per Rank For Production

	A	**B**	**C**	**D**
Selling Price (p.u)	162	156	173	118
Material (p.u)	(64)	(72)	(45)	(56)
Machine Cost	(48)	(32)	(64)	(24)
Other Variable Cost	(32)	(36)	(44)	(20)
Contribution (p.u)	18	16	20	18
÷ hrs. p.u	÷ 6	÷ 4	÷ 8	÷ 3
Contribution per hr.	3	4	2.5	6
	II	**(Sub Contract)**	**III**	**I**

Note No.1 Hrs. Per Unit

Product	**Machine Cost P.U**	**hrs. P.U**
A	48 ÷ 8 =	6
B	32 ÷ 8 =	4
C	64 ÷ 8 =	8
D	24 ÷ 8 =	3

	A	B	C	D
Selling Price (P.U)	162	156	173	118
Sub Contract (Price)	(146)	(126)	(155)	(108)
Contribution P.U	**16**	**30**	**18**	**10**
	÷ 6	Purchase / Subcontract	÷ 8	÷ 3
Contribution Per Hr.	2.67		= 2.25	= 3.33

Statement Showing Purchase Production Plan For the Period

Hrs. Available	Products	Units x hrs. P.U =	Total	Balance
(I) 1,50,000	D	30,000 x 3 =	90,000	(1,50,000 - 90,000)
	B	Purchase		
	A	10,000 units x 6 =	60,000	(60,000 - 60,000)

Statement Showing Analysis of Profit/Loss

Products	Decision	Units x Contribution P.U (Step No.1) =	Total Contribution
A	Production	10,000 x 18 =	1,80,000
B	Purchase	48,500 x 30 =	14,55,000
C	Purchase	26,500 x 18 =	4,77,000
D	Production	30,000 x 18 =	5,40,000
A	Purchase (Sub - Contract)	42,000 x 16 =	6,72,000
			33,24,000
		Fixed Cost	**(10,00,000)**
			23,24,000

Hrs.	Sub Contract V/s Manufacture	
1,50,000	A 25,000 x 6 = 1,50,000	(1,50,000 - 1,50,000)
	(35,000 - 10,000)	

Statement Showing Analysis of Inc –Profit /Loss

	Units x Add Contribution -P.U		Total	Fixed Cost	Net Profit
Product 'A'	25,000 x (18.00 - 16)	=	50,000	(50,000)=	0

Statement Showing Production Plan

Hrs.	Products	Units x hrs. P.U = Total	Balance
1,50,000	A	17,000 x 6 = 102,000	(1,50,000 - 102,000)
	(52,000 - 10,000 - 25,000)		(48,000)
	C	6,000 x 8 = 48,000	

Statement Showing Analysis of Inc –Profit /Loss

Product	Units x Add Contribution -P.U	Contribution
A	17,000 x (18 - 16) =	34,000
C	6,000 x (20 - 18) =	12,000
		46,000
	Additional -Fixed Cost (11,00,000 - 10,50,000)	(50,000)
	Profit/Loss	**(4,000)**

Level –(4) **Statement Showing Production Plan**

Hrs.	Products	Units x hrs. P.U = Total
1,50,000	C	18,750 x 8 = 1,50,000

Statement Showing Analysis of Profit / Loss

Product	Units	Add x Contribution -P.U	In -Contribution
C	18,750	(20 - 18) =	37,500
		(11,00,000 - 11,50,000) Fixed Cost	(50,000)
			(12,500)

- **Advice – Do Not –Expand –Capacities**

Add –Contribution Per Unit = (Contribution On Production –Contribution on Subcontract)

Statement Showing Analysis of Profit / Loss

	A (Sub Contract)	A (Produce)	B (Sub Contract)	C (Sub Contract)	D (Produce)	Total
Units	42,000	10,000	48,500	26,500	30,000	
Contribution (P.U)	x 16	x 18	x 30	x 18	x 18	
Total Contribution	6,72,000	1,80,000	14,55,000	4,77,000	5,40,000	33,24,000
					Fixed Cost	**(10,00,000)**
					Profit / Loss	**23,24,000**

Case Study – 50

AXE Ltd. manufactures for products A, B, C and D. the following details are available for a production period:

	A	B	C	D
Selling Price	100	109	121	124
Material Cost	40	42	46	40
Labour Cost				
Assembly Dept. @ ₹ 10 per hour	15	20	15	20
Machine Dept. @ ₹ 12 per hour	18	24	36	30
Variable overheads @ ₹ 4 per labour hour in assembly dept.	6	8	6	8
Maximum external demand (units)	40,000	55,000	36,000	30,000

Total fixed cost id dependent on the output level and is tabulated below at different levels of output:

Production units (any combination of one or more of any A, B, C or D)	**Total Fixed Cost (₹)**
Zero to 1,00,000 units	8,43,000
1,00,001 to 1,50,000 units	12,50,000
1,50,001 to 2,00,000 units	16,00,000

Production facilities can be interchangeably used among the products.

Labour availability in the assembly department is limited to 2,20,000 hours for the production period. A local firm has offered to make any of the products on a sub –contract basis on the following rates:

	A	**B**	**C**	**D**
Sub - contract Price (₹ / unit)	85	94	101	100

Required:

i) Advise the management on how many units of each product area to be manufactured or subcontracted to fulfill maximum market demand. What would be the corresponding profits?

ii) What is the minimum number of units to be produced to achieve break –even point?

iii) What would advise as the best strategy to maximize profits if assembly labour is not a limiting factor and if there is no compulsion to fulfill market demand?
(Only relevant figures need to be discussed. A detailed profitability statement is not required).

Step No.1 Ans No.1

Statement Showing Contribution Per Unit / Per Hr. /Per Rank

	A	**B**	**C**	**D**
Selling Price (P.U)	100	109	121	124
Variable Price (P.U)				
Material	(40)	(42)	(46)	(40)
Labour Cost				
Ass Department	(15)	(20)	(15)	(20)
Machine	(18)	(24)	(36)	(30)
Variable Overhead	(6)	(8)	(6)	(8)
Contribution P.U	**21**	**15**	**18**	**26**
Hrs. P.U	÷ 1.5	÷ 2	÷ 1.50	÷ 2
Contribution P.H	14	7.5	12	13
Rank	I	IV	III	II

Products	**Variable Overhead ÷ 4 =**	**hrs. / P.U**
A	6 ÷ 4=	1.5
B	8 ÷ 4 =	2
C	6 ÷ 4 =	1.5
D	8 ÷ 4 =	2

Statement Showing Loss On Purchase P.U / Per Hrs. /Rank

	A	B	C	D
Purchase Price	(85)	(95)	(101)	(100)
Man - V - Cost	79	94	103	98
(Selling Price - Contribution)	(100 - 21)	(109 - 15)	(121 - 18)	(124 - 26)
Loss P.U	**(6)**	**(1)**	**(2)**	**(2)**
Hrs. P.U	÷ 1.5	÷ 2		÷ 2
Loss P.H	(4)	(0.50)	III	(1) II

Statement Showing Production Plan

Hrs. Available	Products	Units x Hrs. P.U =	Total	Balance
2,20,000	A	40,000 x 1.5 =	60,000	(2,20,000 - 60,000)
	D	30,000 x 2 =	60,000	(1,60,000 - 60,000)
	B	50,000 x 2 =	1,00,000	(1,00,000 - 1,00,000)

Purchase Plan

B (55,000 - 50,000) = 5,000 units

C (36,000 - 0) = 36,000 units

Statement Showing Contribution Per Unit On Purchase

	B	C
Selling Price (P.U)	109	121
Material (Sub Contribution)	(95)	(101)
Contribution P.U	14	20

Statement Showing Analysis of Profit / Loss

	A (Produce)	B (Produce)	D (Produce)	B (SubCont)	C (SubCont)	Total
Units Contribution (P.U)	40,000	50,000	30,000	5,000	36,000	
	x 21	x 15	x 26	x 14	x 20	
	8,40,000	7,50,000	7,80,000	70,000	7,20,000	31,60,000
	Fixed Cost					**(12,50,000)**
				Net Profit		**19,10,000**

Decision

However AXE Ltd. can save fixed cost of ₹ 4,07,000 (₹ 12,50,000 − ₹ 8,43,000) if it keeps its production limited to 1,00,000 units. But in this case AXE Ltd. has to subcontract 20,000 units of B to fulfill maximum market demand. Contribution Lost from subcontracting of 20,000 units is amounting to ₹ 20,000 [20,000 units x (₹ 15 - ₹ 14)]. Hence optimum profit would be ₹22,97,000 [₹ 19,10,000 + ₹ 4,07,000 - ₹ 20,000].

Statement Showing Analysis of Profit / Loss

	A (Produce)	B (Produce)	D (Produce)	B (SubCont)	C (SubCont)	Total
Units	40,000	30,000	30,000	25,000	36,000	
Contribution (P.U)	x 21	x 15	x 26	x 14	x 20	
Total Contribution	8,40,000	4,50,000	7,80,000	3,50,000	7,20,000	31,40,000
	Fixed Cost			**Net Profit**		(8,43,000) 22,97,000

Ans No. (ii)

Rank **Statement Showing Break Even Point**

D **Selling Price (P.U)**

A

Variable Price (P.U)	Contribution P.U
D →	26 x 30,000 units = 7,80,000
A →	21 x 3,000 units = 63,000
	8,43,000

Fixed Cost	Profit
8,43,000	0

Ans No. (iii)Statement Showing Contribution Per Unit Rank

	Production				Sub Contract			
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Selling Price (P.U)	100	109	121	124	100	109	121	124
Material Cost	(40)	(42)	(46)	(40)	–	–	–	–
Sub Contract	–	–	–	–	(85)	(95)	(101)	(100)
Lab Ass	(15)	(201)	(15)	(20)	–	–	–	–
Machine	(18)	(24)	(36)	(30)	–	–	–	–
(Variable Overhead)	(6)	(8)	(6)	(8)	–	–	–	–
Contribution (P.U)	**21 (II)**	**15 (III)**	**18**	**26 (I)**	**15**	**14**	**20 (Sub Cont)**	**24**

Case Study – 51

Golden Pet Ltd. specializes in the manufacture of one litre plastic bottles. The firm's customers include dairy processors, fruit juice manufacturers and manufacturers of edible oils. The bottles are produced by a process called blow moulding. A machine heats plastic to the melting point. A bubble of molten plastic is formed inside a mould, and a jet of hot air is forced into the bubble. This blows the plastic into the shape of the mould. The machine releases the moulded bottle, an employee trims off any flashing (excess plastic around the edge) and the bottle is complete.

The firm has four moulding machines, each capable of producing 100 bottles per hour. The firm estimates that the variable cost of producing a plastic bottle is 20 paise. The bottles are sold for 50 paise each.

Management has been approached by a local toy company that would like the firm to produce a moulded plastic toy for them. The toy company is willing to pay ₹ 3.00 per unit for toy. The variable cost to manufacture the toy will be ₹ 2.40. In addition, Golden Pet Ltd. would have to incur a cost of ₹ 20,000 to construct the needed mould exclusively for this order. Because the toy uses more plastic and is of a more intricate shape than a bottle, a moulding machine can produce only 40 units per hour. The customer wants 1,00,000 units. Assume that Golden Pet Ltd. has the total capacity of 10,000 machine hours available during the period in which the toy company wants the delivery of toys. The firm's fixed costs, excluding the costs to construct the toy mould, during the same period will be ₹ 2,00,000.

Required:

(i) If the management predicts that the demand for its bottles will require the use of 7,500 machine hours or less during the period, should the special order accepted? Give reasons.
(ii) If the management predicts that the demand for its bottles will be higher than its ability to produce bottles, should the order be accepted? Why?
(iii) If the management has located a firm that just entered the moulded plastic business. This firm has considerable excess capacity and more efficient moulding machine and is willing to subcontract the toy job, or any portion of it, for ₹ 2.80 per unit. It will construct its own toy mould. Determine Golden Pet Ltd's minimum expected excess machine hour capacity needed to justify producing any portion of the order itself rather than subcontracting it entirely.
(iv) The management predicted that it would have 1,600 hours of excess machine hour capacity available during the period. Consequently, it accepted the toy order and subcontracted 36,000 units to the other plastic company. In fact, demand for bottles turned out to be 9,00,000 units for the period. The firm was able to produce only 8,40,000 units because it had to produce the toys. What was the cost of the prediction error failure to predict demand correctly?

Given
Golden –Pet –Ltd. → One –Ltr –Plastic Bottles

Machine	**Production -Per Hour**
4	100 Nos.

Variable Cost =	(0.20)
Selling Price =	(0.50)
Contribution =	**0.30**

Toy =	3.00	Per Toy (Selling Price)
	(2.40)	Variable Price
	0.60	Contribution
Mould =	**20,000**	

Moulding Machine
40 Units / 1 hr.
Exp –Demand = 1,00,000 units
Maximum –Capacity = 10,000 hrs.
Fixed Cost = 2,00,000
Ans No. (i)

Statement Showing Analysis of Special Order

Total Hrs. = 10,000

7,500 hrs. (For Bottles)		Balance Hrs. 2,500 hrs.
	Units	**Hrs. Required**
	1,00,000	$\left(\frac{1,00,000}{40 \text{ Units}}\right)$
		= 2,500 hrs.

Selling Price = 3.00

Variable Price 2.4	Contribution 0.60 x 1,00,000 Units = 60,000	
	Fixed Cost 20,000	Profit 40,000

Decision = Accept

Ans No. (ii) Statement Showing Contribution P.U/P.H Rank

	Bottle	**Toys**
Selling Price	50 (100 x 0.50)	120 (40 x 3)
Variable Price	(20 (100 x 0.20)	(96 (40 x 2.40)
Contribution (P.U)	**30**	**24**
÷ hrs.	÷ 1	÷ 1
Contribution per hr.	30	24

If Should Not Accept the Special Order For Toys.

(iii)Statement Showing Indifference Point

No. of units = x

$20,000 + 2.4x = 2.80x$

$0.40x = 20,000$

x = 50,000 units

This means that as long as the Golden Pet Ltd. has the surplus time available to produce more than 50,000 toys, it is better to produce them than to buy them form outside. However, if the firm has time to produce less than 50,000 toys, it would be better give the job to a sub –contractor and thus, avoid the fixed cost of ₹ 20,000. Thus, Golden Pet Ltd. must have more than 1,250 hours (50,000 / 40 units per hour) of machine time to justify the production of toys by itself as compared to sub –contracting the job.

The firm decided to manufacture 64,000 toys and sub –contract the manufacture of 36,000 toys. This has resulted in production of only 8,40,000 bottles. The economics of this decision would be as under:

Statement Showing Analysis of Profit/Loss

	Total	Bottles Produced	Toys Produced	Sub Contract
		8,40,000 Units	64,000 Units	
Sales	7,20,000	4,20,000 (8,40,000 x 0.50)	1,92,000 (64,000 x 3)	108,000 (36,000 x 3)
Variable Cost	(4,22,400)	(1,68,000) (8,40,000 x 0.20)	(1,53,600) (64,000 x 2.40)	(100,800) (36,000 x 2.80)
Contribution	**2,97,600**	**2,52,000**	**38,400**	**7,200**
Fixed Cost	(2,20,000)	(2,00,000)	(20,000)	(−)
Profit/Loss	**77,600**	**52,000**	**18,400**	**7,200**

Ans No. (b)		**9,00,000 (Made)**	**Toys = 1,00,000**
(A)	**Total**	**Bottles**	**(Subcontract)**
Sales	7,50,000	4,50,000 (9,00,000 x 0.5)	3,00,000 (1,00,000 x 3.00)
Variable Cost	(4,60,000)	(1,80,000) (9,00,000 x 0.20)	(2,80,000) (1,00,000 x 2.8)
Contribution	**2,90,000**	**2,70,000**	**20,000**
Fixed Cost	**(2,00,000)**	**(2,00,000)**	**–**
	90,000	**70,000**	**20,000**

Thus, the Cost of the Prediction Error of ₹ 12,400, Calculated as under –

Net Profit of Optimal Action [as per (iv) (b)]	₹ 90,000
Net Profit of Actual Production [as per (iv) (a)]	₹ 77,600
Cost of Prediction Error	**₹ 12,400**

Decision on Capacity Utilization

Case Study – 52

AB Ltd. manufactures product 'X'. the company operates single shift of 8 hours for 300 days in a year. The capital employed in the business is ₹ 18crores.

The manufacturing operations of the company comprise of four production departments. The company at present produces 9,000 units of product 'X' at maximum capacity. However, the capacity utilization of all the four departments is not equal and the present individual capacity utilizations are as under:

Department		**Capacity Utilisation (%)**
A	……	75
B	……	100
C	……	70
D	……	50

The present run on capital of the company has gone down to 10% from the earlier cut –off rate of 15% due to increased cost of production.

As the company cannot operate more than one shift, the management is considering two alternative proposals to increase the return on capital employed.

Alternative I

To hire out the surplus capacity of departments A, C and D. the cost and revenue projections are as under:

Department	Hire Charges per hour	Incremental Cost per Hour
A	2,500	2,000
C	1,800	1,500
D	1,600	1,200

Alternative II

To increase the installed capacity of the factory to 12,000 units by adding plant and machinery in department B at a capital cost of ₹ 4 crore. Any Balance surplus capacity in other departments after meeting the increased volume to be hired out as per alternative I. The additional units would fetch incremental revenue of ₹ 1,600 per unit.

Required:

Evaluate the two proposals and suggest to the management, which of the two proposals is to be accepted.

Alternative (I)

Note No. 1 **Statement Showing Balance**

Department	A	B	D
Available	2,400 (300 x 8)	2,400	2,400
Used	1,800 (2,400 x 75 %)	1,680 (2,400 x 70 %)	1,200 (2,400 x 50%)
Balance Hours	**600**	**720**	**1,200**

Note No. 2 Net –Revenue Per Hour

	A	B	D
Hire -Charges per hour	2,500	1,800	1,600
Cost per hour	(2,000)	(1,500)	(1,200)
NET	**500**	**300**	**400**

Statement Showing Net Revenue

Department	Hours (Note No. 1)	Revenue per hour (Note No. 2)		Total Revenue
A	600 hours	x 500	=	3,00,000
B	720 hours	x 300	=	2,16,000
D	1,200 hours	x 400	=	4,80,000
	Present Income (10 % x 18,00,00,000)		=	1,80,00,000
				1,89,96,000

$$\text{Rate of Interest} = \left(\frac{1,89,96,000}{1,80,00,000}\right) \text{ x } 100 = \mathbf{10.553}\ \%$$

Alternative (II)Statement Showing Balance Hours

Department	A	B	C	D
Available Hours	2,400	2,400	2,400	2,400
(300 x 8)	(2,400)	(2,400)	(2,240)	(1,600)
	2,400 x 75 %	$\left(\frac{2,400 \text{ x } 12,000}{9,000}\right)$	$\left(\frac{2,400 \text{ x } 70}{100}\right)$	$\left(\frac{2,400 \text{ x } 50}{100}\right)$
	1,800 hours	= 3,200	= 1,680	= 1,200
	$\left(\frac{1,800}{9,000 \text{ hours}} \text{ x } 12,000\right)$	$\frac{(2,400)}{800 \text{ hours}}$	$\left(\frac{1,680 \text{ x } 12,000}{9,000}\right)$	$\frac{1,200 \text{ x } 12,000}{9,000}$
	= 2,400			= 1,600
	–	–	160	800

Statement Showing Analysis of Profit / Loss

Department	Hours	x	Revenue Per Hour	=	Total
C	160	x	1,800	=	2,88,000
D	800	x	1,600	=	12,88,000
					15,68,000

Cost			**Cost**		
C	160	x	1,500	=	(2,40,000)
D	800	x	1,200	=	(9,60,000)
					3,68,000

Revenue From Additional –Units

(3,000 x 1,600)	48,00,000
Present Income	1,80,00,000
(18,00,000,00 x 10 %)	
$\left(\frac{2,31,68,000}{22,00,00,000} \text{x } 100\right) = 10.53\ \%$	**2,31,68,000**

Case Study – 53

A manufacturing company produces a chemical product which passes through two processes factory and finishing. It has the capacity to process and input of 1,00,000 kgs. of raw material. Normal scrap will be 10% and 5% of input in factory and finishing process respectively. The realizable volume of such scrap is ₹4 and ₹ 8 per kg. respectively for factory and finishing process to be credited against the cost of respective process.

Relevant cost data for the coming year are:-

	Factory Process	**Finishing Process**
	(₹)	**(₹)**
Direct Wages	6,00,000	5,50,000
Overheads	2,28,000	4,22,900

There are three possible sources of purchase of raw –materials:

Supplier	**Purchase Price per kg. (₹)**	**Maximum Quantity (kgs.)**
X	5.00	60,000
Y	5.60	80,000
Z	5.30	Provided entire quantity of 1,00,000 kgs. is ordered, otherwise at ₹ 5.80 per kg.

In each case the company is required to collect the raw –materials from the Godown of supplier. Variable transport cost depends upon the distance involved. The same area as under:

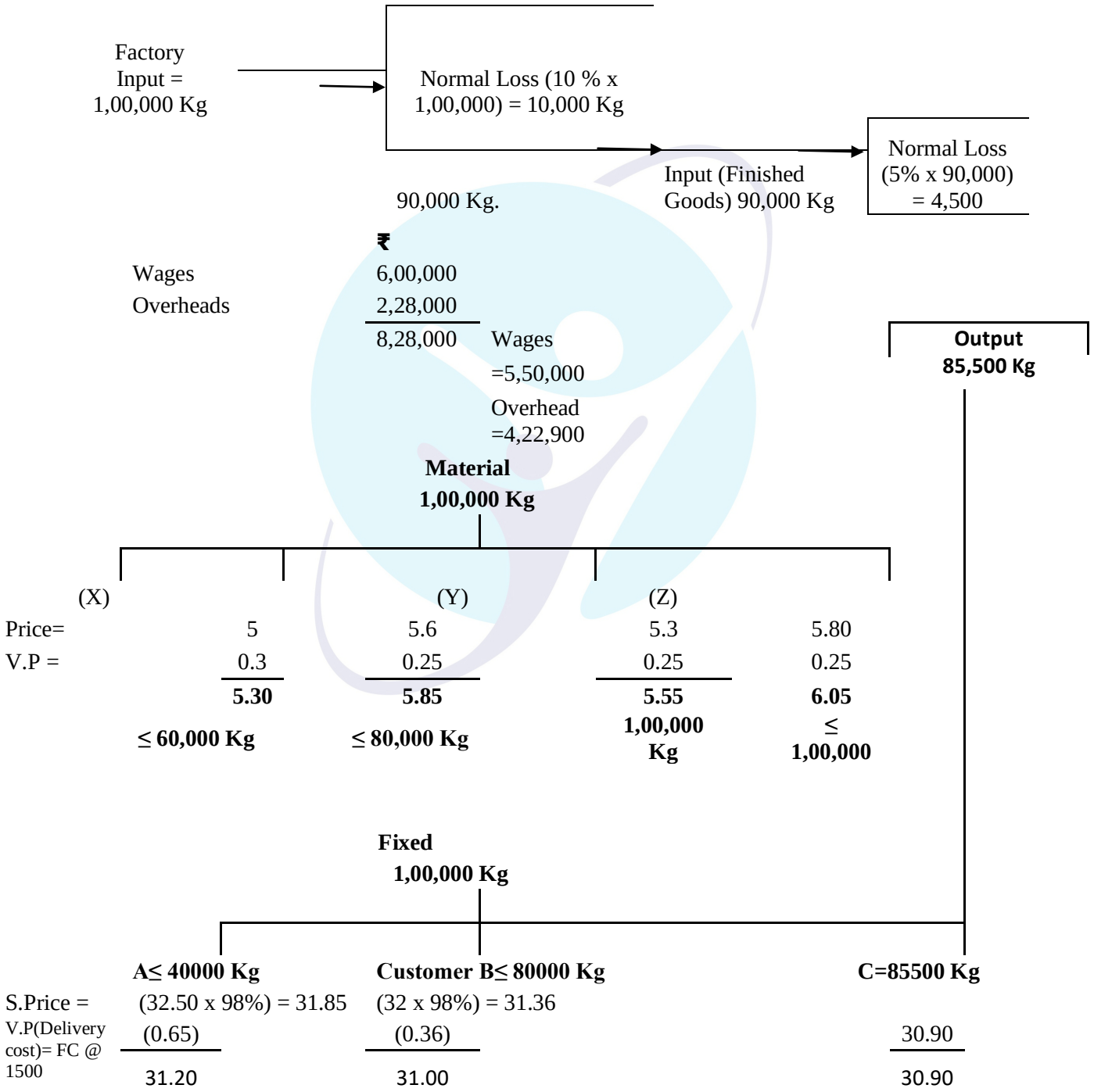
Supplier	**X**	**Y**	**Z**
Transport cost (per kg)	30 paise	25 paise	25 paise

Fixed transport cost would be ₹ 1,00,000 per annum irrespective of the supplier to be contacted. The output of the finishing process can be sold to three prospective customers, their offer being as follows –

Customer	Price per kg. of Output (₹)	Trade Discount (%)	Conditions
A	32.50	2	Maximum quantity 40,000 kgs.
B	32.00	2	Maximum quantity 80,000 kgs.
C	30.90	–	Provided the entire output is sold to him

In case of supplies to customers A and B, the fixed delivery costs will be ₹ 1,500 per month and the variable delivery costs will be 65 paise and 36 paise per kg. respectively.

Customer C will collect the entire output from the warehouse of the company.



Ans No.1

Statement Showing Purchase Analysis

Option (I)	**₹**
'Z' (1,00,000 kg x 5.55) =	5,55,000

Option (II)	**₹**
'X' (60,000 kg x 5.30) =	3,18,000
'Y' (40,000 kg x 5.85)=	2,34,000
	5,52,000

Decision:-

Option (II)

60,000 Kg. → (X)

40,000 Kg. → (Y)

Statement Showing Sales:-

Option (I)	**26,41,950**
'C' (30.90 x 85,500) =	

Option (II)	
A 40,000 kg x 31.20 =	12,48,000
B 45,500 x 31.00 =	14,10,500
	26,58,500
Fixed Cost (1,500 x 12)	(18,000)
	26,40,00

Decision:-

Option 'C' (Maximum Net –Sales) **Statement Showing Process Cost**

	₹
(A) Factory -Process	
Raw -Material (Ans No. i)	5,52,000
Direct Wages	6,00,000
Fixed Transport	1,00,000
Overheads	2,28,000
Input	14,80,000
Normal Loss Realisation (10,000 x 4)	(40,000)
Cost of Finished	14,40,000
Direct Wages	5,50,000
Overheads	4,22,900
	24,12,900
Realisation From Normal Loss (4,500 x 8)	(36,000)
	23,76,900
Profit	**2,65,050**
Sales	**26,41,950**

Case Study – 54

Tista Ltd. has set up a treatment plant at Surat. The company uses raw material 'X' to convert into finished product 'XA' after treatment in its plant having a capacity to treat 60,000 tonnes of 'X' per

annum. There is no loss of raw material in the treatment process. The variable costs of treatment are₹ 5 per tonne and the annual fixed costs amount to ₹ 7,50,000.

The company owns a fleet of vehicles to transport 260 lakh tonnes –kms. of 'X' to the factory site. The fixed costs of maintaining these vehicles amount to ₹ 10,40,000 per annum and the variable costs amount to 8 paise per tonne –km. The company delivers 'XA' to customers through another transport agency at 15 paise per tonne –km., subject to a minimum annual payment of ₹ 1,25,000.Facilities for hiring the transport for incoming of 'X' and outgoing of 'XA' are also available through Chamba Transport Co. at a cost of 18 paise per tonne –km.

The company has three sources of procurement of raw material 'X', the relevant details being:

	Source of Procurement		
	Town A	**Town B**	**Town C**
Quantity Available (tonnes p.a.)	9,000	8,000	45,000
Distance from Surat (Kms.)	300	250	500
Price Offered (per tonne) (₹)	90	110	78

The company has demand of its finished product 'XA' from the following customers:

Customer	**Demand (tonnes p.a.)**	**Price (per tonne)(₹)**	**Delivery Terms**	**Distance from Surat (kms.)**
L	6,000	200	At Customer's Site	9
M	6,000	188	Ex - Factory Surat	–
N	15,000	170	Ex - Factory Surat	–
O	9,000	150	Ex - Factory Surat	–
P	10,000	192	At Customer's Site	22
Q	9,000	220	At Customer's Site	14
R	10,000	200	At Customer's Site	25

Required:

(i) Recommend the best proposal for the purchase of raw material 'X', the break –up of sale of finished product 'XA'; and transport plan for incoming and outgoing goods with a view to maximize the profit.

(ii) Present a statement to show net profit as per above recommendation.

Given

Tista -Ltd.

↓

Treatment Plant - Surat

Raw Material 'X' → Finished Goods 'X – A'

Capacity = 60,000 Tonnes

Variable Cost = 5.00 Per -Tonne

Fixed Cost = **7,50,000**

Own Fleet Vehicles = 260 lacs (Tonne –Kms.)

Fixed Cost= ₹ 10,40,000 (p.a)

Variable Cost = 0.08 Per Tonne/Km

Minimum Payment = **1,25,000**

Chamba Transport (X to 'X –A')

0.18 Per Tonne/Km.

Working Notes

Choice of Transportations Plan for Incoming Goods with a view to Maximize the Profit

	(₹)
Variable Cost per tonne -km.	0.08
Share of Fixed Costs per tonne - km.	
(₹ 10,40,000 / 2,60,00,000 tonnes km.)	**0.04**
Cost per tonne -km (by using own vehicle)	**0.12**

Since per tonne –km. cost of using own vehicle is less than that of other proposal of 18 paise per tonne – km. of Chamba Transport Co., the concern should continue to transport raw material 'X' by using its own fleet of vehicles.

Statement Showing Ranking For Purchase Raw Material 'X'

	Town - A	**Town - B**	**Town - C**
Distance From Surat	300	250	500
Price -Offered (Per Tonne)	90	110	78
Transport Cost	24	20	40
	(300 km x 0.08)	(250 x 0.08)	(500 x 0.08)
Total Procurement Cost Per Tonne =	**114**	**130**	**118**
Minimum Selling Price (Per Tonne) (By - 0)	150	150	150
Contribution	(150 - 114)	(150 - 130)	(150 - 118)
(Per Tonne)	36	20	32
Kms.	÷ 300	÷ 250	÷ 500
Contribution (Per Km.)	0.12	0.08	0.064
	I	**II**	**III**

Statement Showing Total Tonne Kms –Of –Transportation –For Outgoing Goods

Customer	**Demand Tonnes**	**Distance From Surat Ex -Factory**	**Total Tonne Kms.**
Q	9,000	x 14	1,26,000
R	10,000	x 25	2,50,000
L	6,000	x 9	54,000
P	10,000	x 22	2,20,000
M	6,000	–	–
N	15,000	–	–
O	3,600	–	–
	59,600		**6,50,000**

Ans No. (i) Statement Showing Transport Plan For Incoming Good

Source	**Quantities To be Transported (Tonnes)**	**Distance of Source From Surat (Kms.)**	**Tonnes Kms.**
Town A(I)	9,000 x	300 = 27,00,000	27
Town B (II)	8,000 x	250 = 20,00,000	20
Town C (III)	42,600 x	500 = 2,13,00,000	213
	↑		(B -Fig)
	$\left(\frac{2,13,00,000}{500}\right)$	Maximum Capacity	**260**

Statement Showing Break Up of Sales of Finished Goods Product X –A

Customer	Demand In -Tonnes	Price Per Tonne	Sales Value
Q	9,000 x	220 =	19,80,000
R	10,000 x	200 =	20,00,000
L	6,000 x	200 =	12,00,000
P	10,000 x	192 =	19,20,000
M	6,000 x	188 =	11,28,000
N	15,000 x	170 =	25,50,000
O	3,600 x	150 =	5,40,000
	59,600		11,318,000

Statement Showing Transport Plan For Alternative (I) Alternative (II)

Variable Cost	97,500	1,17,000
	(6,50,000 x 0.15)	(6,50,000 x 0.18)
Minimum Payment	12,50,000	
Minimum Cost	1,25,000	11,70,000

Ans No. (ii)Statement Showing Analysis of Profit –Loss

		('000)
Sales		11,318
Material Cost		(5012.8)
Tonnes		
A 9,000 x 90 =	8,10,000	
B 8,000 x 110 =	8,80,000	
C 42,600 x 78 =	33,22,800	
	50,12,800	
Transport Cost		
(260 lac x 0.08) + 10,40,000		(3,120)
Processing Treatment Cost =		
(59,600 x 5) + 7,50,000		(1,048)
Outward Transport Cost		(117)
		2,020.20

Case Study – 55

A and B are members of a cartel producing the same product arrangement, they cater to the entire needs of the market.

	A	B
Installed capacity	20,000 units	15,000 units
Normal Working Efficiency	80%	75%
Details of Fixed Costs :		
– Upto 50% of Installed Capacity	₹ 1,40,000	₹ 1,60,000
– Between 51% and 75% of Installed Capacity	₹ 1,50,000	₹ 1,75,000
– Beyond 75% of Installed Capacity	₹ 1,80,000	₹ 2,00,000
Variable Costs	₹ 50 per unit	₹ 45 per unit
Selling Price ₹ 80 per unit		
Market Demand is 25,000 units (The Demand is Satisfied by A and B in the Ratio of 3 : 2)		

In 2014, it is anticipated that a recession will set in and consequently, the total market demand for the product will only be 50% of the present position. Market price will suffer a reduction by 20%. The members agree that either of them will cater to the needs of the market fully, paying the other 40% of the profits from sales.

You are informed the additional costs of improving machine efficiency beyond the present limits will be ₹ 15,000 and ₹ 25,000 for A and B respectively.

Required:

Ascertain which of the members will find it profitable to work? Workings must form part of your answer.

Solution

Statement Showing "Anticipated Profits from Sales of 12,500 Units"

(When A and B Individually Cater the Needs of the Market Fully)

	A	B
Selling Price at ₹ 64 per unit (after 20% price reduction)	₹ 8,00,000	₹ 8,00,000
Less : Variable Costs		
A (₹ 50 per unit)	6,25,000	---
B (₹ 45 per unit)	---	5,62,500
Contribution	1,75,000	2,37,500
Less : Fixed Costs { W.N. - (ii) & (iii)}	1,50,000	2,25,000
Profits	25,000	12,500

The above statement shows that it is possible for A to work. In case A is authorized to work, he will contribute ₹ 10,000 (being 40% of ₹ 25,000) from the profits to B and retain the balance for himself.

Similarly, if B is authorized to work, he will pay ₹ 5,000 (being 40% of ₹ 12,500) to A and retain the balance for himself.

Note

It has been assumed that the party not operating during recession will be able to make profitable use of the installed capacity for recovering minimum fixed costs by resorting to an alternative use.

Working Note

Position in 2014

i) Expected Demand is to be 50% of 25,000 units i.e. 12,500 units.
ii) Working Efficiency (of installed capacity) required for independent operation to produce 12,500 units:

A	B
$\left[\left(\frac{12{,}500 \text{ units}}{20{,}000 \text{ units}} \text{x } 100\right) = 62.5\ \%\right]$	$\left[\left(\frac{12{,}500 \text{ units}}{15{,}000 \text{ units}} \text{x } 100\right) = 83.33\ \%\right]$

iii) Fixed Cost to be incurred:

	A (₹)	B (₹)
Between 51% and 75% of Installed Capacity	1,50,000	–
Beyond 75% of Installed Capacity	–	2,00,000
Additional Cost on improving machine efficiency	–	25,000
Total Fixed Cost	1,50,000	2,25,000

Marketing Decision

Case Study – 56

Better and Best Ltd. manufacture only one product. Production is regular throughout the year and the capacity of the factory is 1,50,000 units per annum. The summarized Profit and Loss Account for the year ended 31st December is being reviewed by the Board of Directors.

		₹
Sales @ ₹ 10 per unit	…….	10,00,000
Cost of Sales :		
Direct materials	…….	2,50,000
Direct labour	…….	1,50,000
Production overheads:		₹
Variable	…….	30,000
Fixed	…….	2,30,000
Administrative overheads:		
Fixed	…….	1,00,000
Selling and distribution overhead :		
Variable	…….	50,000
Fixed	…….	1,50,000

i) The Production Director proposed to reduce selling price to ₹ 9 in order to utilize full capacity.
ii) The Sales Director proposed to increase selling price by 20 percent. By spending ₹ 2,25,000 on advertisement, sales will be increased to 1,20,000 units per annum.

iii) The Personnel Director pleaded for a change in the method of wage payment. For the present piece rate of ₹ 1.50 per unit, a bonus scheme (for each 2% increase in production over target, there would be an increase of 1 % in the basic wage of each employee) will be implemented. A target of 2,000 units per week for the company will be set for 50 week year. Selling price increase by 10%. With an additional advertisement cost of ₹ 1,60,000, 20% increase in present sales will be achieved.

iv) The Chairman felt that the packaging of the product required improvement. He wanted to know the sales required to earn a target profit of 10% on turnover with the introduction of an improved packing at an additional cost of 20 paise per unit (no change in selling price).

Required:

Evaluate individually the proposals of each of the board member and give your recommendation.

	Proposal (I)	**Proposal (II)**	**Proposal (III)**	**Proposal (IV)**
	1,50,000 (Units)	1,20,000 (Units)	1,20,000 Units	1,20,000 (Note a)
(A) Sales	13,50,000 (1,50,000 x 9)	14,40,000 (1,20,000 x 12) (10 x 120%)	13,20,000 (1,20,000 x 11) (10 x 110%)	12,00,000 (1,20,000 x 10)
(B) Relevant Cost (Variable)				
(1) Materials	(3,75,000) $\left(\frac{2,50,000}{1,00,000}x1,50,000\right)$	(3,00,000) $\left(\frac{2,50,000}{1,00,000}x1,20,000\right)$	(3,00,000) $\left(\frac{2,50,000}{1,00,000}x1,50,000\right)$	(3,00,000) $\left(\frac{3,75,000}{1,50,000}x1,20,000\right)$
(2)Labour	(2,25,000) $\left(\frac{1,50,000}{1,00,000}x1,50,000\right)$	(1,80,000) $\left(\frac{1,50,000}{1,00,000}x1,20,000\right)$	(1,98,000) (Note No. 1)	(1,80,000) $\left(\frac{2,25,000}{1,50,000}x1,20,000\right)$
(3) Production Overhead	(45,000) $\left(\frac{30,000}{1,00,000}x1,50,000\right)$	(36,000) $\left(\frac{30,000}{1,50,000}x1,20,000\right)$	(36,000) $\left(\frac{30,000}{1,00,000}x1,20,000\right)$	(36,000) $\left(\frac{45,000}{1,50,000}x1,20,000\right)$
(4) Selling Overhead	(75,000) $\left(\frac{50,000}{1,00,000}x1,50,000\right)$	(60,000) $\left(\frac{50,000}{1,00,000}x1,20,000\right)$	(60,000) $\left(\frac{50,000}{1,00,000}x1,20,000\right)$	(60,000) $\left(\frac{75,000}{1,50,000}x1,20,000\right)$
Packing				(24,000)
Contribution	**6,30,000**	**8,64,000**	**7,26,000**	**6,00,000**
Fixed Cost				
(1) Production Overhead	(2,30,000)	(2,30,000)	(2,30,000)	(2,30,000)
(2) Admin Overhead	(1,00,000)	(1,00,000)	(1,00,000)	(1,00,000)
(3) Selling Overhead	(1,50,000)	(1,50,000)	(1,50,000)	(1,50,000)
(4) Advertisement				
Profit/Loss	**(1,50,000)**	**1,59,000**	**86,000**	**1,20,000**

(2,000 units x 50 weeks) = 1,00,000

Note No. (1) Wages -

(1,20,000 - 1,00,000) = 20,000 (20% Target Production)

20% 10 % P.U = (1.5 x 1.10) = 1.65 x 1,20,000 = **1,98,000**

2% 1%

Note No.1

No. of Units Sold = *x*

10 *x*

Variable Cost (Note No. a) Contribution

$\left(\frac{7,20,000}{1,50,000 \text{ units}}\right) = 4.80$ 5 *x*

Packing = 0.20

5.00 *x*

Fixed Cost Profit

(2,30,000 + 1,00,000 + 1,50,000) (10% 10 *x*)

= **4,80,000** = 1 *x*

5 *x* = 4,80,000 + 1 *x*

4 *x* = 4,80,000

x = 1,20,000

Note No. (a)

Proposal (I)

Sales = 13,50,000

Variable Cost Contribution

(3,75,000 + 2,25,000 + 45,000 + 1,75,000) 7,20,000 6,30,000

÷ 1,50,000

@ = 4.80

Case Study – 57

Neelgagan Ltd. manufactures a range of products which it sells through manufacture's agents to whom it pays commission of 20% of the selling price of the products. Its budgeted profit and loss statement for 2013 is as follows:

	(₹)
Sales	22,50,000
Prime Costs and Variable Overhead	7,87,500
Fixed Overhead	3,62,500
Selling Costs :	
Commission to Manufacturer's Agents	4,50,000
Sales Office Expenses (Fixed)	20,000
Administration Office Expenses (Fixed)	3,00,000
Profit	**3,30,000**

Subsequent to the preparation of the above budgeted profit and loss statement, the company is faced with a demand from its agents for an increase in their commission to 22% of selling price. As a result, the company is considering whether it might achieve more favorable results it were to discontinue the use of manufacturer's agents and, instead employ its own sales force. The costs that this could involve are budgeted as follows:

	(₹)
Sales Manager (Salary and Expenses)	75,000
Sales men's Expenses (including Travelling Costs)	20,000
Sales Office Costs (additional to Present Costs)	50,000
Interest and Depreciation on Sales Department Cars	35,000

In addition to the above, it will be necessary to hire four salesman at a salary of ₹ 40,000 per annum each plus commission of 5% on sales plus car allowance of ₹ 1 per kilometer to cover all costs expect interest and depreciation.

On the assumption that the company decide to employ its own sales force on the above terms.

Required:

(i) What is the maximum average kilometer per annum that salesman could travel if the Company is to achieve the same budgeted profit as would have obtained by retaining the manufacture's agents and granting them the increased commission they had requested. Assume that sales in each would be as budgeted.

(ii) At what level of sales would the original budgeted profit be achieved if each salesman were to travel an average of 14,000 kilometers per annum. Assume that all other assumptions inherent in the budgets were maintained.

(iii) What is the maximum level of commission on sales that the company could afford to pay if it wished to achieve a 10% increase in its original budgeted profit and expected a 16% increase in sales (at budgeted selling prices) and average of 16,000 kilometers per annum to be travelled by each salesman.

Statement Showing Analysis of Proposal

Net Savings = 42,500 *

Savings	→		Additional Cost
	(₹)	(Excluding Salesman Car - Allowance)	**(₹)**
Savings in Existing Commission = (20 % x 22,50,000)	4,50,000	Commission (5% x 22,50,000)	1,12,500
		Salesman Salary	75,000
Saving in Proposed Increase In Commission (2% x 22,50,000)	45,000	Salesman Expenses (Including Travelling Expenses)	20,000
	4,95,000	Sales Off Cost	50,000
		Int & Depreciation On Sales Dept. Cars	35,000
		Salesman Salary (40,000 x 4)	1,60,000
			4,52,500

*Net –Savings (4,95,000 - 4,52,500) = **42,500**

The above computations show that there would be a net saving (excluding salesmen's car allowance) to achieve the same budgeted profit as company would have obtained by retaining the manufacturer's agents and granting them increased commission. Since the car allowance of salesmen is ₹ 1 per km., the maximum total kilometers to be travelled by all the salesmen would amount to 42,500. The number of salesman being 4, the maximum average kilometers per salesman would amount to 10,625 (i.e 42,500 / 4).

Ans No. (ii) Statement Showing Computation of P.V Ratio After Employing Own Sales Force

Sales = 22,50,000

	(₹)	Contribution
Variable Cost	7,87,500	13,50,000
Commission (5% x 22,50,000)	1,12,500	
	9,00,000	

$$\text{P.V Ratio} = \left(\frac{13,50,000}{22,50,000}\right) \text{ x } 100 = 60\%$$

$$\textbf{Expected Sales For Required Profit} = \left(\frac{\mathbf{1,408,500}}{\mathbf{60}}\right) \mathbf{x\ 100} = \mathbf{23,47,500}$$

Variable Cost	Contribution	
	60% Fixed Cost	1,408,500
10,78,500 (Note No. a)		Profit 3,30,000

Note No. (a) Statement Showing Fixed Cost

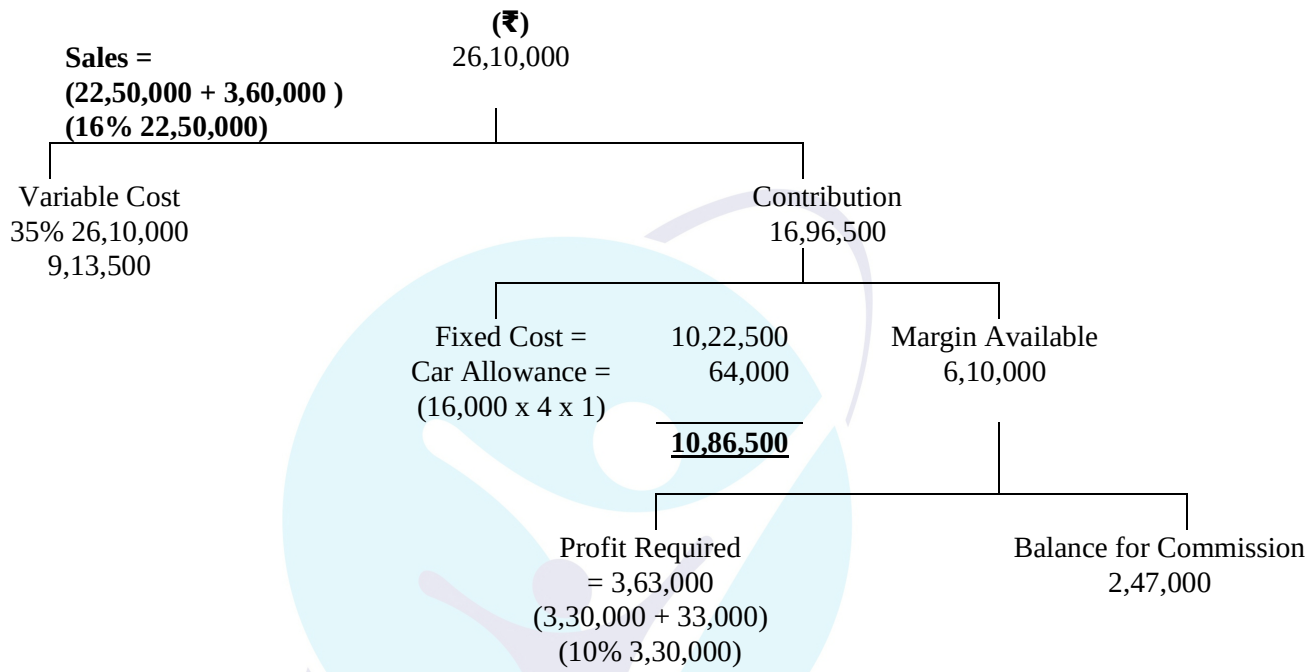
	(₹)
Present Fixed Cost (3,62,500 + 20,000 + 3,00,000)	6,82,500
Extra fixed Cost (75,000 + 20,000 + 50,000 + 35,000 + (60,000))	3,40,000
Total Fixed Cost	10,22,500
Car - Allowance (14,000 x 4) x 1	56,000
	10,78,500

(iii)Statement Showing (%) of Variable Production Cost of Sales

$$\left(\frac{7,87,500}{22,50,000} \text{ x } 100\right) = 35\%$$

Statement Showing Analysis of New Plan

(Before –Commission)



$$\text{Commission On Sales} = \left(\frac{2,47,000}{26,10,000} \text{ x } 100\right) = 9.46\%$$

Case Study – 58

The financial controller of ACE Ltd. has prepared the following estimates of working results for the year ending 31st March, 2013:

	Year ending 31.3.2013
Direct Material (₹ / unit)	16.00
Direct Wages (₹ / unit)	40.00
Variable Overheads (₹ / unit)	12.00
Selling Price (₹ / unit)	125.00
Fixed Expenses (₹)	6,75,000 per annum
Sales (₹)	25,00,000 per annum

During the year 2013 -14, it is expected that the materials prices and variable overheads will go up by 10% and 5% respectively. As a result of re –engineering of business processes, the overall direct labour efficiency will increase by 12%, but the wage rate will go up by 5%. The fixed overheads are also expected to increase by ₹ 1,25,000.

The Vice –President Manufacturing states that the same level of output as obtained in 2012 -13 should be maintained in 2013 -14 also and efforts should be made to maintain the same level of profit by suitably increasing the selling price.

The Vice –President –Marketing states that the market will not absorb any increase in the selling price. On the other hand, he proposes that publicity involving expenses as given below will increase the quantity of sales as under:

Advertisement Expenses (₹)	80,000	1,94,000	3,20,000	4,60,000
Additional units of sales	2,000	4,000	6,000	8,000

Required:

1) Present an Income Statement for 2013 -14.
2) Find the Revised Price and the Percentage of increase in the price for 2013 -14, if the views of the Vice –President –Manufacturing are accepted.
3) Evaluate the four alternative proposals put –forth by the Vice –President –Marketing.
4) Determine the best output level to be budgeted and prepare and over –all Income Statement for 2013 -14 at that level of output.

Case Study – 59

Thar Ltd. manufactures and markets three products A, B and C in the State of Haryana and Rajasthan. At the end of first half of 2011 -12 the following absorption based profit statement has been drawn by the accountant.

(₹ in '000)

	Haryana	**Rajasthan**	**Total**
Sales	3,000	900	3,900
Manufacturing Cost of Sales	2,331	699	3,030
Gross Profit	669	201	870
Administration Expenses (A)	120	36	156
Selling Expenses (B)	184	169	353
Total Expenses	304	205	509
Net Profit	365	(-) 4	361

(a) The expenses are constant and common to both the States. They stand allocated on the basis of sales.
(b) The expenses are semi fixed but specifically relate to the respective State.

The management is worried to note that the decision taken to market the products in Rajasthan to utilize idle capacity has proved wrong and wishes to cover only Haryana State. The incharge marketing division is not satisfied with the above way of profit presentation. He is of the firm opinion that a sale affected in the State of Rajasthan is contributing profits. For the next half year he expects no increase in demand in Haryana while for Rajasthan he anticipates to sell B or C more by 50% of existing sales. This will utilize the idle capacity in full.

The product wise relevant details for the first half of 2011 – 12 are:

	A	B	C
Sales (in ₹ '000)			
Haryana	1,200	900	900
Rajasthan	300	300	300
Variable Costs (as a % on sales) :			
Manufacturing	40	35	30
Selling	3	2	2
Specific Fixed Manufacturing Expenses (in ₹ '000)	570	470	610

Required:

i) Prepare a State –wise profit statement for the first half of 2011 -12 using contribution approach. Also offer your views on the contention of the management and opinion expressed by in charge marketing division.

ii) Prepare a product wise profit statement for the same period using contribution approach.

iii) Submit your well throughout recommendation as to which product should be produced to utilize the idle capacity.

Statement Showing Analysis of Profit/Loss For the First Half -2011 – 12
(Using –Contribution –Approach)

		Haryana	Rajasthan	Total
(A) Sales		3,000	900	3,900
(B) Variable Cost				
	Product			
Man -Cost	A	(480) (1,200 x 40%)	(120) (300 x 40%)	(600)
	B	(315) (900 x 35%)	(105) (300 x 35%)	(420)
	C	(270) (900 x 30 %)	(90) (300 x 30%)	(360)
		1,065	**315**	
Selling Cost :-				
	A	(36) (1,200 x 3%)	(9) (300 x 3%)	(45)
	B	(18) (900 x 2%)	(6) (300 x 2%)	(24)
	C	(18) (900 x 2%)	(6) (300 x 2%)	(24)
		72	**21**	
Contribution		1,863	564	2,427
Specific Cost				
Man -Cost		(1,266)	(384)	(1,650)
(Total - Variable Cost)		(2,331 - 1,065)	(699 - 315)	
Selling		(112) (184 - 72)	(148) (169 - 21)	(260)
Contribution		**485**	**32**	**517**
(Admin Overhead Common Fixed)		–	–	**(156)**
Net Profit				361
P.V. Ratio		$\left(\frac{1,863}{3,000} \text{ x } 100\right)$ = 62.1 %	$\left(\frac{564}{900} \text{ x } 100\right)$ = 62.67 %	$\left(\frac{2,427}{3,900} \text{ x } 100\right)$ = 62.23%

View

The contention of the management is not valid i.e. the state of Rajasthan shows ₹ 32,000 as contribution to meet the common fixed costs. In case only Haryana state is covered the net profit of the concern would go down from ₹ 3,61,000 to ₹ 3,29,000.

In view of the above position, the statement made by the in charge of the marketing division appears to be correct.

(ii)Product –wise Profit Statement for the First Half of 2011 -12 using Contribution Approach

(₹ in '000)

Statement Showing Analysis of Profit/Loss First Half Year of 2011 -12

(Using Contribution –Approach)

	A	**B**	**C**	**Total**
Total Sales (Haryana + Rajasthan)	1,500	1,200	1,200	3,900
Variable Cost :-				
Manufacturing	(600) (40 % x 1,500)	(420) (35 % x 1,200)	(360) (1,200 x 30%)	(1,380)
Selling Cost	(45) (1,500 x 3%)	(24) (1,200 x 2%)	(24) (1,200 x 2%)	(93)
Contribution	**855**	**756**	**816**	**2,427**
Specific -Cost				
Manufacturing Cost	(570)	(470)	(610)	(1,650)
Selling Cost				(260)
Sales -Ratio (15 : 12 : 12)	(100)	(80)	(80)	(353 - 93)
	185	**206**	**126**	**517**
Common Fixed Expenses				156
Net Profit				**361**
P.V Ratio	$\left(\frac{855}{1,500} \text{ x } 100\right)$ = 57%	$\left(\frac{756}{1,200} \text{ x } 100\right)$ = 63%	$\left(\frac{816}{1,200} \text{ x } 100\right)$ = 68%	$\left(\frac{2,427}{3,900} \text{ x } 100\right)$ = 62.23%

(iii)Recommendation for Utilising Idle Capacity

A review of the above P/V Ratio's shows that increase of output of Product –C in Rajasthan is the best. The increase of production after utilizing the idle capacity in Rajasthan to the extent of₹ 1,50,000 (i.e. 50% of ₹ 3,00,000) would increase the contribution of the company in the state of Rajasthan by ₹ 1,02,000 (68 % x ₹ 1,50,000).

Selling Strategy

Case Study – 60

Ret Ltd., a retail store buys computers from Comp Ltd. and sells them in retail. Comp Ltd. pays Ret Ltd. a commission of 10% on the selling price at which Ret sells to the outside market. This commission is paid at the end of the month in which Ret Ltd. submits a bill for the commission. Ret Ltd. sells the computer to its customers at its store at ₹ 30,000 per piece. Comp Ltd. has a policy of not taking back computers once dispatched from its factory. Comp Ltd. sells a minimum of 100 computers to its customers.

Comp Ltd. charges prices to Ret Ltd. as follows:

₹ 29,000 per unit, for order quantity 100 units to 140 units.

₹ 26,000 per unit, for the entire order, if the quantity is 141 to 200 units. Ret Ltd. cannot order less than 100 or more than 200 units form Comp Ltd.

Due to the economic recession, Ret Ltd. will be forced to offer as a free gift, a digital camera costing it ₹ 4,500 per piece, which is compatible with the computer. These cameras are sold by another company, Photo Ltd. only in boxes, where each box contains 50 units. Ret Ltd. can order the cameras only in boxes and these cameras cannot be sold without the computer.

In its own store, Ret Ltd. can sell 110 units of the computer. At another far of location, Ret Ltd. can sell upto 80 units of the computer (along with its free camera), provided it is willing to spend ₹ 5,000 per unit on shipping costs. In this market also, the selling price that each unit will fetch is ₹ 30,000 per unit.

Required:

(i) State what is Ret's best strategy along with supporting calculations?
(ii) Compute the break –even point in units, considering only the above costs.

Given:

Retail -Ltd. → From → Comp Ltd.
[A -Retail Stores]

Comp Ltd. → Pay Commission -To Ret (10 % on Selling Price)
[end of every month]

	(₹)
Ret Ltd. Sells =	30,000
Minimum Sells =	100 Nos.

Comp Ltd.

[100 - 140] @ 29,000 | [141 - 200] @ 26,000

Gift –Camera = 4 –Box = 50 Nos.
@ 4,500

Exp –Sales -Ret
110 Nos. (Computer)
80 Nos. (Computer) + Camera
Shipping Cost = **5,000**
@ Selling Price = **30,000**

Statement Showing Best Strategy

	Order Quantity (100 - 140)	Order Quantity (141 - 200)
	(₹)	(₹)
Selling Price (P.U)	30,000	30,000
Commission 10%	3,000	3,000
Sales Revenue	**33,000**	**33,000**
Variable Cost	(29,000)	(26,000)
Contribution	**4,000**	**7,000**
Shipping Cost		(5,000)
Contribution		**2,000**

(i) Upto 110 units, Ret Ltd. will earn a contribution of ₹ 4,000 per unit.
(ii) Between 110 & 140 units, contribution of ₹ 4,000 will be wiped out by ₹ 5,000 on shipping costs. Hence we should not consider 110 -140 range.
(iii) 101 -110 not be considered since additional costs of ₹ 2,25,000 on purchase of cameras will not be covered by 10 units.
(iv) Valid consideration, 100 units or 140 to 190 units.

Statement Showing Analysis

	100 (Units)	141 (Units)	150 (Units)	190 (Units)
No. of Boxes (Camera)	2	2	3	4
50 = 1 Box	(4,50,000)	(6,75,000)	(6,75,000)	(9,00,000)
Cost = Cost Of Camera	(4,500 x 100)	(4,500 x 150)	(4,500 x 150)	(4,500 x 200)
Contribution	4,00,000	7,70,000	7,70,000	7,70,000
	(4,000 x 100)			
		(110 x 7,000)	(110 x 7,000)	(110 x 7,000)
		62,000	80,000	1,60,000
		(31 x 2,000)	(40 x 2,000)	(80 x 2,000)
Net Profit	(50,000)	(1,57,000)	(1,75,000)	30,000

Best strategy will be to buy 150 units from Comp. Ltd., and sell 110 units at store and remaining 40 units is outside.

Break –even Point (BEP) should be between 151 -191 units:

Extra Camera Box Cost beyond 150 units	₹ 2,25,000
Less: Profit for 150 units	₹ 1,75,000
Extra Profit to be Earned	₹ 50,000

No. of units to cover this additional costs at contribution 25 units $\left(\frac{₹\ 50,000}{₹\ 2,000}\right)$

BEP 175 units (150 units + 25 units)

Labour Related Decisions

Case Study – 61

MFG Ltd. is producing a component called 'KDK'. Estimated costs are:

	Fixed Cost per year	Variable Cost per 'KDK'
	(₹ '000)	(₹)
Production	32,000	3,600
Distribution	2,000	200

Direct labour costs are 40% of the variable production costs. In the production department machining and assembling of 'KDK', 90 men work 8 hours per day for 300 days in a year. Each worker can machine and assemble 1 'KDK' per uninterrupted 180 minutes time frame. In each 8 hours working day, 20 minutes are allowed for coffee –break, 30 minutes on an average for training and 22 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters.

MFG Ltd. has been facing industrial relations Case Study as the workers of company have a very strong union. Company is faced with the possibility of a strike by direct production workers engaged on the assembly of 'KDK'. The trade union is demanding an increase of 15%, back –dated from the beginning of financial year, but the company expects that if a strike does take place, it will last 25 Days after which the union will settle for an increase of 10% similarly back –dated. The only product of the company is being sold at ₹6,000.

If the strike takes place, Sales of 1,300 'KDK' would be lost. The balance that would ordinarily have been produced during the strike period could, however be sold, but these 'KDK' would have to be made up in overtime working which would be at an efficiency rate of 90% of normal. This would retail additional fixed cost of ₹ 1,00,000 and wage payments at time and one –half.

Required:

Give unnecessary advice to the management to allow the strike to go ahead or to accept the union's demand.

Note No. 1

Selling Price = 6,000 (P.U)

	Variable Cost		Contribution
(3,600 x 40%)	Labour Cost	1,440	2,200
	Production Cost = (3,600 - 1,440)	2,160	
	Distribution =	200	
		3,800	

Note No. 2

Labour Cost

Labour Cost = (40% x 3,600)	1,440	1,440 144
Inc -By	216	
	(1,440 x 15%)	(1,440 x 10%)
	= 1,656	**= 1,584**

Note No. 3

Statement Showing Budgeted Production

Total Time (8 hr. x 60 minutes) =	480 minutes
Idle Time (10% x 480)	(48 minutes)
Coffee Break	(20 minutes)
Instruction	(22 minutes)
Training	(30 minutes)
Productive Time Per Day	**360 minutes**
$\left(\frac{90 \text{ men x } 300 \text{ days x } 360 \text{ minutes}}{180 \text{ minutes}}\right)$ =	**54,000 Units**

Statement Showing Analysis of Proposal

Alternative -1 (With –No –Strike)

Cost of Settlement is = **1,16,64,000**

(15 % x 1,440) x 54,000

Alternative -2 Strike Goes Ahead

Annual Labour Cost	75,88,800
Production (Note No. 3) = 54,000	
Loss of Sales (Given) = (1,300)*	
52,700 x 144	
Labour Cost (1,440 x 10%) = 144	
Loss of Contribution Due to Sales	28,60,000
(1,300 x 2,200)	
Overtime Premium	
(25 days x 90 men x 2 units) = 4,500	
Loss of Sales = (1,300)	
3,200	
(3,200 x 1,584 x 0.50)	25,34,400
Payment For Efficiency	
$\left(3{,}200 \text{ x } \frac{100}{90} \text{ x } 1{,}584 \text{ x } 1.5\right)$	8,44,800
Fixed Cost	1,00,000
	1,39,28,000

Case Study – 62

The details of the output presently available from a manufacturing department of Hitech Industries Ltd. are as follows:

Average output per week 48,000 units from 160 employees

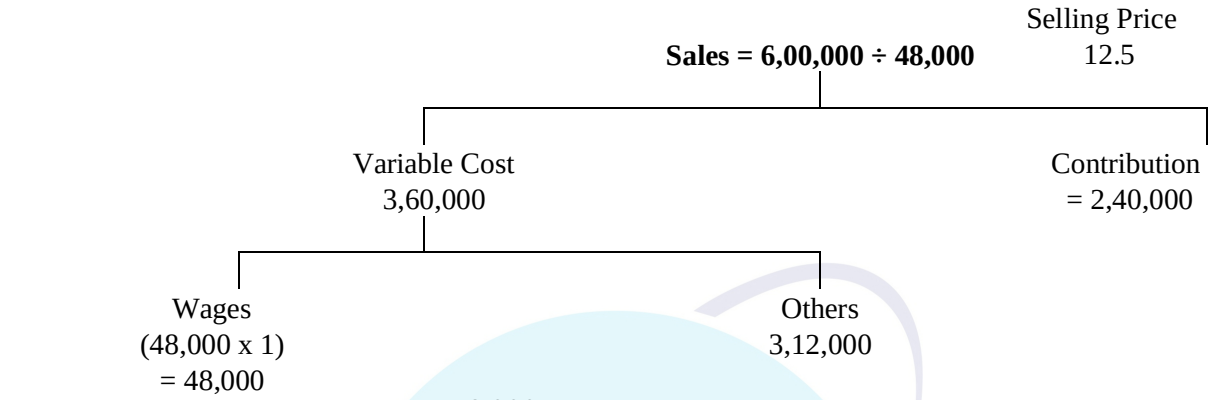
Saleable value of output	……	₹ 6,00,000
Contribution made by the output towards fixed expenses and profit	……	₹ 2,40,000

The Board of Director plans to introduce more automation in the department at a capital cost of ₹1,60,000. The effect of this will reduce the number of employees to 120, but to increase the output per individual employee by 60%. To provide necessary incentive to achieve the increased output the Board intends to offer a 1% increase in the piece work rate of one rupee per article for every 2% increase in

average individual output achieved. To sell the increased output, it will be necessary to decrease the selling price by 4%.

Required:

Calculate the extra weekly contribution resulting from the proposed change and evaluate, for the Board's information, the worth of the project.



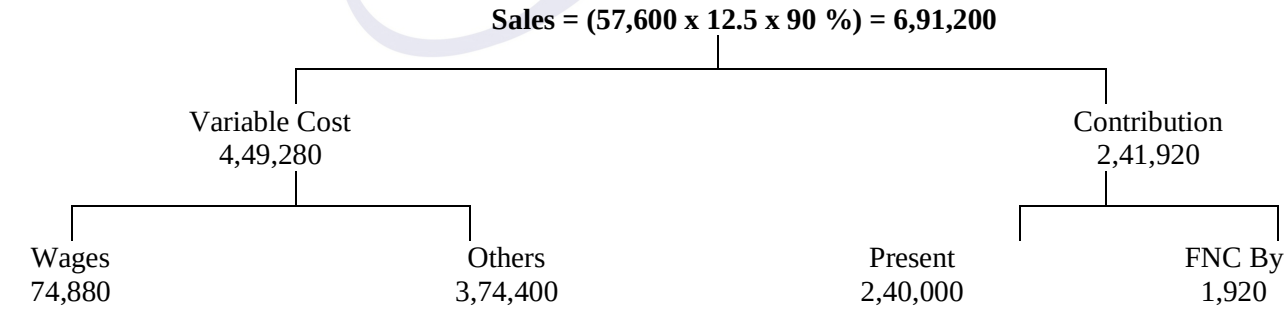
$$\text{Present Production Per Worker} = \left(\frac{48,000}{160}\right) = 300 \text{ Units}$$

Proposed Production (300 x 120% x 160%) = 57,600 units

$$\text{Variable Cost} = \left(\frac{3,12,000}{48,000} \text{ x } 57,600\right) = 3,74,400$$

Wages (57,600 x 1 x 130%) = 74,880

Efficiency	**Bonus**
60%	30%
2%	1%



Case Study – 63

In its round of talks with the representatives ofthe Trade Union, Maxima Ltd. is faced with a Union demand for an increase of 15% on the hourly wage rates, in response to a management offer of 5%.

The management is most reluctant to agree to such a demand but is willing to consider making an increased offer provided that it influences productivity. The suggestion is to offer 5% on basis of hourly

rates plus ₹0.15 for every standard hour of outputproduced. If this is agreed to, it is expected that production would increase by 10% within the budgeted hours (normal factory capacity).

In order to sell the increased output, it would become necessary to effect a reduction of 2.5% in the selling price.

The draft budget for the forthcoming year, excluding the wages and sales increase, are:

(Amount in ₹)

Sales (15,00,000 units)	60,00,000
Direct Material	12,00,000
Direct Wages	18,00,000
Variable Production Overhead	3,00,000
Fixed Production Overhead	10,00,000
Variable Sales Overhead (5% of turnover)	3,00,000
Fixed Sales Overhead	6,00,000
Variable Distribution Overhead	1,00,000
Fixed Distribution Overheads	1,00,000
Fixed Administration Overhead	2,00,000
Profit	4,00,000

Required:

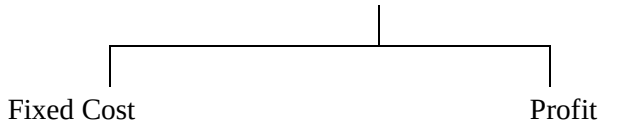
Work out the alterations in the budget:

(i) If the trade union demand is accepted by management.
(ii) If the management's proposal of wage increase linked to productivity is accepted by the trade union.

Also work out the minimum output necessary for the management's proposal to be more rewarding to the labour force than a 15% wage increase.

Ans No. (i) Statement Showing Revised Budget If the Trade Union's Demand is Accepted

	₹	
Sales	**=**	**60,00,000**
Variable Cost		Contribution
	₹	(60,00,000 - 39,70,000)
(1) Direct -Material =	12,00,000	20,30,000
(2) Direct Wages = (18,00,000 + 15% 18,00,000)	20,70,000	
(3) Variable Production Overhead	3,00,000	
(4) Variable Sales Overhead	3,00,000	
(5) Variable Distribution Overhead	1,00,000	
	39,70,000	

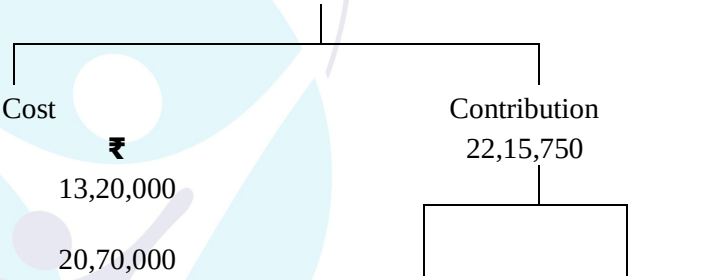


	₹
(1) Fixed Production Overhead =	10,00,000
(2) Fixed Sales Overhead =	6,00,000
(3) Fixed Distribution Overhead =	1,00,000
(4) Fixed Admin Overhead =	2,00,000
	19,00,000

Ans No. (ii)

Statement Showing Revised Budget If Proposal Of the Management is Accepted

	₹
Sales (1,50,000 x 110 %) $\left(\frac{60,00,000}{15,00,000}\right) = 4.00\ P.U = (16,50,000 \times 3.90)$	= 64,35,000
(2.5 % 4) = (0.10)	
3.90	



	₹
(1) Direct -Material = $\left(\frac{12,00,000}{15,00,000\ units} \times 16,50,000\right)$	13,20,000 20,70,000
(2) Direct Wages	
Wages	
(18,00,000 x 1.05) =	18,90,000
(16,50,000 x 0.15) =	2,47,500
	21,37,500
(3)Variable Overhead $\left(\frac{3,00,000}{15,00,000} \times 16,50,000\right)$	3,30,000
(4) Variable Overhead (Selling) = (5 % 64,35,000)	3,21,750
(5) Distribution Overhead = $\left(\frac{1,00,000}{15,00,000} \times 16,50,000\right)$	1,10,000
	42,19,250

Case Study – 64

Marvellous Manufacturers produce a single product. The Company's annual normal production in 5 lakhs units of output on a single shift of eight –hour a day basis in terms of a standard input of 1 lakh direct labour hours. Last year's income statement is given below:

	(₹)
Sales (7 lakh units @ ₹ 2.50)	17,50,000
Less: Variable Expenses	
Direct Material	2,80,000
Direct Labour (1,40,000 hours @ ₹ 3.50)	4,90,000
Overtime Premium	1,40,000
Miscellaneous	2,10,000
Contribution Margin	6,30,000
Less: Fixed Expenses	5,30,000
Net Income	1,00,000

Management is concerned about the overtime working done last year (overtime is paid at double the normal rate) and wants to investigate the possibility of working a second shift. The cost accountant of the company estimates that a second shift would increase costs as follows: an additional factory supervisor at ₹ 30,000 per annum, a night shift allowance of 60 paise per direct labour hour and an increase in security and administrative costs of ₹ 40,500 a year.

Required:

Management requires you as their consultant to answer these questions with supporting figures:

(i) If instead of working overtime a second shift had been introduced at the beginning of last year itself, would profits have been better? If so by how much?

(ii) At what capacity level it would be advantageous to the company to change from overtime working to a second shift?

(iii) This year it is estimated that there will be, on last year's figures, 20% increase in units sold, 10% increase in selling price, 5% increase in direct material cost per unit and a direct labour rate increase of ₹ 0.30 per hour. Assuming that the overtime working would be continued, prepare an income statement for the year based on the current estimates; if a second shift working were to be introduced, with an increase in night shift allowance of 6 paise per direct labour hour, what would have been the savings in cost?

Given

Ans No. 1 Marvellous Manufacturers Single Product

Annual Production= 5,00,000 units

Labour Hrs. = 1,00,000

Single Day / 8 hrs.

Statement Showing Comparative Profitability Of Second Shift Overtime Working

Total Hrs. = 1,40,000

Normal	Overtime
= 1,00,000 hrs.	40,000 hrs. x 3.50
	= **1,40,000**

Cost of Second –Shift	**(₹)**
(1) Factory Supervisor =	30,000
(2) Security & Admin=	40,500
(3) Night Shift Allowance (40,000 hrs. x 0.6) =	24,000
	94,500
Excess of Overtime Premium Over Cost of Second Shift (1,40,000 - 94,500) =	**45,500**

Ans No. ii

Statement Showing InDiff Point

No. of Hrs. = *x* (Capacity)

3.50 *x* = 30,000 + 40,500 + 0.60 x

2.90 *x* = 70,500

x **= 24,310.34**

24,311 hrs.

Ans No. iii (a) Statement Showing Profit/Loss

Assuming Overtime - Continue		**(₹)**
(A) Sales (8,40,000 x 2.75)		23,10,000
Units =	7,00,000	
Inc -By 20 %	1,40,000	
	8,40,000	
Selling Price	2.50	
Inc -By 10 %	0.25	
	2.75	
Variable Cost		
Direct Material		(3,52,800)
$\left(\frac{2,80,000}{7,00,000}\text{ x } 8,40,000 \text{ x } 1.05\right)$		
Direct Labour		
$\left(\frac{1,40,000 \text{ hrs.}}{7,00,000}\text{ x } 8,40,000\right) = 1,68,000 \text{ hrs.}$		
Normal =	(1,00,000 x 3.80)	(3,80,000)
Overtime =	(68,000 x 3.8 x 2)	(5,16,800)
		(₹)
Miss $\left(\frac{2,10,000}{7,00,000}\text{ x } 8,40,000\right)$	=	(2,52,000)
Contribution		**808,400**
Fixed Expenses		(5,30,000)
Net Profit		**2,78,400**

(b)Statement Showing Computation Of Saving In Cost

(Assuming Second Shift –Working Is to be Introduced)

Overtime Premium		2,58,400
(68,000 x 3.80)		
Cost of Second Shift		
(1) Factory Supervision	30,000	
(2) Sec- Administrative Cost =	40,500	
(3) Night Shift	**44,880**	
(68,000 x 0.66)		(1,15,380)
		1,43,020

Preventive Maintenance Vs Break –Down Maintenance

Case Study – 65

A company has continuous manufacturing process involving an output of 6 tonned per hour valued at ₹70 per tonne. Process wages cost ₹60 per hour and raw material, ₹35 per tonne of product. Regular maintenance works out to ₹750 per week.

The company is experiencing breakdown due to mechanical reason averaging 25 hours a week, costing ₹7,500 to repair. It is estimated that these breakdown can be reduced or eliminated if additional maintenance on the following scale were undertaken:-

Breakdown per week (hours)	0	5	10	15	20
Maintenance Cost (₹)	23,000	13,000	6,500	3,000	1,500
Repair Costs (₹)	0	2,500	3,000	5,000	6,500

Process labour during stoppages can be used elsewhere upto 10 hours per week.

Required:

(i) Present, in tabular form, the optimum amount of maintenance to be undertaken each week.
(ii) What is the additional revenue that will be resulting from the optimal level, compared with the present situation?

Solution

(i) Statement of Comparative Cost of Repairs and Maintenance to ascertain the optimum amount of maintenance each week

	Breakdown Hours (per week)					
	0	**5**	**10**	**15**	**20**	**25 ***
	(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Maintenance Cost	23,000	13,000	6,500	3,000	1,500	750
Repairs Cost	0	2,500	3,000	5,000	6,500	7,500
Total	23,000	15,500	9,500	8,000	8,000	8,250
Cost of Idle Time (Breakdown hrs - 10 hrs) x ₹ 60	---	---	---	300	600	900
Total Cost	23,000	15,500	9,500	8,300	8,600	9,150

* At present

It is seen from the above table that the optimum amount of maintenance is for break –down of 15 hours a week.

(ii) Additional Revenue that will Result from the Optimal level; Compared with Present Situation

	(₹)
Value of Additional Output (10 hours saved x 6 tonnes x ₹ 70)	4,200
Less : Wages (10 hours x ₹ 60)	600
Less : Materials (10 hours saved x 6 tonnes x ₹ 35)	2,100
Add : Saving in Maintenance and Repairs Cost (₹ 9,150 - ₹ 8,300)	850
Total Additional Revenue	2,350

Shut Down or Continue

Case Study – 66

Paints Ltd. manufactures 2,00,000 tins of paint at normal capacity. It incurs the following manufacturing cost per unit:

		(₹)
Direct material	……	7.80
Direct Labour	……	2.10
Variable Overhead	……	2.50
Fixed Overhead	……	4.00
Production cost/unit	……	16.4

Each unit is sold for ₹21, with an additional variable selling overhead incurred at ₹ 0.60 per unit.

During the next quarter, only 10,000 units can be produced and sold. Management plans to shut down the plant estimating that the fixed manufacturing cost can be reduced to ₹ 74,000 for the quarter.

When the plant is operating, the fixed overheads are incurred at a uniform rate throughout the year. Additional costs of plant shut down for the quarter are estimated at ₹ 14,000.

Required:

I. To advise whether it is more economical to shut down the plant during the quarter rather than operate the plant.
II. Calculate the shut down point for the quarter in terms of numbering units.

GivenExpected Production for the year 8,00,000

(2,00,000 x 4)

$$\text{Quantity} = \frac{8,00,000}{4} = 2,00,000$$

Sales Price = 21

Variable Price		Contribution	
Direct Material	7.8	8	
direct Labour	2.1		
Variable Overhead	2.5	Shut down cost	88,000
Sales & Admin Expenses	0.6	(74,000 + 14,000)	
	13.0		

Expected Sales for the Quarter 10,000 units

(a) Statement Showing Analysis of Proposal

Option I if Continue Operation

Contribution (10,000 x 6)	80,000
Fixed Cost	(2,00,000)
	(1,20,000)

Option II if Shut Down

Profit/Loss (88,000)

(b) Shut down point $\left(\frac{2,00,000 - 88,000}{8}\right)$

= 14,000 units

Case Study – 67

G Ltd. produces and sells 95,000 units of 'X' in a year at its 80% production capacity. The selling price of the product is ₹ 8 per unit. The variable cost is 75% of sales price per unit. The fixed cost is ₹ 3,50,000. The company is continuously incurring losses and management plans to shut-down the plant. The fixed cost is expected to be reduced to ₹1,30,000.Additional costs of plant shut-down are expected at ₹ 15,000.

Should the plant be shut-down? What is the capacity levelof production of shut-down point?

Given Fixed Cost 3,50,000
Normal Production capacity at 80% = 95,000 units

At $100\% = \frac{95,000}{80\ \%} =$ 1,18,750 units
Selling Price = 8

Variable Cost Contribution

Shut down cost
= 1,30,000 + 15,000
= 1,45,000

Expenses Sales

Statement Showing Analysis of Proposal

Option I if Continue Operation

Contribution (95,000 x 2)	1,90,000
Fixed Cost	(3,50,000)
	(1,60,000)

Option II if Shut Down

Profit/Loss (1,45,000)

Decision Shut Down

Shut down point $= \left(\frac{3,50,000 - 1,45,000}{2}\right)$

= 1,02,500 units

Case Study – 68

If Moonlite Limited operates its plant at normal capacity it produces 2,00,000 units from the plant 'Meghdoot'. The unit cost of manufacturing at normal capacity is as under:

		(₹)
Direct material	…….	65
Direct labour	…….	30
Variable Overhead	…….	33
Fixed Overhead	…….	7
		135

Direct labour cost represents the compensation to highly –skilled workers, who are permanent employees of the company. The company cannot afford to lose them. One labour hour is required to complete one unit of the product.

The company sells its product for₹200 per unit with variable selling expenses of ₹16 per unit. The company estimates that due to economic down turn, it will not be able to operate the plant at the normal capacity, at least during the next year. It is evaluating the feasibility of shutting down the plant temporarily for one year.

If it shuts down the plant, the fixed manufacturing overhead will be reduced to ₹1,25,000. The overhead costs are incurred at a uniform rate throughout the year. It is also estimated that the additional cost of shutting down will be ₹50,000 and the cost of re –opening will be ₹1,00,000.

Required:

Calculate the minimum level of production at which it will be economically beneficial to continue to operate the plant next year if 50% of the labour hours can be utilized in another activity, which is expected to contribute at the rate of ₹40 per labour hour. The additional activity will relate to a job which will be off –loaded by a sister company only if the company decides to shut down the plant.

(Assume that the cost structure will remain unchanged next year. Ignore income tax and time value of money)

Given

Labour Cost –Fixed –Not Relevant

Fixed Overhead = (2,00,000 x 7) = **14,00,000**

Selling Price = 200

Variable Price		Contribution
Direct Material =	65	86.00
Direct Labour =	Fixed	
Variable Overhead =	33	
Selling Overhead =	16	
(65 + 33 + 16) =	**114**	

Labour Hr.	**Production**
1	1 Unit

	(₹)	
Shutdown Cost =	1,25,000	(Manufacturing Fixed -Overheads)
Shutdown Cost =	50,000	
Re-opening Cost =	1,00,000	
(1,25,000 + 50,000 + 1,00,000) =	**2,75,000**	

Saving If Plant Shutdown

	(₹)
Contribution (2,00,000 x 50% x 40) =	40,00,000
Saving In Fixed Overhead (2,00,000 units x 7) =	14,00,000
Shutdown Cost	(2,75,000)
Net -Savings	**51,25,000**

Shutdown Point $= \left(\frac{51,25,000}{86}\right) = \mathbf{59,594.02 = 59,594\ units}$

Case Study −69

Illustration

Rabi Ltd. is considering the discontinuance of Division C. the following information is given:

Particulars	Divisions A & B	Division C	Total
Sales (Maximum achievable)	41,40,000	5,17,500	46,57,500
Less: Variable cost	20,70,000	2,76,000	23,46,000
Contribution	20,70,000	2,41,500	23,11,500
Less: Specific avoidable fixed cost	14,49,000	4,14,000	18,63,000
Divisional Income	6,21,000	(1,72,500)	4,48,500

The rates of variable costs are 90% of the normal rates due to the current volume of operation. There is adequate market demand.

For any lower volume of operation, the rates would go back to the normal rates.

Facilities released by discontinuing Division C cannot be used for any other purpose.

Required:

COMMENT on the decision to discontinue Division C using relevant cost approach.

Statement Showing Analysis of Proposal

Option (I) if continue operation		
Profit/loss	(1,72,500)	
Saving in variable cost A & B		
$\left(\frac{20,70,000 \times 100}{90}\right) =$	23,00,000	
Present Cost =	(20,70,000)	2,30,000
Saving Cost =	2,30,000	
	Net profit	57,500
IF Discontinue = Profit/Loss =		
Inclusive in cost A & B		(2,30,000)

Case Study −70

Cold Drinks Ltd. bottles and distributes 'Cola' brand cold drinks. It operates its distribution division as a cost centre. Budgeted cost for the year ending 31st March, 2013 is as follows:

		(₹)
Cash Operating Costs	……..	21,00,000
Depreciation on Fleet of Vehicles (8 x ₹ 52,500)	……..	4,20,000
Apportioned Corporate Costs	……..	3,00,000
		28,20,000

Distribution division has started operation on 1st April, 2011. Each vehicle of the fleet was acquired at a cost of ₹ 2,40,000 and had an estimated economic life of four years. Salvage value of each vehicle at the end of four years (March 31, 2015) was estimated at ₹ 30,000.

Native Distributors Ltd. which has countrywide network for the distribution of food and beverages has offered Cold Drinks Ltd. a three year distribution contract for ₹ 19,50,000 each year. The contract will start on 1st April, 2012.

If Cold Drinks Ltd. accepts the offer, it will close down its own distribution division, and will sell the delivery vehicles. Current (April 1,2012) disposal price of each vehicle is estimated at ₹ 75,000. Cold Drinks Ltd. will avoid cash operating cost of ₹ 21,00,000.

Security analysts have recommended the purchase of share of Cold Drinks Ltd., security analysts are forecasting a net profit of ₹ 6,60,000 for 2012 -13 as against an estimated Profit of ₹ 6,30,000 for 2011 -12, the forecast assumes that the company will continue operation of its distribution division.

Required:

(i) Tabulate a comparison of all relevant cost for next three years (2012 -13 to 2014 -15) for the two alternatives – use of own distribution division or use of Native distributors Ltd. Recommend whether Cold Drinks Ltd. should accept the offer of Native distributors Ltd.

(ii) Why might Cold Drinks Ltd. be reluctant to accept the offer of Native distributors Ltd?

(Ignore Income –tax and time value of money. Wherever appropriate, suitable assumption to be made by you)

Statement Showing Relevant Cost (Comparative)

	Own -Distribution			Native Distribution		
	2012 -13	**2013 - 14**	**2014 -15**	**2012 -13**	**2013 - 14**	**2014 -15**
Annual Relevant Cash Out Flow						
(1) Cash Operating Cost	21,00,000	21,00,000	21,00,000	–	–	–
Sub Contract Cost	–	–	–	19,50,000	19,50,000	19,50,000
	21,00,000	**21,00,000**	**21,00,000**	**19,50,000**	**19,50,000**	**19,50,000**
One Time Cash In Flow						
Sale of Delivery Vehicles	–	–	–	(60,000 (75,000 x 8)	–	–
	–	–	(2,40,000) (30,000 x 8)	–	–	–
	21,00,000	**21,00,000**	**18,60,000**	**13,50,000**	**19,50,000**	**19,50,000**
Total	**60,60,000**			**52,50,000**		

Recommendation

Cold Drinks Ltd. should accept the offer of Native Distributors Ltd. because the acceptance of the offer will reduce cash outflows by ₹ 8,10,000 (₹ 60,60,000 -₹ 52,50,000).

Assumption

No portion of the common corporate cost of which ₹ 3,00,000 is apportioned to distribution division will be avoided even if the distribution division is closed down.

(ii)Cold Drinks Ltd. may be reluctant to accept the offer of Native Distributors Ltd. due to –

(a) The impact of recognizing book loss on the disposal of the delivery vehicles. The figure of book loss will be as below:

	(₹)
Cost of Fleet (8 Vehicles) on 01.04.2011	19,20,000
Less: Depreciation for 2011 - 12	4,20,000
Book Value as on 01.04.2012	15,00,000
Less: Sales Realization (8 Vehicles x ₹ 75,000)	6,00,000
Book Loss	9,00,000

(b) Reduction in reported net income, as per the forecast of security Analysis, if the offer of Native Distributors Ltd is accepted. The expected operating income figures based on the forecast of Security Analysis are –

		(₹ '000)
	2011 -12	**2012 -13**
Estimated Profit (when Cold Drinks Ltd. uses its own distribution division)	630	660
Net Income (if the offer of Native Distributors Ltd. is accepted)	630	330*
*Estimated Profit as projected		660
Add: Depreciation Avoided		420
Add: Saving in Operating Cost (₹ 2,100 - ₹ 1,950)		150
Less: Book Loss on the Disposal of Delivery Vehicles		900
Net Income on the Acceptance of Offer		330

Hence according to the analysis of Security analyst in capital market, there will be a reduction in the reported net income to the tune of ₹ 3,30,000 (₹ 6,60,000 - ₹ 3,30,000) in the short run if Native Distributors Ltd.'s offer is accepted.

Security analysis did not recognized the long term benefits of accepting the offer of Native Distributors Ltd.

(c) Management of Cold Drinks Ltd. may feel that they can better focus on customer needs by operation the distribution function themselves.

Case Study −71

Tuscan Reel Ltd. manufacturers a range of films extensively used in the Cinema industry. The films, once manufactured, are packed in circular containers and stored in specially constructed crates lined with "Protecto". These crates are manufactured and maintained by a special department within the company and the departmental costs last year are as under:

	(₹)
Direct Materials (including "Protecto")	1,40,000
Direct Labour	1,00,000
Overheads:	
Department Manager	16,000
Depreciation of Machine	30,000
Maintenance of Machine	7,200
Rent (Portion of Warehouse)	9,000
Other Miscellaneous Costs)	31,500
Administration Overhead (20 % of Direct Costs)	48,000

Max Associates have approached the Tuscan Reel Ltd., offering to make all the crates required on a four –year contract for ₹ 2,50,000 per annum and/or to maintain them for further ₹ 50,000 per annum.

The following data are relevant:

(i) The machine used in the department cost ₹ 2,40,000 four years ago and will last for four years. It could be currently sold for ₹ 50,000.
(ii) The stock of "Protecto" was acquired last year for ₹ 2,00,000 and one –fifth was used last year and included in the material cost. Its originally cost was ₹ 1,000 per ton, but the replacement cost is ₹ 1,200 per ton; and it could be currently sold for ₹ 800 per ton.
(iii) The department has acquired warehouse space for ₹ 18,000 per annum. It uses only one –half of the space; the rest is idle.
(iv) If the department were closed, the manager will be transferred to another department; but all the labour force will be made redundant, and the terminal benefits to be met with amount to ₹ 15,000 per annum. In that event,

Max Associates will undertake to manufacture and maintain the crates.

If Tuscan Reel Ltd. continued to maintain the crates, but left their manufacture to Max Associates:

(i) The machine will not be required.
(ii) The manager will remain in the department.
(iii) The warehouse space requirements will not be reduced.
(iv) Only 10% of all materials will be used.
(v) Only one worker will be dispensed with and taking the terminal benefit to be met into account, the saving will be ₹ 5,000 per annum.
(vi) The miscellaneous costs will be reduced by 80%.

If Tuscan Reel Ltd. continued to manufacture the crates, but left their maintenance to Max Associates:

(i) The machine will be required.
(ii) The manager will remain in the department.
(iii) The warehouse space will be required.
(iv) 90% of all the materials will be required.
(v) The labour force will continue.
(vi) The miscellaneous cost will be reduced by 20%.

Assuming that for the four –year period, there is no significant change envisaged in the pattern of other costs.

Required:

Evaluate the alternate courses of action with supporting figures of each flows over the four –year per and advise accordingly.

Solution

Evaluation of the Three Alternative Courses of Action

Alternative I –Department is closed and Max Associates undertake to manufacture and maintain the Crates.

Alternative II –Tuscan Reel Ltd. continue to maintain the Crates, but leave their manufacture to Max Associates.

Given

Tuscan Ltd
↓
Films
↓
Cinema - Industry

Film → Packed → Circular Container
↓ ↓
(Manufactured) Stored in Specially Special Department

Max Associates → (Approached) → Tuskan Reel Ltd.

→ Crates [One –For –Four Year]

₹ 2,50,000 (p.a) Maintenance Cost = **50,000**

(i) The Machine Used in Department Cost -2,40,000

[4 years Ago] → Last For Four Years

Currently Sold = **50,000**

(ii) Stock - Protecto - ₹ 2,00,000

$\left(\frac{1}{5}\text{ Used}\right)$ x 2,00,000 = 40,000

$\left(\frac{4}{5}\right)$ Balance = 1,60,000

Statement Showing Analysis Proposals

	Alternative		
	I	**II**	**III**
	₹	**₹**	**₹**
Direct Material (Note No. 1)	1,00,000 (1,40,000 - 40,000)	90,000	10,000
Direct Labour (Note No. 2)	85,000 (1,00,000 - 15,000)	5,000	–
Maintenance Of Machine	7,200	7,200	
Rent	18,000		
Other Miscellaneous Cost	31,500	25,200	6,300
Total Cost Avoided (p.a)	**2,41,700**	**1,27,400**	**16,300**
Total Cost	**9,66,800 (2,41,700 x 4)**	**5,11,200 (1,27,400 x 4)**	**65,200 (16,300 x 4)**
Cash Realization			
Sale of Machine	50,000	50,000	–
Sale of Protecto	1,28,000	1,15,200	12,800
Total Cash Inflow			
	1,78,000	**1,65,200**	**12,800**
(A) Total Cash Inflow	11,44,800 (9,66,800 + 1,78,000)	6,76,400 (5,11,200 + 1,65,200)	78,000 (65,200 + 12,800)

	I	II	III
Outflow			
Payment -To -Max Associates (p.a) (writing note no. 3)	3,00,000	2,50,000	5,000
Cash Outflow in 4 years	(12,00,000)	(10,00,000)	(20,000
	(3,00,000 x 4)	(2,50,000 x 4)	(5,000 x 4)

Recommendation

The above analysis shows that net cash outflows exceed the amount of costs avoided in the three alternative courses of action. Hence, none of the alternatives is profitable. Tuscan Reel Ltd. should, therefore, continue to manufacture and maintain the crates.

Working Notes

1. The total cost of direct materials (including "Protecto") is ₹ 1,40,000. The cost of "Protecto" used for the last year comes to ₹ 40,000. Thus, cost of direct materials that can be avoided in Alternative –I comes to ₹ 1,00,000 (₹ 1,40,000 - ₹ 40,000). The cost of direct materials excluding "Protecto", to be avoided under Alternatives –II and III have been calculated on the basis of this amount.
2. Cost of direct labour that can be avoided under Alternative –I : ₹ 85,000 (₹ 1,00,000 - ₹ 15,000) [terminal benefits].
3. The total cash outflow per annum under Alternative- I will amount to ₹ 3,00,000 (₹ 2,50,000 + ₹ 50,000).
4. The stock of "Protecto", in terms of quantity comes to 160 tonnes (₹ 1,60,000 / 1,000).

The amount to be realized from the sale of "Protecto" under different alternatives has been ascertained as follows:

Alternative I : ₹ 1,28,000 (160 tonnes x ₹ 800)

Alternative II : $₹\ 1,15,200 \left(160 \text{ tonnes x} \frac{9}{10} \text{x } ₹\ 800\right)$

Alternative III : $₹\ 12,800 \left(160 \text{ tonnes x} \frac{1}{10} \text{x } ₹\ 800\right)$

5. The sale proceeds of machinery and stock could have alternatively been added to the avoided costs, in place of deducting them from cash outflow.

Case Study −72

'EXE' Ltd. manufactures a product called 'HN -2'. The company is organized into two divisions viz., Division 'KXA' and Division 'KXB'. Division 'KXA' manufactures 'HN-2' and Division 'KXB', which manufactures the containers, packs 'HN-2' in the containers and stores them by using a special protective material called 'P-6'. The details of the expenses incurred by Division 'KXB' during 2011 are as under:

	(₹)
Direct Materials including 'P-6'	5,25,000
Direct Labour	3,75,000
Supervision	60,000
Maintenance of Machine	27,000
Rent of a part of the Warehouse used	33,750
Depreciation of Machine	1,12,500
Miscellaneous Overheads	1,18,125
Administration Overheads apportioned to the Division	1,80,000

'WYE' Ltd. a company engaged in warehousing of a variety of products, approached 'EXE' Ltd. to undertake to manufacture the containers required on contract basis for a period of four years for ₹ 9,37,500 per annum and / or store the packed product for a further sum of ₹ 1,87,500 per annum.

Division 'KXB' uses a machine for the manufacture of containers. This machine was installed four years ago at a capital cost of ₹ 9,00,000 and it has a useful life of four more years. It can be currently sold at ₹ 1,87,500.

Division 'KXB' purchased 'P -6' worth ₹ 7,50,000 during the last year. Out of this, one –fifth was used during the last year and the cost thereof is included in the material cost of 2011. The original purchase price of 'P -6' was ₹ 3,750 per tonne but, if sold now, the stock of 'P -6' would fetch only ₹ 3,000 per tonne. Its current replacement cost is ₹ 4,500 per tonne.

Division 'KXB' hired a warehouse for storage of the product for ₹ 67,500 per annum. It uses only half of the space and has taken only half the amount of rent into account. The remaining space of the warehouse is idle.

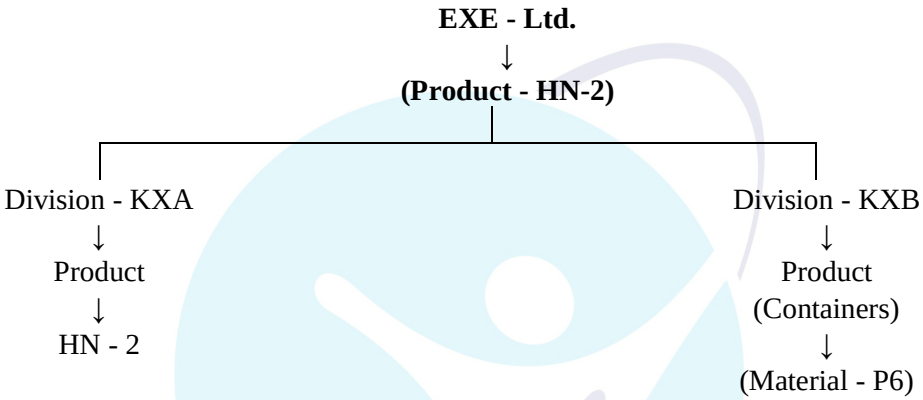
Required:

Evaluate the following three proposals on a four –year term basis and state recommendations.

(i) If contract for manufacture of the containers and the storage of the product, 'HN -2' is given to 'WYE' ltd. Division 'KXB' will be close down. In that event the supervisory staff will be transferred to another department and there will be 100% saving in direct labour cost.

(ii) If 'EXE' Ltd. continues to store the product 'HN -2' and leaves the manufacture of the containers to 'WYE' Ltd., The machine in Division 'KXB' will not be required and the storage space requirements cannot be dispensed with. The supervisory staff will be required to be retained in Division 'KXB' and only 10% of all material will be used. The saving on account of labour retrenchment will come to ₹ 18,750 per annum. The miscellaneous overheads will be reduced by 80%.

(iii) If 'EXE' Ltd. continues to manufacture the containers and leaves the storage of 'HN-2' to 'WYE' Ltd. Division 'KXB' will retain the machine and the warehouse space for use. The supervisory staff will also be retained and 90% of all materials will be required. The labour force will continue and the miscellaneous overheads will reduced by 20%.



WYE LTD.

Containers on Contract Basis

Year	**(₹)**
1 -4	**9,37,500**
Further	**1,87,500**

Division - KXB

Machine

Installed Four Years Ago

Capital Cost = **9,00,000**

Current Value = **1,87,500**

Life Remaining Fourly Fares

Incase –Material

Division 'KXB' Purchased P6 - 7,50,000 (Last Year)

$\left(\frac{1}{5} \text{ x Used Last Year}\right)$

Original Price = 3,750 Per Tonne

Real Value = 3,000 Per Tonne

Replacement Cost = 4,500 Per Tonne

Hired 'KXB Storage = 67,500

Use - Half | Half - Idle

Statement Showing Evaluation Of Alternatives

Alternative	**I**	**II**	**III**
Manufacture of Containers	WYE Ltd.	WYE Ltd.	EXE Ltd.
Storage of Product	WYE Ltd.	EXE Ltd.	WYE Ltd.
Relevant	**(₹)**	**(₹)**	**(₹)**
Direct Material (Other Than P-6)	3,75,000	3,37,500	3,75,000
Direct Labour (Note No. 4)	3,75,000	18,750	–
Rent of A Part -Ware - House (Working Note No. 6)	67,500	–	–
Maintenance of Machine (Note No. 7)	27,000	27,000	–
Miscellaneous Overheads (Note No.8)	1,18,125	94,500	23,625
	9,62,625	**4,77,750**	**61,125**
(A) Cash Outflow			
Contract Fee to WYE Ltd.			
(1) For Manufacture	9,37,500	9,37,500	
For Packing Storage	1,87,500	–	1,87,500
(B) Total Out Flow	**11,25,000**	**9,37,500**	**1,87,500**
(C)(A - B)			
Net Cash Outflow	1,62,375	4,59,750	1,26,375
Cash Outflow of 4 years	6,49,500 (1,62,375 x 4)	18,39,000 (4,59,750 x 4)	505,500 (1,26,375 x 4)
One Time Income			
Sale of P-6 (Note No.3)	(4,80,000)	(4,32,000)	(48,000)
Sale of Machine	(1,87,500)	(1,87,500)	–
Net Cash Outflow	**(18,000)**	**(12,19,500)**	**(4,57,500)**

Therefore it is in the interest of 'EXE' Ltd. to shut down Division 'KXB'

Working Note

(1)Direct Material other than 'P -6'

Direct material including 'P-6'	₹ 5,25,000
Use of 'P-6' 1/5th of ₹ 7,50,000	₹ 1,50,000
	₹ 3,75,000

Alternative One:

The material will be avoidable cost if Division 'KXB' is closed down.

Alternative Two:

Savings: ₹ 3,75,000 (₹ 3,75,000 - ₹ 37,500) if manufacture is given to 'WYE' Ltd. and storage remains with 'EXE' Ltd.

Alternative Three:
Savings: ₹ 37,500[₹ 3,75,000 – (90% of ₹ 3,75,000] if manufacture is done by 'EXE' Ltd. and storage given to 'WYE' Ltd.

(**2**) 'P – 6' - Stock

Stock in 2011	₹ 7,50,000
Used last year (1/5th)	₹ 1,50,000
Balance Stock	₹ 6,00,000

It is given that original price is ₹ 3,750
Therefore, 160 tonnes (₹ 6,00,000 / ₹ 3,750) 'P-6' is there.

(3)'P -6 ' Value

Alternative One:

Manufacturing and Storage is done by 'WYE' Ltd. Therefore it will be sold at ₹ 3,000 per tonne.

Cash Inflow will be ₹ 4,80,000 (₹ 3,000 x 160)

Alternative Two:

10% of all material will be used. It means 90% of 160 tonne will be sold.

Cash Inflow will be ₹ 4,32,000 (160 x 0.90 x ₹ 3,000).

Alternative Three:

In this situation storage is done by 'WYE' Ltd. Therefore it will be sold at ₹ 3,000 per tonne.

Cash Inflow will be ₹ 48,000 (16 x ₹ 3,000)

(4) Direct Labour Cost

Alternative One:

Avoidable Cost, if Deptt. KXB is closed (saving) ₹ 3,75,000

Alternative Two:

If manufacturing is given to 'WYE' Ltd. and 'EXE' Ltd. continues to store the product, saving on account of labour retrenchment will be only ₹ 18,750.

(5)Machine

Machine is used for manufacturing of containers. It is not required in alternative one and two. Therefore, It will be sold and there will be one time cash inflow of ₹ 1,87,500 under alternative one and two.

(6) Rent of Warehouse

The hire charge of warehouse is ₹ 67,500 per annum. The remaining space of the warehouse is isle. It means, when department 'KXB' is closed, cash outflow of ₹ 67,500 will be avoided. Therefore, cash flow for alternatives two and three will not be disturbed on this account.

(7) Maintenance of Machine

Maintenance of machine is required for manufacturing. It means ₹ 27,000 will be avoidable cost for alternative one and two. In third alternative this cost will continue to be there.

(8) Miscellaneous Overhead

Miscellaneous overhead of ₹ 1,18,125 will be avoidable cost for alternative one. For second alternative 80% of this i.e. ₹ 94,500 will be avoidable cost. For third alternative 20% of ₹ 1,18,125 i.e. ₹ 23,625 will be avoidable cost.

(9) Supervisory Staff

Supervisory staff will be transferred to another department in the first alternative. It means cash flow will not be affected. In the second and third alternatives, supervisory staff will be retained and it means so additional cash flow or relevant cost due to decision.

(10) Depreciation

Depreciation does not affect the cash flow. Therefore it is not relevant for these decisions.

Case Study −73

SFM Ltd. wants to evaluate the potential elimination of Division 'Z'. The basic information regarding cost and revenue is given below

	Division X and Y	Division Z	Total
Sales	₹ 1,20,000	₹ 15,000	₹ 1,35,000
Variable Expenses	(60,000)	(8,000)	(68,000)
Contribution Margin	60,000	7,000	67,000
Traceable Fixed Costs	(42,000)	(12,000)	(54,000)
Divisional Income	18,000	(5,000)	13,000
Unallocated Fixed costs	---	---	(6,000)
Income before Taxes			7,000

Required:

(i) What will be the increase or decrease in profit by eliminating Division 'Z' if all costs traceable to division 'Z' are avoidable? Should the company eliminate?

(ii) Assume that executives and supervisory personnel in Division 'Z' will be reassigned to other divisions, if division is eliminated. Included in ₹ 12,000 of traceable fixed costs of Division 'Z' are ₹ 6,000 of salaries for these personnel. What is the effect of eliminating division 'Z' with this assumption?

(iii) Assume that fixed assets of Division 'Z' can be sold for ₹ 1,50,000 if Division 'Z' is eliminated. Remaining life of these assets is 10 years. Company can earn interest of 12% on invested funds. By what amount will this information affect the benefit to eliminate? [PVIFA (12%,10) = 5.650]

Statement Showing Analysis of Profit/ Loss
(Assuming that Costs Traceable to Division Z Are Avoidable)

	If Eliminates 'Z'	If -Keeps 'Z'	If Eliminates 'Z'
Sales	1,20,000	1,35,000	15,000
Variable Cost	(60,000)	(68,000)	(8,000)
Contribution	**60,000**	**67,000**	**7,000**
Fixed Cost	(48,000)	(60,000)	12,000
	(42,000 + 6,000)	(42,000 + 12,000 + 6,000)	
	12,000	**7,000**	**(5,000**

Advantages to Eliminate Division Z	(₹)
Reduction in Variable Expenses	8,000
Reduction in Fixed Expenses (₹ 12,000 - ₹ 6,000)	6,000

Disadvantages to Eliminate Division Z	(₹)
Reduction in Sales	15,000
Decrease in Profit by Eliminating Division Z	1,000
Total Benefit	14,000

₹ 26,549 should be added to the annual benefits of eliminating Division Z. The equivalent annual cash flow of ₹ 26,549 is computed by using annuity table for an assumed annuity of ten years at 12% with present value of ₹ 1,50,000.

Cash Flow ₹26,549 (₹ 1,50,000 ÷ 5.650)

The equivalent annual cash flow of ₹26,549 is the opportunity cost of keeping division Z or alternatively it is a benefit from eliminating the division Z.

Case Study −74

TQM Limited makes engines for motor cars for its parent company and for two other motor car manufactures.On 31st December, the company has sufficient order for January and one further order for 21,000 engines. Due to recession in the economy, no further orders are expected until May when it is hoped economic prospect for the motor car industry will have improved. Recently factory has been working at only 75% of full capacity and the order for 21,000 engines represents about one month production at this level of activity.

The board of directors are currently considering following two options:

(i) Complete the order in February and close the factory in March and April.

OR

(ii) Operate at 25 per cent of full capacity for each of three months of February, March and April.

The costs per month at different levels of activities are as follows:

	At 75% (₹)	At 25% (₹)	Idle (₹)
Direct Material	5,25,00	1,75,000	---
Direct Labour	5,23,600	1,73,250	---
Factory Overhead			
Indirect Material	8,400	4,900	4,900
Indirect Labour	1,01,500	59,500	---
Indirect Expenses			
Repairs and Maintenance	28,000	28,000	---
Other Expenses	52,500	34,300	26,600
Office Overheads			
Staff Salaries	1,48,400	98,000	67,550
Other Overheads	28,000	19,950	11,200

Other information is as follows:

- ✓ Material and labour cost will not be incurred where there is no production.
- ✓ On the reopening of the factory, one-time cost of training and engagement of new personnel would be ₹65,800 and overhauling cost of plant would be ₹14,000.
- ✓ Parent company can purchase engines from open market at reasonable price.

Required:

(i) To express your opinion, along with calculations, as to whether the plant should be shut down during the month of March and April or operate 25% of full capacity for three months.
(ii) To list and comment on cost / non –costs factors which might to relevant to the discussion.

Statement Showing Analysis of Cost

	Option (I)	Option (II)
	75% In Feb	At -25 Each
	And Close In March & April	From Feb March/April
	(₹)	(₹)
(A) Direct Cost		
(1) Direct Material	5,25,000	5,25,000
		(1,75,000 x 3)
(2) Direct Labour	5,23,600	5,19,750
		(1,73,250 x 3)
(B) Indirect Cost Factory Overheads		
(1) Indirect Material Idle	8,400	14,700
	9,800	(4,900 x 3)
	(4,900 x 2 months)	
(2) Indirect Labour	101,500	1,78,500
		(59,500 x 3)
(3) Training Cost	65,800	–
(C) Indirect Expenses		
(1) Repairs & Maintenance	28,000	(84,000)
Overhauling Cost	14,000	(28,000 x 3)
(2) Other Expenses	52,500	102,900
Two Months Idle	53,200	(34,300 x 3)
	(26,600 x 2)	
(D) Office Overheads		
(1) Staff Salaries	1,48,400	2,94,000
Two Months Idle	1,35,100	(98,000 x 2)
	(67,550 x 2)	
(2) Other Overheads	28,000	59,850
	22,400	(19,950 x 3)
(3) Two Month Idle	(11,200 x 2)	
Total Cost	**17,15,700**	**17,78,700**

The more economic course of action is to operate at 75% capacity for a month only, and close the plant for March and April. This option will save ₹63,000 (₹17,78,700 - ₹17,15,700).

In regard to the decision on close down of operations or continuing with operations, the factors to be considered are:

1) The proposal which involves the lower total costs will be selected.
2) If the company has contracted the purchases from high quality and high price suppliers, a change in the procurement policy to 'shop around' may be considered to obtain economics in purchases.
3) The services of unskilled labour, if any, who do not require re –training may be dispensed with. They may be recruited and put on work without incurring training cost on re –opening of the factory. This will save training and idle time cost.
4) The possibility of wage freeze may reluctantly be considered as an extreme measure.

Case Study −75

XY Ltd. is manufacturing a consumer product and doing marketing through 200 depots all over the country. The company is considering closing down the depots and resorting to dealership arrangements. The total turnover of the company is ₹ 160 crores per annum. The following information is given for each depot:

		₹ in lakhs
Annual turnover	……	80.00
Average inventory	……	16.00
Administrative expenses per annum	……	1.60
Staff Salary per annum	……	2.58

The inventory cost is 16% p.a. which is also the interest rate prevailing in the market for working capital finance. The other fixed cost per annum is ₹ 16 crores. Marketing through dealers would involve engaging dealers for each area. The dealers will assure Minimum sales for each area. This would result in increasing the capacity utilization from 80% to 100%. At present the company's P/V ratio is 20%. Marketing through dealers would involve payment of commission of 8% on sales. Half of the existing depot staff will have t be absorbed in the company. The dealer will deposit ₹ 3.20 crores with company on which interest at 12% p.a will be paid.

Required:

Work out the impact on profitability of the company by accepting the proposal.

Statement Showing Analysis of Proposal

		₹ Crores
	Exiting	**Proposed**
Sales	160 (0.80 x 200)	200
Variable Cost	(128) (80% x 160)	(160) (80% x 200)
Contribution	32	40
Admin Expenses	(3.20) (200 x 0.16)	
Staff Salaries	(200 x 0.0288)	(2.88) (50%)
Investment Carrying Cost	(5.12) (200 x 16% x 0.16)	
Other Fixed Cost	(16)	(16)
Commission on Sales		16 (200 x 8%)
Profit		
Saving on Internal Deposit		25.6 (3.20 x 200 x 4)
Total Profit	**1.92**	**30.72**
Increase In Profit		28.80

Case Study −76

A manufacturing unit of ABC Co. Ltd. has presented the following details:

Average units produced and sold per month	……..	2,40,000
No. of workers	……..	80
Sales value	……..	₹ 60 Lacs
Contribution	……..	₹ 24 Lacs
Wage rate	……..	₹ 5 per unit

The production manager proposes to introduce a new automated machine due to which following changes will take place:

1) No. of units produced and sold are expected to increase by 20%.
2) No. of workers will be reduced to 60.
3) With a view to provide incentive for increased production, production manager intends to offer 1% increase in wage rate for every 3% increase in average individual output achieved.
4) Decrease in selling price by 2%.

Required:

Calculate amount of extra contribution after introduction of new automated machine and give your recommendations.

Statement Showing Extra Contribution

Sales = 60,00,000

- Variable Cost 36,00,000
  - Wages (2,40,000 x 5) = **12,00,000**
  - Others 24,00,000
- Contribution 24,00,000

Revised Sales = (2,88,000 x 24.50) (Note No. 1) = 70,56,000

- 4,608,000 Variable Cost
  - Wages (2,88,000 x 6) = **17,28,000**
  - Others $\left(\frac{24,00,000}{2,40,000} \text{ x } 2,88,000\right) = \mathbf{28,80,000}$
- (70,56,000 - 4,608,000) Contribution 24,48,000
  - Present 24,00,000
  - Inc - By 48,000

Note No.1

Selling Price (P. U) $= \left(\frac{60,00,000}{2,40,000}\right) = \mathbf{25.00}$

Present − Production (per worker) $= \left(\frac{2,40,000}{80}\right) = 3,000$ units

Proposed Production = (2,40,000 x 120%) = **2,88,000 units**

Future Output = 2,40,000 x 120% = 2,88,000

(2,88,000 ÷ 60 Employee) = **4,800 units**

	₹
Present PC -Work Rate =	5.00
Inc – By (20% 5)	1.00

$\left(\frac{4,800 - 3,000}{3,000}\right) = 60\ \%$

Bonus :- Inc By	**Bonus**
3%	1%
60%	20%

6.00

Selling Price = 25

- Decrease -By (2 % 25) = **0.50**
- Proposed Selling Price **24.50 (P.U)**

Case Study −77

R.G. Ltd. has several product lines with a sales manager in charge of each product line and he is paid a bonus based on the net income generated by his product line.

In analysis the performance of one product line, the General Sales Manager noted that the sales declined from ₹ 8 lakhs last year to ₹ 6 lakhs for the current year. However the product line manager received a larger than last year because net income increased from ₹ 90,000 last year to ₹ 1,20,000 for the current year.

The General Sales Manager wonders how the product line manager is entitled to a bonus with a decline in sales. He also wants to know how net income increased, when sales decline.

As a Cost accountant you are required to prepare the income statements, based which the bonus was paid. Explain with supporting figures why net income increased when sales declined. What do you think of the present method of paying the Bonus? Can you suggest some other method?

The data given in support for the bonus payment are:

	Year 2	**Year 1**
Units Sold @ ₹ 20	30,000	40,000
Standard Variable Cost of Production per unit (₹)	8	8
Fixed Factory Overhead Cost (₹)	2,00,000	2,00,000
Selling & Distribution Expenses (assumed to be fixed) (₹)	1,40,000	1,40,000
Standard Fixed Factory Overhead per unit (₹)	5	5
Units Produced	50,000	30,000
Units -Opening Finished Goods Inventory	–	10,000

All Factory overhead variances are written off to cost of goods sold.

Statement Showing Analysis of Profit / Loss (As Per Absorption Costing)

	Year I	**Year I**	**Year 2**	**Year 2**
(A) Sales	(40,000 x 20)	8,00,000	(30,000 x 20)	6,00,000
(B) Cost of Sales				
Manufacturing Variable Cost				
Variable	2,40,000 (30,000 x 8)		4,00,000 (50,000 x 8)	
Fixed	1,50,000		2,50,000	
(30,000 x 5)	**3,90,000**		**(50,000 x 5)**	
Opening Stock	1,30,000 (10,000 x (8 + 5)			
Closing Stock			(2,60,000) $\left(\frac{6,50,000}{50,000} \text{ x } 20,000\right)$	
	5,20,000		**3,90,000**	
Under Recovery Fixed Overhead (2,00,000 - 1,50,000)	50,000		(50,000) (2,00,000 - 2,50,000) Over Recovery	
Cost of Goods Sold	5,70,000		**3,40,000**	
Selling Exp (Fixed)	**1,40,000**	(7,10,000)	**1,40,000**	
				(4,80,000)
	Profit	**90,000**	**4,80,000**	**1,20,000**

In the above statements income in year 2 increased in spite of decrease in sale because fixed overheads have been carried over to next year as part of the value of closing stock in year 2.

The above method of paying bonus to sales manager cannot be considered appropriate. It may be appropriate to pay bonus to production manager. The relevant method for paying bonus to sales manager is the contribution method as shown below:

	Year 1	**Year 2**
	(₹)	**(₹)**
Sales	8,00,000	6,00,000
Less : Variable Cost	3,20,000	2,40,000
Contribution	4,80,000	3,60,000
Less : Fixed Cost	3,40,000	3,40,000
Income	1,40,000	20,000

If bonus to sales manager is paid on the contribution method, sales manager cannot get more bonus when sales decline.

CHAPTER – 7

PRICING DECISION

Case Study – 1

Technocraft has just completed repair work on Car No. DL 7CL 2001 of Mr. 'M'. The parts used to repair the vehicle cost ₹ 250. The company's 20% markup rate on parts covers parts related overhead costs. Labour involved 5 hours of time from a Technocraft service engineer whose wages are ₹ 80 per hour. The current overhead workup rate on labour is 80 %.

Required:

Compute how much Mr. 'M' will be billed for his car repairs?

Source P.M –(Pricing)

TECHNOCRAFT – CARNO. – DL–7CL –2001

STATEMENT SHOWING COST- SHEET

	₹
Cost of parts	250
O.H. (20 % 250)	50
Labour cost (50 x 8)	400
O.H (80% 400)	320
BILL AMOUNT	**1,020**

Case Study – 2

Computer Tec a manufacturing firm has entered into an agreement of strategic alliance with Comp Inc. of United States of America for the manufacture of Super Computers in India. Broadly, the terms of agreement are:

i. Comp Inc. will provide Computer Tec with kits in a dismantled condition. These will be used in manufacture of Super Computers in India. On a value basis, the supply, in terms of the FOB price will be 50% thereof.
ii. Computer Tec will procure the balance of materials in India.
iii. Comp Inc. will provide to Computer Tec with designs and drawing and in regard to the materials and supplies to be procured in India. For this, Computer Tec will pay Comp Inc. a technology fee ₹ 8 crores.
iv. Computer Inc. will also be entitled total royalty at 10% of the selling price of the computers fixed for sales in India as reduced by the cost of standard items procured in India and also the cost of imported kits from Comp Inc.
v. Computer Tec will furnish to Comp Inc. detailed quarterly returns.

Other Information available:

a. FOB price agreed $ 2,040. Exchange rate to be adopted $ 1 = ₹ 55.00
b. Insurance and freight - ₹ 2,000 per imported kit;

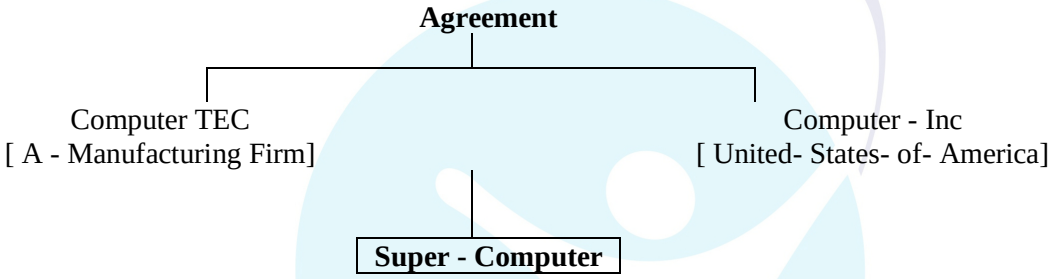
c. Customs duty leviable is 200% of the CIF prices; but as a concession, the actual rate leviable has been fixed at 40% of CIF.
d. The technology agreement expires with the production of 8,00,000 computers;
e. The quoted price on kits includes a 25% margin of profits on cost to Comp Inc.
f. The estimated cost of materials and supplies to be obtained in India will be 150% of the cost of supplies made by Comp Inc.
g. 50% of the value in rupees of the locally procured goods represents cost of the standard items.
h. Cost of assembly and other overheads in India will be ₹ 8,000 per Super Computer.

Required:

Calculate the selling price, of a personal computer in India bearing in mind that Computer Tec Ltd has targeted a profit of 20% to itself on the selling price.

Note: In making calculations, the final sum may be rounded to the next rupees.

Given:



Working Note No. – 1

		₹
FOB (Price) ($ 2,040 x 55)	=	112,200

Note No. 2

		₹
Cost of Dismantled Kit - to- Computer Inc.	=	89,760

Cost	Profit	Selling Price
100	25	125
		112,200

$$\left(\frac{112,200 \times 100}{125}\right)$$

= 89,760

Note No. 3

Cost of Local Procurements

(150 % x 8,760 x 50%) = 67,320

Note No. 4

Landed Cost of Dismantled Kit

		₹
FOB (Price) (1,12,200 x 50%)	=	56,100
Insurance & Freight	=	2,000
CIF Value	=	58,100
Custom Duty (40 % 58,100)	=	23,240
Landed Cost A Dismantled Kit	=	**81,340**

Note No. 5

Cost of Standard Item	₹
Procured Locally (50 % x 67,320)	**33,660**

Royalty Payment Per Computer

X = Selling Price

Y = Royalty Paid Per Computer

Selling Price 100

Profit	Cost
20 % x 100 = 20	80

$$\text{Profit on Cost} = \left(\frac{20}{80} \text{ x } 100\right) = 25\ \%$$

X = 1.25 [8,12,140 + 67,320 + 8,000 + 100 + 4]

Y = 10% x (*x* – 33,660 + 81,340)

On Solving Equation

X = 207,514 (Approx)

Y = 9,251 (Approx)

Statement Showing Selling Price of A Computer in India

	₹
(A) Landed Cost of Dismantled Kit (Note No. 4)	81,340
(B) Cost of Local Procurement (Refer Note No. 3)	67,320
(C) Cost of Assembly Buy & other Overheads per Computer	8,000
Total Cost (A + B + C)	156,660
(E) Technology Fee Per Computer $\left(\frac{8,00,000}{8,00,000}\right)$	100
(F) Royalty Payment Per Unit (Note No. 6)	9,251
Total Cost (D + E + F)	**166,011**

Case Study – 3

RST Ltd. is specialists in the manufacture of sports goods. They manufacture croquet mallets but purchase the wooden balls, iron arches and stakes required to complete a croquet set.

Mallets consist of a head and handle. Handles use 2.5 board feet per handle at ₹50 per board foot. Spoilage loss is negligible for the manufacture of handles. Heads frequently split and create considerable scrap.

A head requires 0.40 board feet of high quality lumber costing ₹60 per board foot. Spoilage normally works out to 20% of the completed heads. 4% of the spoiled heads can be salvaged and sold as scrap at ₹10 per spoiled head.

In the department machining and assembling the mallets, 6 men work 8 hours per day for 25 days in a month. Each worker can machine and assemble 12 mallets per uninterrupted 40 minutes time frame. In each 8 hours working day, 15 minutes are allowed for coffee-break, 8 minutes on an average for training and 9 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters. Workers are paid at a comprehensive rate of ₹ 6 per hour.

The department is geared to produce 20,000 mallets per month and the monthly expenses of the department are as under:

		(₹)
Finished and painting of the mallets	……	20,000
Lubricating oil for cutting machines	……	600
Depreciation for cutting machine	……	1,400
Repairs and maintenance	……	200
Power to run the machines	……	400
Plant Manager's salary	……	9,400
Other overheads allocated to the department	……	60,000

Required:

As the mallets are machined and assembled in lots of 250, prepare a total cost sheet for one lot and advise the management on selling price to be fixed per mallet in order to ensure a minimum 33.33% margin on the selling price.

Statement Showing Cost – Sheet

	(₹)
(I) Direct Cost	
(A) Direct Material	
(i) Handle (2.5 feet x 250 units x 50) =	31,250
(ii) Heads (1.2 x 250 x 0.40 x 60) = (Note No.1)	7,200
Scrap Recovery (4% 50 x 10)	(20)
(B) Direct Labour Cost	100
$\left(\frac{8\ \text{Hrs.} \times 6 \times 250}{120}\right)$ (Note No. 2)	
Prime Cost	**38,530**
(II) Factory & Other Overheads	
Variable Finishing & Painting $\left(\frac{20{,}000 \times 250}{20{,}000}\right)$	250
Fixed $\left(\frac{72{,}000 \times 250}{18{,}000}\right)$	1,000
Total Cost	**39,780**
Units ÷	250
Cost per Mallet	= 159.12
Profit (50%)	79.56
Selling Price	**238.68**

W Note No. 1

Output	**Loss**	**Input**
1	0.20	1.20
$\left(250 \times \frac{1.2}{1.00}\right)$ = 300		250

Head Processed Output 250 | Spoiled Head 50

Note No. 2

Minutes Per Day = (8 x 60) = 480

Idle Time	(48)
Coffee Break	(15)
INST.	(9)
Training	(8)
	400

Melts – To –Be –Produced –Per MAN –Day

$\left(\frac{400}{40}\right) \text{x } 12 = 120$

Monthly Production (120 units x 6 men x 25) = **18,000**

W Note

3. Finishing and painting overheads are assumed to be variable for the production of 20,000 mallets.

W Note

4. All the other expenses are fixed and are to be absorbed by 18,000 (120 units x 6 men x 25 Days) mallets of monthly production.

Case Study – 4

A Japanese soft drink company is planning to establish a subsidiary company in India to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced in the following estimates for the Indian subsidiary:

	Total Annual Costs (₹)	**Percentage of Total Amount Cost which is Variable**
Material	2,10,000	100%
Labour	1,50,000	80%
Factory Overheads	92,000	60%
Administrative Overheads	40,000	35%

The Indian production will be sold by manufacturer's representatives who will receive a commission of 8 % of the sale price. No portion of the Japanese office expenses is to be allocated to the Indian subsidiary.

Required:

i. Computes the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in India.

ii. Calculate the break – even point in Rupees sales and also in number of bottles for the Indian subsidiary on the assumption that the sale price is ₹ 14 per bottle.

STATEMENT SHOWING COST SHEET

	40,000 BOTTLES	
(A) VARIABLE COST		
(1) Material	2,10,000	5.25
(2) Labour (Note No.1)	1,20,000	3.00
(3) Factory O.H (Note No.1)	55,200	1.38
(4) Admin O.H (Note No.1)	14,000	0.35
(5) Commission(Note No.1)	48,000	1.20
TOTAL V.COST	**4,47,200**	**11.18**
(B) FIXED COST		
(1) Labour (Note No.1)	30,000	0.75
(2) Factory O.H (Note No.1)	36,800	0.92
(3) Admin O.H (Note No.1)	26,000	0.65
Total f. Cost (b)	**92,800**	**2.32**
A + B = total cost	**5,40,000**	**13.50**
Profit	**60,000**	**1.50**
Sales	**6,00,000**	**15.00**

Note No. (1)

LABOUR = 1,50,000

Variable	Fixed
(80 % x 1,50,000)	(20 % x 1,50,000)
= 1,20,000	= 30,000

FACTORY O.H 92,000

Variable	Fixed
(60 % x 92,000)	(40 % x 92,000)
= 55,200	= 36,800

ADMIN O.H 40,000

Variable	Fixed
(40,000 x 35 %)	(40,000 x 65 %)
= 14,000	= 26,000

Selling Price = x

Variable cost = *	3,99,200	Profit
Fixed cost =	92,800	(10 % x)
Commission (V.Cost)	0.08 x	= 0.10 x

VARIABLE COST (NOT-INCLUDED-COMISSION)

(2,10,000 + 1,20,000 + 55,000 + 14,000) = **3,99,000**

x = 3,99,200 + 92,800 + 0.08 x + .10 x

0.82 x = 4,92,000

0.82 x = **6,00,000**

Commission(8 % 6,00,000) = **48,000**

Profit (10 % 6,00,000) = **60,000**

REVISED VARIABLE COST (P.U)

	₹
Material	2,10,000
Labour	1,20,000
F.O	55,200
Admin O.H	14,000
Commission	44,800
(40,000 x 14 x 8 %)	**4,44,000**

V.cost per unit = $\left(\frac{4,44,000}{40,000}\right)$=**11.10**

B.E.P. 14

V

11.1

₹ = (32,000 X 14)

= **4,48,000**

CONT

(14 – 11.10) x 32,000 = 92,800

F

92,800

Pt.

0

Case Study – 5

A manufacturing company has an installed capacity of 1,20,000 units per annum. The cost structure of the product manufacture is as under:

(i). Variable cost per unit -

Materials	……	₹ 8
Labour (subject to a minimum of ₹ 56,000 per month)	……..	₹ 8
Overheads	……..	₹ 3
(ii). Fixed overheads	……..	₹ 1,68.750 per annum

(iii). Semi-variable overheads ₹ 48.000 per annum at 60 % capacity which increases by ₹ 6,000 per annum for increase of every 10 % of the capacity utilization or any part thereof for the year as whole.

The capacity utilization for the next year is estimated at 60 % for two month, 75 % for six months and 80 % for remaining part for the year.

Required:

If the company is planning to have a profit of 25 % on the selling price, calculate the selling price per unit. Assume that there are no opening and closing stocks.

Solution

STATEMENT SHOWING COST SHEET

PRODUCTION	**89,000**	**(NOTE -1)**
	TOTAL	**P.U.**
DIRECT-COST		
Material	7,12,000	8.00
Labour (Note no. 1)	7,28,000	8.18
Prime cost	14,40,000	16.18
IND-COST		
Overhead AOS (Note no. 2)	4,95,750	5.57
Factory cost	19,35,750	21.75
Profit (b.f)	6,45,250	7.25
Sales = (19,35,750 x 25/75)	25,81,000	29.00

NOTE NO. (1)

CAPACITY 1,20,000 UNITS

$\left(1{,}20{,}000 \times \frac{60}{100} \times \frac{2}{12}\right) +$	$\left(1{,}20{,}000 \times \frac{75}{100} \times \frac{6}{12}\right) +$	$\left(1{,}20{,}000 \times \frac{80}{100} \times \frac{4}{12}\right)$
= 12,000 units + 45,00 +32,000 = **89,000 units**		

Note No. (2)

Labour cost

2 months (6,000 x 8) = 48,000

Minimum 56,000

		₹
(56,000 x 2)	=	1,12,000
(45,000 x 8)	=	3,60,000
(32,000 x 8)	=	2,56,000
		7,28,000

Note No.(3) OVERHEADS

VARIABLE = (89,000 x 3) = 2,67,000
FIXED = = 1,68,750

SEMI - VARIABLE =
(48,000 + 6,000 + 6000) 60,000

4,95,750

UPTO 60 %
48,000

$\left(\frac{45,000 + 32,000}{1,20,00}\right)$
= **64.16%**

Case Study – 6

The cost of production and sales of 80,000 units per annum of product 'l' are:

Material	₹ 4,80,000	Labour	₹ 1,60,000
Variable Overhead	₹ 3,20,000	Fixed overhead	₹ 5,00,000

The fixed portion of capital employed is ₹ 12 lacs and the varying portion is 50 % of sales turnover.

Required:

Determine the selling price per unit to earn a return of 12 % net on capital employed (net of Tax @ 40 %).

Solution:-

STATEMENT SHOWING SELLING PRICE (P.U)

SALES x

Cost

Material = 4,80,000
Lab = 1,60,000
V.u = 3,20,000
Fo = 5,00,000

Profit / Return

$\left(\frac{12}{100} \text{ X } \frac{100}{60}\right)$ = 20%

F capital
12,00,000 x 20%
= 2,40,000

W cap
20/100 (.50 x)
= 0.10 x

x = 14,60,000 + 2,40,000 + .10 x

0.90 x = 17,00,000

x = 18,88,888.88 ÷ 80,000 Units = 23.61

Case Study – 7

A company produces a single product 'Impex'.

For an annual sales of 40,000 units of Impex, fixed overhead is ₹ 5,50,000. The variable cost per unit is ₹ 60. Capital employed in fixed assets is ₹ 8,00,000 and in current assets is 50 % of net sales(i.e. sales less discount). The company sells goods at 20 % discount on the maximum retail price (M.R.P). This is ₹ X per unit. The company wants to earn a return of 25% before tax on capital employed in fixed and current assets.

Required:

Calculate the value of X

SALES = 40,000 x

Total Cost
Variable cost (P.U)
60.00 x 40,000
24,00,000
+

Discount
20 % x 40,000 x
= 8,000 x

Return

F.A
25 % 8,00,000
= 2,00,000

C.A
$\left(\frac{25}{100} \text{x } \frac{50}{100} \text{x } 40{,}000x \text{x } 80\%\ x\right)$
= 4,000 x

(+) F.O
5,50,000

40,000 x = 24,00,000 + 5,50,000 + 2,00,000 + 8,000 x + 4,000 x

28,000 x = 31,50,000

Case Study - 8

Excel Ltd. specializes in the manufacture of Printers. They have recently developed a technology to design a new Printer. They are quite confident of selling all of the 4,000 units that they would be making in a year. The capital equipment that would be required will cost₹ 12.5 lakhs. It will have an economic life of 4 years and no significant terminal salvage value.

During each of the first four years promotional expenses are planned as under:

	Year 1	**Year 2**	**Year 3**	**Year 4**
Advertisement (₹)	50,000	50,000	30,000	15,000
Other expenses (₹)	25,000	25,000	45,000	60,000

Variable costs of producing and selling the unit would be ₹ 125 per unit.

Additional fixed operating costs incurred because of this new product are budgeted ₹ 37,500 per year.

The company's profit goals call for a discounted rate of return of 15% after taxes on Investments on new products. The income tax rate on an average works out to 30%. You can assume that the straight line

method of depreciation will be used for tax and reporting. Work out an initial selling price per unit of the product that may be fixed for obtaining the desired rate of return on investment.

Present value of annuity of ₹1 received or paid in a steady stream throughout 4 years in the future at 15 % is 2.854.

Exp– production = 4,000 units
Capital Exp = 12,50,000
Life - 4 years

DEP (p.a) = $\left(\frac{12,50,000}{4} - D\right)$ = 3,12,500 (p.a)

REVENUE EXP

	1	2	3	4
Adv - cost	50,000	50,000	30,000	15,000
Other exp	25,000	25,000	45,000	60,000
V.cost (4,000 x 125)	5,00,000	5,00,000	5,00,000	5,00,000
Fixed cost	37,500	37,500	37,500	37,500
	6,12,500	**6,12,500**	**6,12,500**	**6,12,500**

D.F @ 15 % IT TAX @ 30 %

C.D.F = 2.854 S.P = ?

(1-4)

STATEMENT SHOWING CALCULATION OF S.P (P.U) PRESENT VALUE OF OUTFLOW

YEAR

0	Capital Exp	=	(12,50,000)
	Revenue Exp		
1 - 4	(6,12,500 x 2.854)	=	(17,48,075)

TAX – SAVINGS

1 - 4	Dep	(3,12,500 x 30 % x 2.854)	=	2,67,563
1 - 4	Rev Exp	(6,12,500 x 80 % x 2.85)	=	5,24,423
				(22,06,089)

F.V		C.D.F		P.V
1-4 7,72,981	x	2.854	=	22,06,089

$\left(\frac{7,72,981 \times 100}{70}\right) = 11,04,259$

$\left(\frac{11,04,259}{4,000}\right) = 276.06$ (P. U)

Case Study – 9

Hind Metals Manufactures an alloy product 'Incop' by using iron and Copper. The metals pass through two plants, X and Y. the company gives you the following details for the manufacture of one unit of Incop:

Materials	Iron : 10 kgs @ ₹ 5 per kg.
	Copper : 5 kg @ ₹ 8 per kg.
Wages	3 hours @ ₹ 15 per hour unit in Plant X
	5 hours @ ₹ 12 per hour in Plant Y
Overhead recovery	On the basis of direct labour hours
	₹ 8 per hour in Plant X
	₹ 5 per hour in Plant Y
	₹ 8 per hour in Plant X
	₹ 5 per hour in Plant Y
Selling overhead:	(fully variable) - ₹ 20 per unit

i. Find out the minimum price to be fixed for the alloy, when the alloy is new to the market. Briefly explain this pricing strategy.

ii. After the alloy is well established in the market. What should be the minimum selling price? Why?

Statement Showing Selling Price

							P.U ₹
Direct Material:-							90.00
					Iron (10 kg x 5) =	50	
					Copper (5kg x 8) =	40	
						90	
Direct Wages							105.00
Department :							
X	3 Hrs. x 15				= 45		
Y	5 Hrs. x 12				= 60		
			105				
Variable Overheads							49.00
Dept	**Hrs.**		**x**	**R.R**			
X	3		x	8	= 24		
Y	5		x	5	= 25		
			49				
						S.O	20.00
						Variable Cost	264.00
Fixed Overheads :-							
Dept Hrs.							
X	3	x		8	= 24		
Y	5	x		5	= 25		49.00
						Total Cost	**313.00**

Case Study –10

R.T. Ltd, want to fix proper selling prices for their products 'A' and 'B' which they are newly introducing in the market. Both these products will be manufactured in Department D which is considered as a Profit Centre. **The estimated are as under:**

	A	B
Annual Production (units)	1,00,000	2,00,000
Direct Materials per unit	₹ 15.00	₹ 14.00
Direct Labour per unit (Direct Labour Hour Rate ₹ 3)	₹ 9.00	₹ 6.00

The proportions of Overheads other than interest, chargeable to the two products are as under:
Factory Overheads (50% Fixed) 100% of Direct Wages, Administration Overheads (100% Fixed) 10 % of Factory Cost, Selling and Distribution Overheads (50% Variable) ₹ 3 and ₹ 4 respectively per unit of products A and B.
The fixed capital investment in the Department is ₹ 50 Lakhs. The working capital requirement is equivalent to 6 months stocks of cost of sales of both the products. For this project a term loan amounting to ₹ 40 lakhs has been obtained from Financial Institutions at an interest rate of 145 per annum. 50% of the working capital needs are met by Bank Borrowing carrying interest at 18% per annum. The Department is expected to give a return of 20% on its capital employed.

Required:

a) Fix the selling prices of products A and B such that the contribution per direct labour hour is the same for both the products;
b) Prepare a statement showing in detail the over –all profit that would be made by the Department.

Note No. 1 Statement Showing Variable Cost and Total Cost Per Unit / Each Product

Product	**A**		**B**	
Units	**1,00,000**		**2,00,000**	
	Total	**P.U**	**Total**	**P.U**
Direct Material	15,00,000	15.00	28,00,000	14.00
Direct Labour	9,00,000	9.00	12,00,000	6.00
(i) Factory Overheads				
Variable	4,50,000	4.50 (9 x 50%)	6,00,000	3.00 (6 x 50%)
(ii) Admin Overheads				
Variable	–	–	–	–
(iii) Selling Overheads				
Variable	1,50,000	1.50 (50% x 3)	4,00,000	2 (4 x 50%)
(A) Total	**30,00,000**	**30**	**50,00,000**	**25.00**
Note No. 2				
Fixed :-				
(1) Factory Overhead	4,50,000	4.50 (9 x 50%)	6,00,000	3.00 (6 x 50%)
(2) Admin Overhead	3,30,000	3.3 (33 x 10%)	5,20,000	2.6 (10% 26)
(3) Selling Overhead	1,50,000	1.50 (3 x 50%)	4,00,000	2 (4 x 50%)
	9,30,000	9.30	15,20,000	7.60
(B) (V + F) =Total Cost	**39,30,000**		**65,20,000**	

Note No. 3 Computation of Capital Employed

	₹
Fixed Capital	5,00,000
Working Capital	
1/2 x [39,20,000 + 65,20,000]	52,25,000
	102,25,000
Note No. 4	
Expected – Return $\left(102{,}25{,}000 \times \frac{20}{100}\right)$	**20,45,000**

Note No. 5

Sales 12,495,000

Variable Cost = **80,00,000** (30,00,000 + 50,00,000) (Note No. 1)

Contribution 44,95,000

Fixed Cost 24,50,000 (Note No. 2)

Profit = **20,45,000** (Note No. 4)

Note No. 6

Products	Units		Hrs. Per Unit		Total Hrs.
A	1,00,000	x	(9 ÷ 3)	=	3,00,000
B	2,00,000	x	(6 ÷ 3)	=	4,00,000
					7,00,000

Contribution

44,95,000 : 3,00,000 : 4,00,000

19,26,429 : 25,68,571

Ans No. (a) Statement Showing Fixation of the OF Products A & B

Products	A	B	Total
Sales (Units)	**1,00,000**	**2,00,000**	
	₹	₹	₹
Contribution (Note No. 5)	19,26,429	25,68,571	44,95,000
Variable Cost (Note No. 1)	30,00,000	50,00,000	80,00,000
Sales Values	49,26,429	75,68,571	
÷ Units	÷ 1,00,000	÷ 2,00,000	
Selling Price (P.U)	= 49.26	= 37.84	
Labour hrs.	÷ 3,00,000	÷ 4,00,000	
Contribution per hr.	= 6.42	= 6.42	

Statement Showing Overall –Profit

Products	A	B	Total
Contribution (Note No. 5)	19,26,429	25,68,571	44,95,000
Fixed Cost (Note No. 2)	(9,30,000)	(15,20,000)	(24,50,000)
	9,96,429	10,48,571	2,045,000
Int -On Loan Term - Loan (40,00,000 x 14%)			(5,60,000)
Int-On -Working CAP (52,25,000 x 50% x 18%)			(4,70,250)
		Profit	**10,14,750**

Case Study - 11

Sunny Ltd. has developed a new product which is about to be launched into the market. The variable cost of selling the product is ₹ 17 per unit. The marketing department has estimated that at a sale price of ₹ 25, annual demand would be 10,000 units. However, if the sale price is set above ₹ 25, sales demand would fall by 500 units for each ₹ 0.50 increase above₹ 25. Similarly, if the price is below ₹ 25, demand would increase by 500 units for each ₹ 0.50 stepped reductions in price below ₹ 25.

Required:

Determine the price which would maximize Sunny Ltd.'s profit in the next year.

Statement Showing Analysis Of Best S.P.(₹)

S.P (P.U)	VCOST (P.U)	CONT (P.U)	SALES X VOLUME	TOTAL CONTRIBUTION
25.00	17.00	8.00	10,000	80,000
24.50	17.00	7.50	10,500	78,750
24.00	17.00	7.00	11,000	77,000
25.50	17.00	8.50	9,500	80,750
26.00	17.00	9.00	9,000	**81,000**
27.00	17.00	10.00	8,000	80,000
27.50	17.00	10.50	7,500	78,750

From the above statement clearly shows that the contribution would clearly shows that the contribution would be maximum @ s.p 26.00 (p.u) and sales demand 9,000 units.

Case Study – 12

Genie Carpets Associates have just developed a new carpet design with the brand name 'Arabian Nights'. Sales demand is very difficult to predict but it very must depends upon the selling price. At a price of ₹ 30 per square metre it is estimated that the annual sales demand would be between 50,000 and 90,000 sq. Metres per annum. At a price of ₹ 40 per sq. metre, sales demand would be between 34,000 and 44,000

sq. metres per annum. As regards cost, at production volumes of 45,000 sq. metres or less per annum. As regards cost, at production volumes of 45,000 sq. metres or less per annum, attributable fixed costs would be ₹ 2,12,000 per annum and variable costs would be ₹ 32 per sq. metre. At higher production volumes, attributable fixed costs would increase to ₹ 3,08,000 but variable costs per sq. metre be only ₹ 24.

'Arabian Nights' has been developed at a cost of ₹ 80,000.

When the product is marketed, an amount of ₹ 70,000 per annum will be charged to the operation towards Head Office Expenses.

The production of the new carpet will have to be supervised by a foreman. In order to find time for supervision he has to give up work in another department, for which he is paid a salary of ₹ 1,000 per month.

The production of 'Arabian Nights' would be undertaken, of course, in a division of the factory which is at present rented out to M/s S& R Ltd., Umbrella –makers for an amount of ₹ 10,000 per quarter.

Required:

Calculate the margin of safety, as a percentage of expected sales volume at both the maximum and minimum sales volume for the two price levels and decide on the selling price per sq. metre.

IF Sales	**50,000 to 90,000**	**34,000 to 44,000**
Selling Price	30.00	40.00
Variable Price	(24.00)	(32.00)
	6.00	8.00
B.E.P =	$\left(\frac{3,60,000}{6}\right)$ = 60,000 sq. metres	$\left(\frac{2,64,000}{8}\right)$ = 33,000 sq. metres
Fixed Cost :-		
Attributable	308,000	212,000
Rent - Foregone		
(Opportunity cost)	40,000	40,000
(10,000 x 4)	12,000	12,000
Foreman Sales		
(1,000 x 12)	**3,60,000**	**2,64,000**

Statement Showing Margin of Safety

At- A- Price	**30**		**40**	
	Minimum	**Maximum**	**Minimum**	**Maximum**
	50,000	90,000	34,000	44,000
x Cont - P.U	x 6	x 6	x 6	x 8
Total Contribution	= 3,00,000	= 5,40,000	= 2,72,000	= 3,52,000
Fixed Cost	(3,60,000)	(3,60,000)	(2,64,000)	(2,64,000)
Profit/Loss	**(60,000)**	**90,000**	**8,000**	**88,000**

Selling Price

At a price of ₹40 per sq. metre, there is possibility of earnings profit at both the minimum and maximum level of sales. Hence, this price should be adopted. However at the maximum and intermediate volumes (beyond 74,667 sq. mts.) profits will be higher at ₹30 per sq. mt. therefore, the price of ₹30 per sq. mt. should be preferred, assuming that at this price sales would be above 74,667 sq. mts.When the profit at ₹30 will be equal to the profit from maximum sales volume at ₹40 per sq. mt.

Case Study – 13

6,000 pen drives of 2 GB to be sold in a perfectly competitive market to earn ₹1,06,000 profit, whereas in a monopoly market only 1,200 units are required to be sold to earn the same profit. The fixed costs for the period are ₹ 74,000.The contribution per unit in the monopoly market is as high as three fourths its variable cost. Determine the targets selling price per unit under each market condition.

Solution – 146 (n)

PERFECT COMPETITION

UNITS = 6,000

S.P (TARGET) = 230

V.P
200

Contribution $\left(\frac{1,80,000}{6,000}\right) = 30$
1,80,000

Fixed cost
74,000

Profit
1,06,000

MONOPOLY-1,200 UNITS

Selling Price = 350 (P.U)

V.cost

$\left(\frac{150 \text{ x } 4}{3}\right) = 200$

(3/4) Contribution $\left(\frac{1,80,000}{1,200}\right) = 150$

1,80,000

Fixed cost
74,000

Profit
1,06,000

Case Study – 14

An organization manufactures a product, particulars of which are detailed below:

Annual Production (Units)	20,000
Cost per annum (₹)	
Material	50,000
Other variable cost	60,000
Fixed cost	40,000
Apportioned Investment (₹)	1,50,000

Required:

Determine the unit selling price under two strategies mentioned below. Assume that the organization's Tax rate is 40 % -

a. 20 % return on investment.
b. 6 % profit on list sales, when the trade discount is 40 %.

Solution

ANS NO. (a) STATEMENT SHOWING SELLING PRICE P.U.

20,000 UNITS SALES

Cost of sales	₹	Profit $\left(1{,}50{,}000 \times \frac{20}{100} \times \frac{100}{60}\right)$
Material	50,000	= 50,000
Other variable cost	60,000	
Fixed cost	40,000	
	1,50,000	

$$\left(\frac{1{,}50{,}000 + 50{,}000}{20{,}000}\right) = 10.00 \text{ (P. U)}$$

Ans No. (b)

SELLING PRICE (P.U) = 100

Discount	Profit	Cost
40 % x 100	$\left(\frac{6}{100} \times \frac{100}{6} \times 100\right)$	(100 - 40 - 10)
= 40	= 10	= 50

$$\left(\frac{1{,}50{,}000}{50}\right) \times 100 = \left(\frac{3{,}00{,}000}{20{,}000}\right) \text{units} = \mathbf{\underline{15.00}}$$

STATEMENT SHOWING VERIFICATION

Selling Price (P.U)	15.00
Discount (40 %)	(6.00)
Net s.p	**9.00**
Cost	(7.50)
(1,50,000 ÷ 20,000)	
Box	**1.50**
Tax 40 %	(.60)
Pay tax	.90
R.o.i	$\left(\frac{.90}{15} \times 100\right) - 6\%$

Case Study – 15

LMV Limited manufactures product Z in departments A and B which also manufacture other products using same plant and machinery. The information of product Z is as follows:

Items	Department A (₹)	Department B (₹)
Direct Material per unit	30	25
Direct Labour per unit (₹ 10 per hour)	30	40
Overhead Rates:		
Fixed	8 per hour	4 per hour
Variable	6 per hour	3 per hour
Value of Plant and Machinery	25 lakhs	15 lakhs

Overheads are recovered on the basis of direct labour hours. Variable selling and distribution overheads relating to product Z are amounting to₹30,000 per month. The product requires a working capital of ₹4,00,000 at the target volume of 1,500 units per month occupying 30 per cent of practical capacity.

Required:

1. To calculate the price of product Z to yield a contribution to cover 21 percent rate of return on investment.
2. Set the minimum selling price of the product if (1) the product is well established in the market; (2) the product is first time launched in the market.

Statement Showing Computation of Variable Cost

		P.U
Direct - Material	₹	
A	30	
B	25	55
Direct Labour		
A (3 hrs. x 10)	= 30	
B (4 hrs. x 10)	= 40	70
Variable Overheads		
A (30 ÷ 10) x 6	= 18	
B (40 ÷ 10) x 3	= 12	30
Variable Selling Overhead (30,000 ÷ 1,500)		20
	Total Variable Cost	**175**

Statement Showing Total Hrs. Required For a Target of 1,500 Units of Product 'Z'

Department	Units		P.U/Hrs.		Total
A	1,500	x	3 hrs.	=	4,500
B	1,500	x	4 hrs.	=	6,000
			30 % Capacity		**10,500**

$$\text{Monthly Full} - \text{Capacity } \left(\frac{10,5000}{30} \text{ x } 100\right) = 35,000 \text{ hrs.}$$

$$\text{Yearly} - \text{Capacity } (35,000 \text{ x } 12) = 4,20,000 \text{ hrs.}$$

Fixed Capital Employed in Both Depts

(25,00,000 + 15,00,000) = 40,00,000

₹

Expected Return = 8,40,000
(40,00,000 x 21%)

Contribution Per Hrs. ₹
(8,40,000 ÷ 4,20,000 hrs.) = 2.00

Contribution per unit Dept	Hrs. P.U	P.U Total
A	3 hrs. x 2.00 =	6.00
B	4 hrs. x 2.00 =	8.00
		14.00

Return on Working Capital (4,00,000 x 21%)

= 84,000 ÷ 18,000 units = 4.67 **P.U**

Selling Price (P.U) 193.67

Variable Cost P.U	Contribution
175 (P.U)	(14 + 4.67) = 18.67

Fixed Charges Recovery is based on usage. Full Capacity is not being used by Product Z and Departments are also producing other Products using same Plant and Machinery.

Price of Product is ₹ 193.67 per unit [Variable Cost (₹ 175) + Contribution Required (₹ 18.67)].

Price of Product when product is well established in market:

Variable Cost	₹ 175
Fixed Cost (₹ 24 + ₹ 16)	₹ 40
Total price	**₹ 215**

The Product is first time launched in the market, and then Variable Cost ₹ 175 should form the basis for Price Fixation.

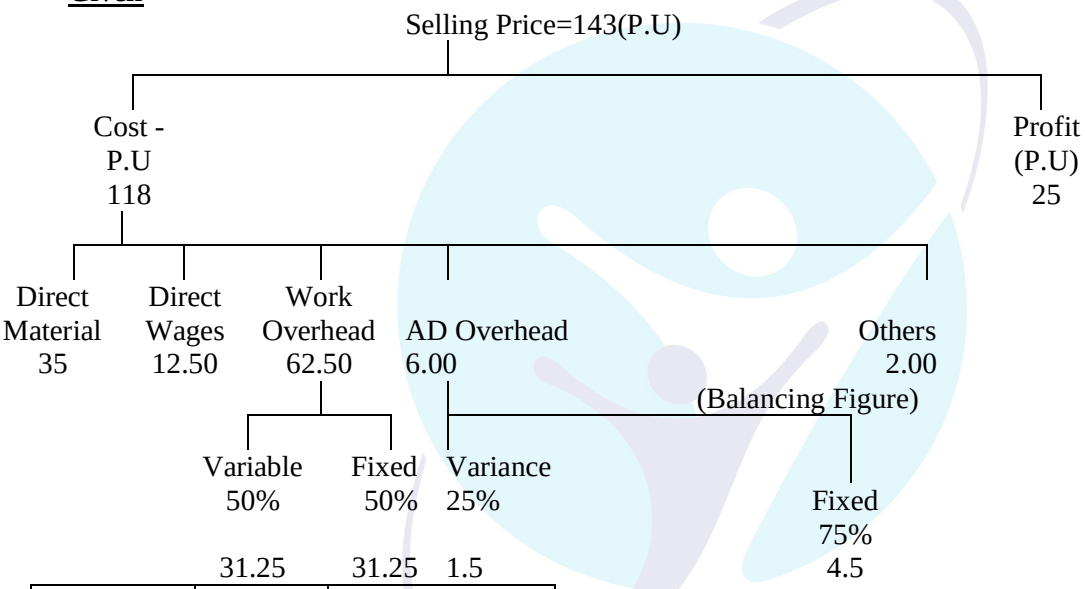
Case Study – 16

A shoe manufacturer has a net profit of ₹ 25 per pair on a selling price of ₹ 143. He is producing 6,000 pairs per annum which is 60% of the potential capacity. The cost per pair is as per under:

	₹
Direct Materials	35.00
Direct Wages	12.50
Works Overheads (50% fixed)	62.50
Administrative Overheads (75% fixed)	6.00

During the current year the manufacturer also estimates demand of 6,000 pairs but anticipates that the fixed charges to go up by 10% while the rate of direct labour and direct materials will increase by 8% and 6% respectively. But he has no option of increasing the selling price. Under this situation he obtains an offer to utilize further 20% of capacity. What minimum price will you recommend to ensure an overall profit of ₹ 1,67,300?

Given



Total Fixed Cost	Present ₹	Revised
Works Overheads (6,000 x 31.25) =	1,87,500	= 206,250 (1,87,500 x 110%)
Admin - Overheads (6,000 x 4.50) =	27,000	= 29,700 (27,000 x 110 %)
Other - Overheads (6,000 x 2) =	12,000	= 13,200 (12,000 x 110%)
	2,26,500	**2,49,150**

Revised Variable Cost

	P.U
Direct Material	(35 x 106%) = 37.10
Direct Wages	(12.5 x 108 %) = 13.50
Works Overheads	(31.25 x 100 %) = 31.25
Admin Overheads	(1.5 x 100%) = 1.50
	83.35

Revised

Sales Price (P.U) = 143.00

Variable Price (P.U)	Contribution
83.35	59.65

	₹
Total Contribution	
(59.65 x 6,000) =	3,57,900
Fixed Cost=	(2,49,150)
	108,750

Balance Profit Required = (1,67,300 - 108,750) = 58,550

Units ÷ 2,000

$\left(\frac{60{,}000}{60\ \%}\ \text{x}\ 20\%\right)$

Contribution - P.U	=	29.275
Variable Cost P.U	=	83.35
Minimum Selling Price		**112.625**

A new machine will be built with the available facilities with a cost of ₹ 1,10,000 (material ₹ 90,000 and labour₹ 20,000). The materials are readily available in stores which are regularly used. However, these are to be replenished immediately. The prices of these materials have since been increased by 50%. Scrap value of the machine at the end of the 10th year is estimated at ₹ 20,000. The product scraps generated can be disposed of at the end of year 10 for a price of ₹ 1,43,000.

Year 1 - 5		Years 6 - 10	
Demand (Unit)	**Probability**	**Demand (Unit)**	**Probability**
40,000	0.15	24,000	0.30
20,000	0.60	16,000	0.50
12,000	0.25	4,000	0.20

It is estimated that the commercial life of the machine will be no longer than 10 years and the after tax cost of capital is 10%. The full cost of the machine will be depreciated on straight line basis, which is allowed for computing the taxable income, over a period of 10 years. Tax rate is 30%.

DCF factors at 10%	
1 - 5 years (cumulative)	3.79
6 - 10 years (cumulative)	2.355
10^{th} year	0.386

Required:

Compute minimum selling price for the handy sewing machine.

Note No.1

Statement Showing Expected Sales

Year 1 to 5 Demand		**Probility**		**Exp - Demand**
40,000	x	0.15	=	6,000
20,000	x	0.6	=	12,000
12,000	x	0.25	=	3,000
			=	**21,000**

Year 6 to 10 Demand		**Probility**		**Exp - Demand**
24,000	x	0.3	=	7,200
16,000	x	0.5	=	8,000
4,000	x	0.2	=	800
			=	**16,000**

Note No. 2 Capital Cost

	₹
Material (90,000 x 1.5) =	1,35,000
Labour (Replacement Cost) =	20,000
Overheads (Not- Relevant)	–
	1,55,000

Note No. 3 Production Variable Cost

Material	45.00
Labour	75.00
Overheads (Not - Relevant)	–
	120

Cash In Flow In the Terminal Year -10

	₹
Sales Value of Machine	20,000
Scrap Realization	1,43,000
Total	1,63,000
Tax 30 %	(48,900)
	1,14,100

Statement Showing Cash In Flow

	Year 1 -5	Year 6 - 10
Sales Units	21,000	16,000
x Sales Price	*x*	*x*
Sales Value	= 21,000 *x*	= 16,000 *x*
Relevant - Cost		
Material and	= (25,20,000)	= (19,20,000)
Labour Cost	(21,000 x 120)	(16,000 x 120)
Incremental Fixed Cost	(1,95,000)	(1,95,000)
(1,25,000 + 70,000)		
Depreciation		
Material = 1,35,000	(15,500)	(15,500)
(90,000 x 150%)		
Labour = 20,000 / 1,55,000		
(1,55,00 ÷ 10)		
	21,000 *x* - 27,30,500	(16,000 *x* - 21,30,500)
Tax 30%	(6,300 *x* - 8,19,150)	(4,800 *x* - 6,39,150)
	14,700 *x* - 19,11,350	11,200 *x* - 14,91,350
Dep	15,500	15,500
	14,700 *x* - 18,95,850	11,200 *x* - 14,75,850

Statement Showing Present Value

Year	**₹**
0 Capital Exp (1,55,000) x 1 =	(1,55,000)
Cash Flow	
From Operation	
1 - 5 (14,700 x - 18,95,850) x 3.79 =	55,713 x - 71,85,272
6 - 10 (11,200 x - 14,75,850) x 2.355 =	36,376 x - 34,75,626
10 114,100 x 0.386 =	44,042
=	82,089 x
	–107,71,856
$\left(\frac{107,71,856}{82,089} = 131.22\right)$	

Note

a) R & D expenses of ₹ 95,000 is notrelevant.
b) Fee for consultant's report of ₹ 22,500 is not relevant.
c) Tax element on irrelevant costs not considered, since the benefit will arise even without this product.

Case Study – 18

The Budgeted cost data of a product manufactured by Ayudhya Ltd. is furnished as below:

Budgeted units to be produced	……..	2,00,000
Variable cost (₹)	…….	32 per unit
Fixed cost (₹)	……	16 lacs

It is proposed to adopt cost plus pricing approach with a mark – up of 25 % on full budgeted cost basis. However, research by the marketing department indicates that demand of the product in the market in price sensitive. The likely market responses are as follows:

Selling price (₹ per unit)	44	48	50	56	60
Annual Demand (units)	1,68,000	1,52,000	1,40,000	1,28,000	1,08,000

Required:

ANALYSE the above situation and DETERMINE the best course of action.

NOTE NO. (1)(GIVEN)

Exp - production qty	=	2,00,000 units
		₹
Variable cost (2,00,000 x 32)	=	64,00,000
Fixed cost		16,00,000
Budget cost		80,00,000
Budget profit $\left(80,00,000 \times \frac{25}{100}\right)$		20,00,000
Budget sales		100,00,000
	÷	2,00,000 UNITS
Bud s.p (p.u)	=	50.00

Determination of the Best Course of Action

i. Taking the above calculation and analysis into account, the company should produce and sell 1,28,000 units at ₹ 56. At this price company will not only be able to achieve its desired markup of 25 % on the total cost but can earn maximum contribution as compared to other even higher selling price.

ii. If the company wants to uphold its proposed pricing approach with the budgeted quantity, it should try to reduce its variable cost per unit for example by asking its supplier to provide a quantity discount on the materials purchased.

STATEMENT SHOWING PROFIT AT DIFFERENT DEMAND & PRICE LEVEL

	QUANTITY (UNITS)	**1,68,000**	**1,52,000**	**1,40,000**	**1,28,000**	**(BUDGETED) 1,00,000**
(A)	**S.P** Sales	**x 44** 73,92,000	**x 48** 72,96,000	**x 50** 70,00,000	**x 56** 71,68,000	**x 60** 64,80,000
(B)	Variable cost	(53,76,000) (1,68,000 x 32)	(48,64,000) (1,52,000 x 32)	(44,80,000) (1,40,000 x 32)	(40,96,000) (1,28,000 x 32)	(34,56,000) (1,08,000 x 32)
(A - B) = C	Contribution	20,16,000	24,32,000	25,20,000	30,72,000	30,24,000
(D)	Fixed cost	(16,00,000)	(16,00,000)	(16,00,000)	(16,00,000)	(16,00,000)
C - D	Profit	4,16,000	8,32,000	9,20,000	14,72,000	14,24,000

$$(\%)\ \text{PROFIT ON COST} = \left(\frac{\text{PROFIT}}{\text{TOTAL COST}} \text{x } 100\right)$$

1,68,000 UNITS	$\left(\frac{4,16,000}{53,76,000+16,00,000}\right)$ x 100	=	5.96
1,52,000 UNITS	$\left(\frac{8,32,000}{48,64,000+16,00,000}\right)$ x 100	=	12.87
1,40,000 UNITS	$\left(\frac{9,20,000}{44,80,000+16,00,000}\right)$ x 100	=	15.13%
1,28,000 UNITS	$\left(\frac{14,72,000}{40,96,000+16,00,000}\right)$ x 100	=	25.84%
1,08,000	$\left(\frac{4,16,000}{34,56,000+16,00,000}\right)$ x 100	=	28.16%

Case Study – 19

Illustration

Generation 2050 Technologies Ltd. develops cutting – edge innovations that are powering the next revolution in mobility and has nine tablet smart phone models currently in the market whose previous year financial data is given below:

Model	Status (₹ 000)	Profit - Volume (PV) Ratio
Tab - A001	5,100	3.53%
Tab - B002	3,000	23.00%
Tab - C003	2,100	14.29%
Tab - D004	1,800	14.17%
Tab - E005	1,050	41.43%
Tab - F006	750	26.00%
Tab - G007	450	26.67%
Tab - H008	225	6.67%
Tab - I009	75	60.00%

Required:

i. Using the financial data, carry out a Pareto ANALYSIS (80 / 20 rule) of Sales and Contribution.
ii. DISCUSS your findings with appropriate RECOMMENDATIONS.

STATEMENT SHOWING PARETO ANALYSIS ANALYSIS OF SALES

MODEL (TAB)	SALES ('000)	$\% \left(\frac{\text{SALES}}{\text{TOTAL SALES}}\right) \text{x } 100$	CUMULATIVE TOTAL
A - 001	5,100	= 35.05% $\left(\frac{5,100}{14,550} \text{x} 100\right)$	35.05%
B-002	3,000	= 20.62% $\left(\frac{3,000}{14,550} \text{x} 100\right)$	55.67%
C-003	2,100	= 14.43% $\left(\frac{2,100}{14,550} \text{x} 100\right)$	70.10%
D-004	1,800	= 12.37% $\left(\frac{1,800}{14,550} \text{x} 100\right)$	82.47%
E-005	1,050	= 7.22% $\left(\frac{1,050}{14,550} \text{x} 100\right)$	89.69%
F-006	750	= 5.15% $\left(\frac{750}{14,550} \text{x} 100\right)$	94.84%
G-007	450	= 3.09% $\left(\frac{450}{14,550} \text{x} 100\right)$	97.93%
H-008	225	= 1.55% $\left(\frac{225}{14,550} \text{x} 100\right)$	99.48%
I-009	75	= 0.52% $\left(\frac{75}{14,550} \text{x} 100\right)$	100%
	14,550	**100%**	

STATEMENT SHOWING ANALYSIS OF CONTRIBUTION

MODEL (TAB)	(CONTRIBUTION = SALES x P.V. Ratio)		ROUNDING - OFF '000	RANK
A - 001	(5,100 x 3.53 %)	=	180	6 th
B - 002	(3,000 x 23 %)	=	690	1 st
C-003	(2,100 x 14.29 %)	=	300	3 rd
D-004	(1,800 x 14.17 %)	=	255	4 th
E-005	(1,050 x 41.43 %)	=	435	2 nd
F-006	(750 x 26.00 %)	=	195	5 th
G-007	(450 x 26.67 %)	=	120	7 th
H-008	(225 x 6.67 %)	=	15	9 th
I-009	(75 x 60 %)	=	45	8 th
			2,235	

STATEMENT SHOWING CONTRIBUTION OF ANALYSIS

(PARETO)

MODEL	MODEL	CONTRIBUTION	$\left(\frac{\text{CONTRIBUTION}}{\text{TOTAL}}\right) \times 100$	CUMULATIVE
		'000	(%)	
(1)	B - 002	690	$\left(\frac{690}{2,235} \times 100\right) = 30.87\ \%$	30.87%
(2)	E - 005	435	$\left(\frac{435}{2,235} \times 100\right) = 19.47\ \%$	50.44%
(3)	C-003	300	$\left(\frac{300}{2,235} \times 100\right) = 13.42\ \%$	63.76%
(4)	D-004	255	$\left(\frac{255}{2,235} \times 100\right) 11.41\ \%$	75.17%
(5)	F-006	195	$\left(\frac{195}{2,235} \times 100\right) = 8.73\ \%$	83.90%
(6)	A-001	180	$\left(\frac{180}{2,235} \times 100\right) = 8.05\ \%$	91.95%
(7)	G-007	120	$\left(\frac{120}{2,235} \times 100\right) = 5.36\ \%$	97.32%
(8)	I-009	45	$\left(\frac{45}{2,235} \times 100\right) = 2.01\ \%$	99.33%
(9)	H-008	15	$\left(\frac{15}{2,235} \times 100\right) = 67\ \%$	100%
		2,235		

CHAPTER -8

PERFORMANCE MEASUREMENT & EVALUATION

& BALANCE SCORE CARD

Case Study -1

Action Plan Manufactures normally produce 8,000 units of their product in a month, in their Machine Shop. For the month of January, they had planned for a production of 10,000 units. Owning to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January.

Indirect manufacturing costs are carefully planned and monitored in the Machine Shop and the Foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision.

The Foreman has put in calm that he should be paid a bonus of ₹ 88.50 for the month of January. The Works Manager wonders how anyone can calm a bonus when the Company has lost a sizeable contract. The relevant figures are as under:

Indirect manufacturing costs	Expenses for a normal month ₹	Planned for January ₹	Actual in January ₹
Salary of foreman	1,000	1,000	1,000
Indirect Labour	720	900	600
Indirect material	800	1,000	700
Repairs and Maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	100	100	100
5.290	**5.875**	**4,990**	

Do you agree with the Works Manager? Is the Foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures.

Application of Performance Analysis in Flexible Budget

Note (i)	**Note (ii)**
Repair and Maintenance	Power
Variable cost p.u = x Fixed Cost = y	Variable Cost p.u = x Fixed Cost = y
8,000 x + y = 600	8,000 x + y = 800
10,000 x + y = 650	10,000 x + y = 875
2,000 x = 500	2,000 x = 75
x = 0.025	x = 0.0375
8,000 (0.025) + y = 600	8,000 (0.0375) + y = 800
y = 400	y = 500
6,000 (0.025) + 400	6,000 (0.0375) + 500
= 550	= 725

Statement Showing Performance Analysis

(Flexible Budget)				(₹)
Particulars	**Nature of Expenses**	**Budget Cost for 6,000**	**Actual Cost for 6,000**	**Variation**
(1) Salary of foreman	Fixed	1,000	1,000	0
(2) Indirect Labour	Variable	540	500	(60)
		↑	$\left(\frac{720}{8,000} \text{x } 6,000\right)$	
(3) Indirect Material	Variable	600	700	(100)
		$\left(\frac{800}{8,000} \text{x } 6,000\right)$		
(4) Repairs & Maintenance	Semi Variable	550	600	(50)
	(Note i)			
(5) Power	Semi Variable	725	740	(15)
	(Note ii)			
(6) Tools consumed	Variable	240	300	(60)
		$\left(\frac{320}{8,000} \text{x } 6,000\right)$		
(7) Rates & Taxes	Fixed	150	150	0
(8) Depreciation	Fixed	800	600	0
(9) Insurance	Fixed	100	100	0
		4,705	4,990	(285)

The above performance analysis clearly shows that the company is making a loss of ₹ 285 so workers are not entitled to get any bonus yes we agree with works manager.

Balance Score Card

Case Study -2

Star Telecom Ltd. is a leading cellular service provider having a global presence. It aims to be most innovative and trusted Telecom Company in the world. To achieve this aim, it is constantly working on its overall functioning. It is trying to adopt best managements practices in the world. Following are some information related to the company's performance for a particular period:

Particulars	Current Year	Base Year	
Operating Ratio	60%	54%	Reduce it to 50 %
Average Revenue per user	₹ 225	₹ 210	Increase it to ₹ 250
Unresolved Consumer Complaints	27,500	25,000	Reduce it by 20%
Customer Relationship Centres	280	200	Take the total to 250
Employee Coverage under Training Programme	10%	8%	At least 15 %

Evaluate the performance of the company using Balance Scorecard approach.

The Balance scorecard is a method which displays organization's performance into four dimensions namely financial, customer, internal and innovation. The four dimensions acknowledge the interest of

shareholders, customers and employees taking into account of both long –term goals. The detailed analysis of performance of the company using Balance Scorecard approach as follows.

(i) **Financial Perspective:** Operating ratio and average revenue will be covered in this prospective.

Company is unable to achieve its target of reducing operating ratio to 50% instead it has increased to 60%. Company is required to take appropriate steps to control and manage its operating expenses. Average revenue per user has increased from ₹ 210 to ₹ 225 but remains short of targeted ₹ 250. This is also one of the reasons of swelled operating ratio. Company can boost up its average revenue per user either by increasing the price of its services or by provision more paid value added services.

(ii) **Customer Perspective:** Service complaints will be covered under this perspective. The company had set a target of reducing unresolved complaints by 20% instead unresolved complaints by 20% instead unresolved complaints have risen by 10% [(27,500-25,000)/(25,000) x 100]. It shows dissatisfaction is increasing among the consumers which would adversely impact the consumer's general perception about the company and company may lose its consumers in long run.

(iii) **Internal Business Perspective:** Establishing customer relationship centres will be covered under this perspective. Company has established 80 relationship centres in the current period exceeding its target of 50 (250 – 200) to cater to the needs of existing consumers as well as soliciting new consumers. This shows the seriousness of the company towards the consumer satisfaction and would help them in the long run.

(iv) **Learning and Growth Perspective :** Employee training programmes are covered under this perspective.

Company had set a target to cover at least 15% employee under its training programmes but covered only 10%. This could hurt capabilities of the employees which are needed for long term growth of the organization necessary to achieve the objectives the set in the previous three perspectives. People or the Indraprastha resource of the company is one of the three principle sources where organizational learning and growth comes.

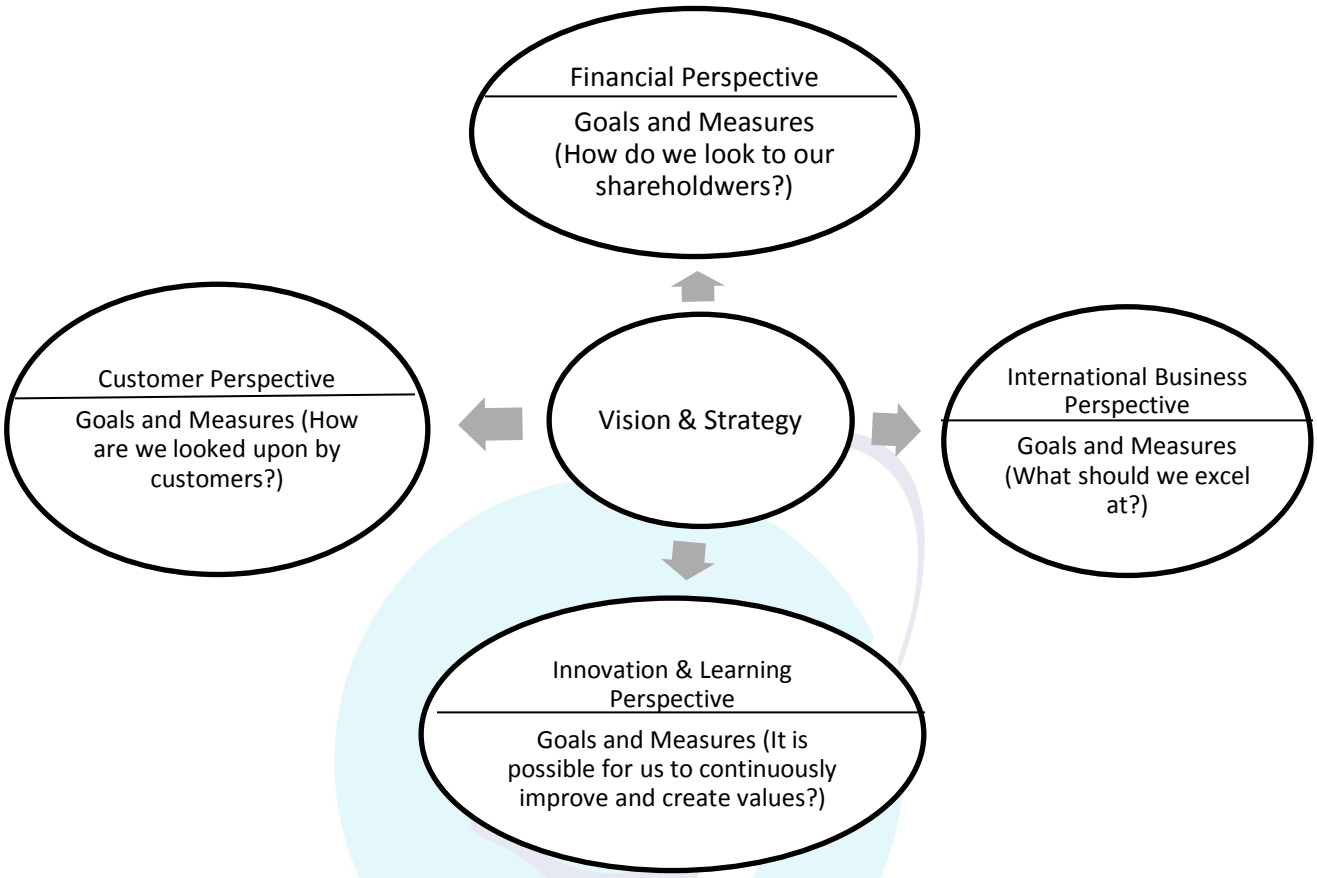
Balance Scorecard

The Balanced Scorecard can be defined as 'an approach to the provision of information to management to assist strategic policy formulation and achievement. It emphasizes the need to provide the user with a set of information, which addresses all relevant areas of performance in an objective and unbiased fashion. The information provided may include both financial and non –financial elements, and cover areas such as profitability, customer satisfaction, internal efficiency and innovation.'

It is clear from the above definition that the central idea of the Balance Scorecard is that managers should develop the measures on which they manage the business from four different perspectives:

i) Customer Perspective i.e. customer satisfaction.
ii) Internal Business Perspective
iii) Learning and growth perspective
iv) Financial Perspective e.g., operating income by segments.

The following figure summarizes the ideas of a Balanced Scorecards:



Balanced Scorecard

In today's business environment information becomes a vital element and to gain competitive advantage over the peers, it cannot be denied. In this era of information age competition, a company cannot survive just by injecting huge capital investment in new technology for physical assets only or by excellent management of financial assets and liabilities. In this information age both manufacturing and service organization needs new capabilities for competitive success. Merely, investing in and managing physical, tangible assets is not enough but an organization must be able to mobilize and exploit its intangible or invisible assets which in turn becomes a decisive factor.

Intangible assets enable an organization to:

- Maintain and further development in customer relationships to retain loyalty of existing customers and to serve new market/ customer segments effectively and efficiently.
- Introduce products and services as per the desire of targeted customer and market segments.
- Produce customized high –quality products and services economically with short gestation periods.
- Mobilise employee skills and motivation for better and consistent deliberation in process capabilities, quality and response times.
- Deploy information technology, data bases and effective management information systems.

The balanced scorecard is a method which displays organization's performance into four dimensions namely financial, customer, internal and innovation. The four dimensions acknowledge the interest of shareholders, customers and employees taking into account of both long –term and short –term goals.

Kaplan and Norton classified performance measures into four business 'perspectives':

i) The financial perspective
ii) The customer perspective
iii) The internal business perspective
iv) The learning and growth perspective

Financial Perspective : "How Do We Look to Shareholders?" In this step manager of a division or a unit, link its business objectives to the corporate strategy of the company as a whole. Financial performance measures indicate whether the company's strategy implementation and execution are contributing to its revenue and earnings. To identify key performance measures in this perspective, managers, during strategic planning ask "How do we look to shareholders?"

Corporate strategy and strategic initiatives are examined from the financial perspective to see feasibility of these initiatives of being met. The financial objectives chosen at the onset of the balanced scorecard implementation should serve two purposes:

- To provide definite performance that was expected at the time of strategies selection.
- To provide a focus for objectives and appropriate measures in each of the other three perspectives.

Customer Perspective: "How Do Customer views Us?" In this stage, companies identify customers and market segments in which they compete and also the means by which they provide value to these customers and markets. Managers identify the lead indicators which make a particular business unit or product different from that of others. Lead indicator may vary from customer to customer or market segment. If for example, a customer values on –time delivery then on –time delivery becomes a lead indicator. Examples of lead indicators may include any number of customer considerations, including:

- On –time delivery
- On –site service
- After sales support
- Defects per order
- Cost of the product
- Free shipments etc.

By delivering quality as per the customer demand and need, business units can improve outcome measures such as customer satisfaction, retention, acquisition and loyalty.

Internal Business Perspective: "At What Must We Excel?" In this stage companies identify processes and activities which are necessary to achieve the objectives as identified at financial perspectives and customer perspective stage. These objectives may be achieved by reassessing the value chain and making necessary changes to the existing operating activities. If maintaining net earnings is the financial objective of a company and after sales service can increase customer retention, then internal business perspective needs to improve after sales services to satisfy customer requirements to maintain net earnings. This

objective may be achieved by providing for example toll free customer help lines, setting up service centres in all major cities.

Learning and Growth Perspective: "How Do We Continue To Improve And Create Value?" In the learning and growth perspective, Companies determine the activities and infrastructure that the company must build to create long term growth, which are necessary to achieve the objectives set in the previous three perspectives. Organizational learning and growth comes from three principle sources:

- People i.e. employee capabilities.
- Systems i.e. information system capabilities and
- Organizational procedures i.e. motivation, empowerment and alignment.

Since, the balanced scorecard is intended to improve long –term performance, managers may invest in resources needed in the short –run but this should not affect business unit's performance.

The ultimate result of using the Balanced Scorecard approach should be an improved long term financial performance. Since the scorecard gives equal importance to the relevant non –financial measures, it should discourage the short termism that leads to cuts in spending on new product development, human resource development etc. which area ultimately detrimental for the future prospects of the company.

The responsibility to devise and implement a Balanced Scorecard should be that of the managers working with the business. Since every company is different, it shall need to work out for itself the various financial and non –financial measures, which need to be focused upon for its own development. Since the Balanced Scorecard is recommended as a management tool used both for internal and external reporting purposes, it is again the manager's responsibility to decide as to what information needs to be disclosed and how many problems of confidentiality can best be overcome.

The following are some reasons why Balanced Scorecards sometimes fail to provide for the desired results;

- Managers mistakenly think that since they already use non –financial measures, they already have a Balanced Scorecard.
- Senior executives misguidedly delegate the responsibility of the Scorecard implementation to middle level managers.
- Company's try to copy measures and strategies used by the best companies rather than developing their own measures suited for the environment under which they function.
- There are times when Balanced Scorecards are thought to be meant for reporting purposes only. This notion does not allow a Business to use the Scorecard to manage Business in a new and more effective way.

It may be noted that the above –mentioned difficulties refer to the internal use of the Scorecard, unless it is used internally successfully, it should not be used as a basis for external reporting.
The following figure summarizes the ideas of a Balanced Scorecard:

Application of Balanced Scorecard in Performance Analysis

Meaning of Balance Scorecard

It is a statement which is showing balance between non-financial objective and financial objective.

CHAPTER - 9
DIVSIONAL TRANSFER PRICING INTERNATIONAL TRANSFER PRICING

Case Study-1

A company is engaged in the manufacture of edible oil. It has three divisions as under:

i. Harvesting oil seeds and transportation thereof to the oil mill.
ii. Oil Mill, which processes oil seeds and manufactures edible oil.
iii. Marketing division, which packs the edible oil in 2kg. containers for sale at ₹ 150 each container.

The Oil Mill has a yield of 1,000 kgs of oil from 2,000 kg of oil seeds during a period. The Marketing Division has a yield of 500 cans of edible oil of 2kg each from every 1,000 of oil.

The net weight per can is 2 kgs of oil.**The cost data for each division for the period are as under:**

Harvesting Division	**₹**
Variable cost per kg of oil seed	2.50
Fixed cost per kg of oil seed	5.00
Oil Mill Division	**₹**
Variable cost of processed edible oil	10.00 per kg
Fixed cost of processed edible oil	7.50 per kg
Marketing Division	**₹**
Variable cost per can of 2kg of oil	3.75
Fixed cost per can of 2kg of oil	8.75

The fixed costs are calculated on the basis of the estimated quantity of 2,000 kg of oil seeds harvested, 1,000 kg of processed oil and 500 cans of edible oil packed by the aforesaid divisions respectively during the period under review.

The other mills buy the oil seeds of same quality at ₹12.50 per kg in the market. The market price of edible oil processed by the oil mill, if sold without being packed in the marketing division is ₹ 62.50 per kg of oil.

Required:

i. Compute the overall profit of the company of harvesting 2,000 kg of oil seeds, processing it into edible oil and selling the same in 2 kg cans as estimated for the period under review.
ii. Compute the transfer prices that will be used for internal transfers from (1) Harvesting Division to Oil Mill Division to Marketing Division under the following pricing methods :
    1) Shared contribution in relation to variable costs; and
    2) Market price.
iii. Which transfer pricing method will each divisional manager prefer to use?

Solution – (1)
Note No- (1) (Given)

	Harvesting	**Oil - Mill**	**Marketing**
	OUTPUT 2,000Kg	INPUT OUTPUT 2,000Kg 1,000Kg	INPUT CANS 1,000Kg 5,000Kg
Variable cost	= 5,000 (2,000 x 2.50)	= 10,000 (1,000 x 10)	= 1,875 (500 x 3.75)
Fixed cost	= 10,000 (2,000 x 5)	= 7,500 (1000 x 7.50)	= 4,375 (500 x 8.75)
	15,000	**17,500**	**6,250**
Market value	= 25,000 (2,000 x 12.50)	= 6,25,000 (1,000 x 62.50)	= 75,000 (500 x 750)

Ans No (1)

Statement Showing Overall Profit / Loss

Sales (500 x 150) =	75,000
Variable cost (5,000 + 1,000 + 1,875)	(16,875)
Fixed cost (1,000 + 7,500 + 4,375)	(21,875)
Profit / Loss =	**36,250**

Ans No. (ii)

Statement Showing Calculation Of Transfer Pricing

If – Transfer Pricing = **Shared Contribution In Relation To Variable Cost**

	₹
SALES	**75,000**
VARIABLE COST	**(16,875)**
CONTRIBUTION	58,125
VARIABLE COST	5,000 / 10,000 / 1,875
	17,222 / 34,445 / 6,458

Ans No. (1)

Statement Showing T.P = Variable Cost + Contribution

	Harvesting	Oil-Mill	Marketing
Variable Cost	5,000	10,000	1,875
Contribution	17,222	34,445	6,458
Transfer Pricing	**22,222**	**66,667**	**75,000**

Division Z is a profit center, which produces four products – A, B, C and D. each product is sold in the external market also. Data for the period is as follows:

	A	B	C	D
Market price per unit	₹ 150	₹ 146	₹ 140	₹ 130
Variable cost of production per unit	₹ 130	₹ 100	₹ 90	₹ 85
Labour hours required per unit	3	4	2	3

Product D can be transferred to division Y, but the maximum quantity that might be required for transfer is 2,500 units of D.

The maximum sales in the external market are:

A	2,800 units
B	2,500 units
C	2,300 units
D	1,600 units

Case Study-2

Division Y can purchase the same product at a slightly cheaper price of ₹125 per unit instead of receiving transfers of product D from Division Z.

What should be the transfer price for each unit for 2,500 units of D, if the total labour hours available in Division Z are:

(i) 20,000 hours (ii) 30,000 hours?

Step No. (1) Statement Showing Contribution Per Unit/Per Hr./ Rank

	A	B	C	D
Selling Price (P.U)	150	146	140	130
Variable Price (ii)	(130)	(100)	(90)	(85)
Contribution (ii)	20	46	50	45
Hrs. P.U	÷ 3	÷ 4	÷ 2	÷ 3
Contp.h	6.67	11.50	25	15.00
Rank	IV	III	I	II

Step No. (2) Statement Showing Production Plan For Max Profit Per Unit

Hrs	Hrs		Total		Balance
Available	Products	Units X	P.U =	Hrs	Hrs
20,000	C	2,300 × 2	=	4,600	(20,000 – 4,600)
	D	1,600 × 3	=	4,800	(15,400 – 4,800)
	B	2,500 ×4	=	10,000	(10,600 – 10,000)
	A	200× 3	=	600	(600 – 600)

Step No. (3) Statement Showing Transfer Price P.U 'D

Total hrs. required = 'd' (2,500 × 3)	7,500
Cut down 'a' (200 × 3)	(600)
	(6,900)
Cut down 'b' (1,725 × 4)	×××

		₹
Opp- cost 'a' (200 × 20)	=	4,000
'b' (1,725 × 46)	=	79,350
Man-v- cost 'd' (2,500 × 85)	=	21,2500
		2,95,850
	÷	2,500 units
Transfer Pricing (P.U)	=	118.34

Case Study-3

Maryanne Ltd. has two divisions Division A and Division B. Division A produces product Z, which it sells to external market and also to Division B. Division in the Maryanne Ltd. area treated as profit centres and divisions are given autonomy to set transfer prices and to choose their supplier. Performance of each division measured on the basis of target profit given for each period.

Division A can produce 1,00,000 units of product Z at full capacity. Demand for product Z in the external market is for 70,000 units only at selling price of ₹ 2,500 per unit. To produce product Z division A incurs ₹ 1,600 as variable cost per unit and total fixed overhead of ₹ 4,00,00,000. Division A has employed ₹ 12,00,00,000 as working capital, working capital is financed by cash credit facility provided by its lender bank @ 11.50% p.a. Division A has been given a profit target of ₹ 2,50,00,000 for the year.

Division B has found two other suppliers Ltd. and S Ltd. who area agreed to supply product Z.

Division B has requested a quotation for 40,000 units of product Z from Division A.

Required:

1) CALCULATE the transfer price per unit of product Z that Division A should be quote in order to meet target profit for the year.
2) CALCULATE the two prices Division A would have to quote to Division B, if it became Maryannne Ltd. policy to quote transfer prices based on opportunity costs.
3)

Statement Showing Transfer Price Per Unit Of 'C'

	₹
Target profit	2,50,00,000
Int on Working Capital (12,00,00,000 x 11.5 %)	1,38,00,000
Required point	3,88,00,000
Fixed cost	4,00,00,000
Target cont	7,88,00,000
Target Contribution	
7,88,00,000	

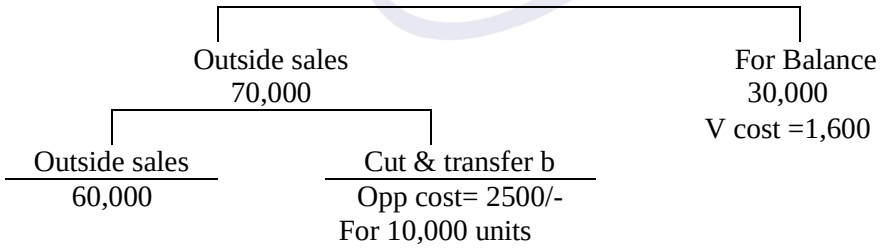
External	**Contribution Read internal Sales**
T.P / S.P = 2,500 Variable Price = $\frac{(1,600)}{900}$ × 60,000 units = **5,40,00,000**	2,48,00,000 ÷ 40,000 units = **620 per unit**

Ans No. (1) Product 'Z' B

Statement Showing Transfer Pricing = (Variable Cost + Contribution)

(1600 + 620) = **2,220**

Ans No. (2)



Case Study-4

A large business consultancy firm is organized into several divisions. One of the divisions is the Information Technology (IT) division which provides consultancy services to its clients as well as to the other divisions of the firm. The consultants in the It divisions always work in a team of three professional consultants on each day of consulting assignment. The external clients are charged a fee at the rate of ₹

4,500 for each consulting day. The fee represents the cost plus 150% profit markup. The break –up of cost involved in the consultancy fee is estimated at 80% as being variable and the balance is fixed.

The textiles division of the consultancy firm which has undertaken a big assignment requires the services of two terms of It consultants to work five days in a week for a period of 48 weeks. While the director of the textiles division intends to negotiate the transfer price for the consultancy work, the director of IT division proposes to change the textiles division at ₹ 4,500 per consulting day.

In respect of the consulting works of the textile division, IT division will be able to reduce the variable costs by ₹ 200 per consulting day. This is possible in all cases of internal consultations because of the use of specialized equipment.

Required:

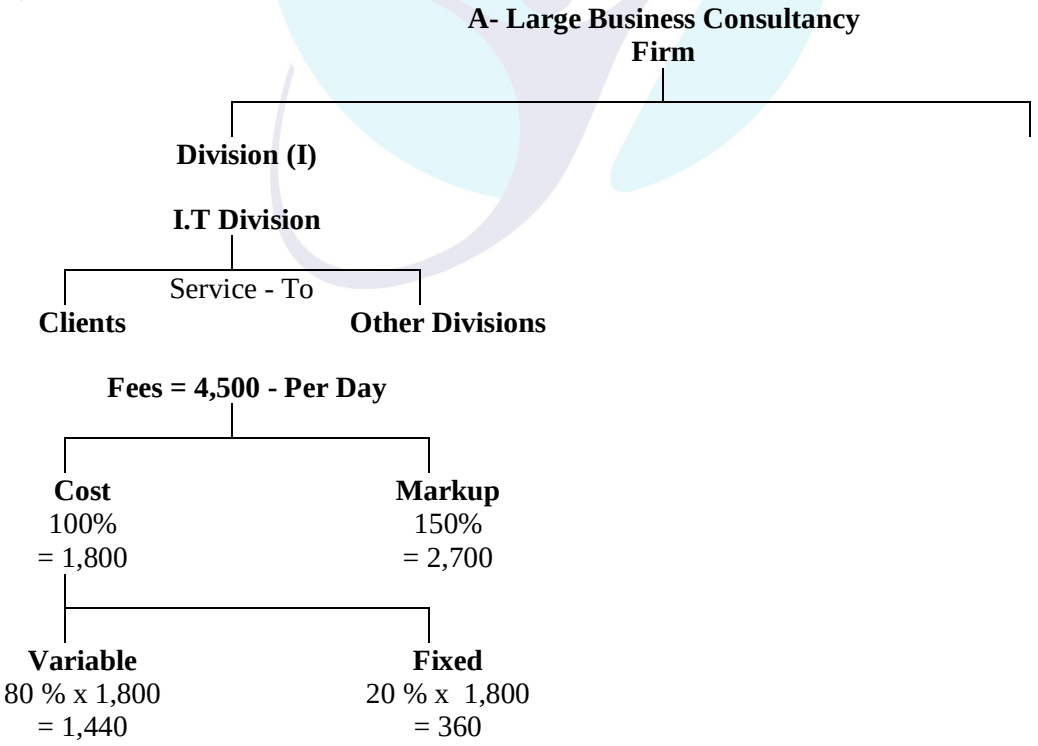
Explain the implications and set transfer prices per consulting day at which the IT division can provide consultancy services to the textiles division such that the profit of the business consultancy firm as a whole is maximized in each of the following scenarios:

Every team of the IT division is fully engaged during the 48 week period in providing consultancy services to external clients and that the IT division has no spare capacity of consultancy teams to take up the textiles division assignment.

IT division will be able to spare only one team of consultants to provide services to the textiles division during the 48 week period and all other teams are fully engaged in providing services to external clients.

A new external client has come forward to pay IT division a total fee of ₹ 15,84,000 for engaging the services of two teams of consultants during the aforesaid period of 48 weeks.

(Given)



If –Work –For –Division

Reduced By = 200 Per Consulting Day

Case (1)

Every Consultancy Team Fully Engaged

(There is no Idle –Time –OR –Spare Capacity)

Transfer Pricing	= 4,500	
Saving In Variable Cost	(200)	
	4,300	**(Transfer Pricing)**

Case (2)

One Team Is Idle

Variable Cost	1,240
Opp Cost	4,300
	5,540
	÷ 2
	2,770 Per Consulting Day

Case (3)

Revenue Per Day (15,84,000 ÷ 480)	3,300
Variable Cost	(1,440)
Contribution	**1,860**

(1,860 + 1,240) = 3,100 Per Consulting Day

Case Study-5

X Division and Y Division are two divisions in the XY group of companies. X Division manufactures one type of component which it sells to external customers and also to Y Division.

Details of X Division are as follows:

Market price per component	……	₹ 300
Variable Cost per component	……	₹ 157
Fixed Costs	……	₹ 20,62,000 per period
Demand from Y Division	……	20,000 components per period
Capacity	……	35,000 components per period

Y Division assembles one type of product which it sells to external customer. Each unit of that product requires two of the components that are manufactured by X Division.

Details of Y Division are as follows:

Selling Price Per Unit	……	₹ 1,200
Variable Cost Per Unit		
(i) Two components from X	……	2 @ transfer price
(ii) Other variable cost per unit	……	₹ 375
Fixed Costs	……	₹ 13,50,000 per period
Demand	……	10,000 units per period
Capacity	……	10,000 units per period

Group Transfer Pricing Policy

Transfers must be at opportunity cost.

Y must be at opportunity cost.

X must satisfy demand from Y before making external sales.

Required:

1) Calculate the profit for each division if the external demand per period for the components that are made by X Division is:

   (i) 15,000 components
   (ii) 19,000 components
   (iii) 35,000 components

2) Calculate the financial impact on the group if Y Division ignored the transfer pricing policy and purchased all of the 20,000 components that it needs from an external supplier for ₹ 255 each. Your answer must consider the impact at each of the three levels of demand (15,000,19,000 and 35,000 components) from external customers for the component manufactured by X Division.

X - Y Group-Companies

Division - X
Capacity = 35,000 Nos.

Output -Sells (Component)

External Customer — Division Y
Demand = 20,000 Nos.

Market Price =	**300.00**
Variable Cost =	**157.00**
Fixed Cost =	**20,620,000**

Division - Y
(External - Customer)

1 Units	**Component**
1	2
Sales Price =	1,200 (P.U)
Variable price =	(Transfer Pricing)
Variable price =	375 (P.U)
Fixed Cost =	**13,50,000**
Demand =	**10,000**
Capacity =	**10,000**

(X –Must Satisfy Demand From
Y –Before Making External Sales)

Group Transfer Price Policy
Transfer Price = **Opp -Cost**
[Y -Must Buy Components From X]

Ans No. (i)

If External Demand = 15,000
Capacity = 35,000 (X)

Transfer To -Y	External
20,000	15,000

No. -Opp -Cost
Transfer Price = 157.00 (Variable Cost)

Ans No. (ii)

If Demand = 19,000 Nos.

Transfer - Y 20,000

Opp - Cost =	5,72,000
Variable Cost = (20,000 x 157)	31,40,000
	37,12,000
	÷ 20,000
Transfer Pricing =	**185.60**

External Sales 19,000

Cut Down	Sales
4,000	15,000

Opp Cost :-

Sales Price :-	300
Variable Price :-	(157)
Contribution =	143 x 4,000 = 5,72,000

If Demand = 35,000 Nos.

Transfer - Y 20,000

	₹
Opp - Cost =	28,60,000
Variable Cost = (20,000 x 157)	31,40,000
	60,00,000
	÷ 20,000 units
Transfer Pricing =	300.00

External Sales 35,000

Cut Down 20,000

Opp Cost :-

	₹
Sales Price :-	300
Variable Price :-	(157)
	143

20,000 units x 143 = **28,60,000**

Statement Showing Analysis of Profit / Loss

If External Demand	15,000 Nos.	19,000 Nos.	35,000 Nos.
Division - X	**₹**	**₹**	**₹**
Sales	= 45,00,000 (15,000 x 300)	= 45,00,000 (15,000 x 300)	= 45,00,000 (15,000 x 300)
Division – Y	31,40,000 (20,000 x 157)	37,12,000 (20,000 x 185.60)	60,00,000 (20,000 x 300)
Variable Cost	(54,95,000) (35,000 x 157)	(54,95,000) (35,000 x 157)	(54,95,000) (35,000 x 157)
Fixed Cost	(20,62,000)	(20,62,000)	(20,62,000)
(A) Profit / Loss	**83,000**	**6,55,000**	**29,43,000**
Division – Y			
Sales	= 1,20,00,000 (10,000 x 1,200)	= 1,20,00,000 (10,000 x 1,200)	= 1,20,000,00 (10,000 x 1,200)
Variable Cost	(37,50,000) (10,000 x 375)	(37,50,000) (10,000 x 375)	(37,50,000) (10,000 x 375)
Fixed Cost	(13,50,000)	(13,50,000)	(13,50,000)
Transfer Pricing	(31,40,000)	(37,12,000)	(60,00,000)
(B) Profit/Loss	**37,60,000**	**31,88,000**	**9,00,000**
A + B = Profit/Loss	**38,43,000**	**38,43,000**	**38,43,000**

Ans No. 2

Statement Showing Financial Impact On The Group If Y Division Ignored The Transfer Pricing Policy

Division – X	15,000 Nos.	19,000 Nos.	35,000 Nos.
Sales	45,00,000 (15,000 x 300)	57,00,000 (19,000 x 300)	105,00,000 (35,000 x 300)
Variable Price	(23,55,000) (15,000 x 157)	(29,83,000) (19,000 x 157)	(54,95,0000 (35,000 157)
Fixed Cost	(20,62,000)	(20,62,000)	(20,62,000)
(A) Profit / Loss	**83,000**	**6,55,000**	**29,43,000**
Division – Y			
Sales	1,20,00,000 (10,000 x 1,200)	1,20,00,000 (10,000 x 1,200)	1,20,000,00 (10,000 x 1,200)
Variable Cost (Purchase)	(51,00,000) (20,000 x 255)	(51,00,000) (20,000 x 255)	(51,00,000) (20,000 x 255)
Others Variable Cost	(37,50,000) (10,000 x 375)	(37,50,000) (10,000 x 375)	(37,50,000) (10,000 x 375)
Fixed Cost	(13,50,000)	(13,50,000)	(13,50,000)
(B) Profit / Loss	**18,00,000**	**18,00,000**	**18,00,000**
A + B Profit / Loss	18,83,000	24,55,000	47,43,000
Profit/Loss Ans (i)	38,43,000	38,43,000	38,43,000
Net Impact	**(19,60,000)**	**(13,88,000)**	**(9,00,000)**

Case Study-6

Division A is a profit centre, which produces four products P, Q, R and S. Each product is sold in the external market also. **Data for the period is as follows:**

	P	Q	R	S
Market Price per unit (₹)	350	345	280	230
Variable Cost of Production per unit	330	310	180	185
Labour hours required per unit	3	4	2	3

Product S can be transferred to Division B but the maximum quantity that might be required for transfer is 2,000 units of S.

The maximum sales in the external market are:

P	3,000 units
Q	3,500 units
R	2,800 units
S	1,800 units

Division B can purchase the same product at a slightly cheaper price of ₹ 225 per unit instead of receiving transfers of products S from Division A.

What should be transfer price for each unit for 2,000 units of S, if the total labours available in Division A are:

(i) 24,000 hours?
(ii) 32,000 hours?

Step No. 1 Statement Showing Contribution P.U/ P.H Rank

	P	Q	R	S
Selling Price (P.U)	350	345	280	230
V.p (p.u)	(330)	(310)	(180)	(185)
Cont - (p.u)	20	35	100	45
	÷ 3	÷ 4	÷ 2	÷ 3
Contp.h	6.67	8.75	50	15
	IV	III	I	II

Step No. (2) Statement Showing Production Plan For Maximum Point

Hrs.	Hrs.				Balance
Available	Products	Units x	P.U =	Total	Hrs.
24,000	R	2,800 × 2	=	5,600	(24,000 – 5,600)
	S	1,800 × 3	=	5,400	(18,400 – 5,400)
	Q	3,250 × 4	=	13,000	(13,000 – 13,000)

Step No. (3) Statement Showing Transfer Price (P.U)'S

Total hrs. required for 's' (2000 x 3)	6,000
Cut down 'q' (min-cont-per-hrs.) (1,500 x 4)	6,000
	x
	₹
Opp- cost 'Q'(1500 x 35) =	52,500
Mancost 'S'(200 x 185) =	3,70,000
	4,22,500
	÷ 2,000
T.p (P.U) =	211.25

Step No. (4) Statement Showing Production Plan For Maximum Profit

Hrs	Hrs				Balance
Available	**Products**	**Units X**	**P.U =**	**Total**	**Hrs**
32,000	R	2,800 × 2	=	5,600	(32,000 – 5,600)
	S	1,800 × 3	=	5,400	(26,400 – 5,400)
	Q	3,500 × 4	=	14,000	(21,000 – 14,000)
	P	2,333 × 4	=	6,999	(7,000 - 6,999)
					=1

Statement Showing Transfer Price P.U 'S

Total hrs. required for 'S' (2000 x 3)	6,000
Cut down 'P' & save hrs. (2,000 x 3)	6,000
	x
	₹
Opposition cost 'P'(2000 x 20) =	40,000
Manufacturing Variable cost (2000 x 185) =	3,70,000
	4,10,000
	÷ 2,000
	= 205

Case Study-7

Bright Furniture Company has two Division 'FXR' and Division 'FQR'. Both divisions are independent. Each division serves a different market in the furniture industry.

Division 'FXR' manufactures furniture that is used by the canteens/ coffee bars. The division plans to introduce cushioned seat for the counter chairs. A cushioned seat currently made by the Division 'FQR' for use on its stylish stool could be modified for use on the new counter chair. Division 'FQR' can make the necessary modifications to the cushioned seat easily.

The raw materials used in Division 'FXR' seat are slightly different and should cost about 20 per cent more that those used in Division 'FQR' stylish stool. However, the labour time should be the same because the seat fabrication operation is basically the same.

Division 'FQR' is operating at full capacity. By making the cushion seats for Division 'FXR' Division 'FQR' have to cut its production of stylish stools. However, Division 'FQR' can increase its production

of normal stools. The labour time freed by not having to fabricate the frame or assemble the stylish stool can be shifted to the frame fabrication and assembly of the normal stool. Division 'FQR' can switch its labour force between these two models of stools without any loss of efficiency. Labour hours cannot be increase. Division 'FQR' has excess demand for both products. Following are Division 'FQR's' standard costs for the two stools and a schedule of Division 'FQR's' manufacturing overhead.

'FQR' Division Standard Selling Price and Cost

	Stylish Stool		**Normal Stool**	
	(₹)	**(₹)**	**(₹)**	**(₹)**
Selling Price		225.00		160.00
Less : Raw Materials				
Framing	32.60		39.04	
Cushioned Seat				
− Padding	9.60		---	
− Vinyl	16.00		---	
Moulded Seat (Purchased)	---	58.20	24.00	63.04
Less : Direct Labour				
Frame Fabrication				
− (0.5 x ₹ 30.00/ DLH *)	15.00		---	
− (0.5 x ₹ 30.00/ DLH)	---		15.00	
Cushion Fabrication				
− (0.5 x ₹ 30.00/ DLH)	15.00		---	
Assembly *				
− (0.5 x ₹ 30.00/ DLH)	15.00		---	
− (0.3 x ₹ 30.00/ DLH)	---	45.00	9.00	24.00
Less: Manufacturing Overhead				
− (1.5 DLH x ₹ 51.20/ DLH)		76.80		---
− (0.8 DLH x ₹ 51.20/ DLH)		---		40.96
Profit/Loss		45.00		32.00

(*) Attaching seats to frames and attaching rubber feet
(*) DLH refers to Direct Labour Hour.

'FQR' Division Manufacturing Overhead Budget

Overhead Item	**(₹)**
Indirect Material (variable - at Current Market Prices)	16,80,000
Indirect Labour (Variable)	15,00,000
Supervision (Non Variable)	10,00,000
Power (Use Varies with Activity; Rates are Fixed)	7,20,000
Heat and Light (Non Variable - Same Regardless of Production)	5,60,000
Miscellaneous Overheads (Non - Variable -Any Change in Amounts or Rates is Independent of Production)	8,00,000
Depreciation (Fixed)	68,00,000
Employee Benefits (20% of Supervision, Direct and Indirect Labour)	23,00,000
Total Overhead	1,53,60,000
Capacity in DLH	3,00,000
Overhead Rate / DLH	₹ 51.20

Required:

Assume that you are the corporate controller. What transfer price would you recommend for a 200 unit lot of seats?

Solution

Working Note (1) Statement Showing Variable Cost per 200 –unit lot

	(₹)	(₹)
Cushion Material :		
− Padding	9.6	
− Vinyl	16	
Total Cushion Material	25.6	
Cost Increase by 20%	5.12	
Cost of Cushioned Seat		30.72
Cushion Fabrication Labour (₹ 30 x 0.5)		15
Variable Overhead (W.N. -2) (₹ 20 x 0.5)		10
Variable Cost per Cushioned Seat		55.72
Total Variable Cost per 200 -unit lot (₹ 55.72 x 200)		11,144

Working Note (1)

Statement Showing Fixed Overhead & Variable Overhead Rate per Direct Labour Hour

	Variable Amount		Fixed Amount	
	(₹)	(₹)	(₹)	(₹)
	Total	Per DLH	Total	Per DLH
Indirect Material	16,80,000	5.6	---	---
Indirect Labour	15,00,000	5	---	---
Supervision	---	---	10,00,000	3.33
Power	7,20,000	2.4	---	---
Heat and Light	---	---	5,60,000	1.87
Miscellaneous Overheads	---	---	8,00,000	2.67
Depreciation	---	---	68,00,000	22.67
Employee Benefits				
− 20 % Direct Labour*	18,00,000	6.00	---	---
− 20% Supervision	---	---	2,00,000	0.66
− 20% Indirect Labour	3,00,000	1.00	---	---
	60,00,000	20.00	93,60,000	31.20

Variable Overhead Rate = ₹ 60,00,000 + 3,00,000

= ₹ 20.00 / DLH

Fixed Overhead Rate = ₹ 93,60,000 ÷ 3,00,000

= 31.20 / DLH

* Direct Labour Cost

0.2 (₹ 10,00,000 + DL + ₹ 15,00,000) = ₹ 23,00,000

0.2 DL = ₹ 18,00,000

DL = ₹ 90,00,000

(2) Statement Showing "Loss of Contribution Margin From Outside Sales"

	Stylish Stool (₹)	Normal Stool (₹)
Selling Price	225	160
Less : Material	58.2	63.04
Less : Labour	45.00 (₹ 30.00 x 1.5)	24.00 (₹ 30.00 x 0.8)
Less : Variable Overhead	30.00	16.00
	(₹ 20.00 x 1.5)	(₹ 20.00 x 0.8)
Contribution Margin per unit	91.80	56.96
Units Produced (units)	200	250 (W.N. -4)
	18,360	14,240

Amount of Contribution Margin Lost as a result of shifting production to the Normal Stool ₹ 4,120 (₹ 18,360 -₹ 14,240).

(3) Number of Economy Office Stools that can be produced

Labour Hours to make a 200 -unit lot of Stylish Stools (1.50 x 200)	300 Hrs.
Less : Labour Hours to make a 200 - unit lot of Cushioned Seats (0.50 x 200)	**100 Hrs.**
Labour Hours available for Normal Stool	**200 Hrs.**
Labour Hours required to make one Normal Stool	0.8 Hrs./Stool
Use of Extra Labour devoted to Normal Stool Production (200 / 0.8)	250 Stools

Since the 'FQR' Division is operating at Full Capacity, the Transfer Price must consider the Division's Variable Costs of Manufacturing the Seat plus the Lost Contribution Margin that will result from losing outside sales. Thus, the Transfer Price (W.N. -1 & 3) equals to (₹ 11,144 + ₹ 4,120).

Case Study-8

Tripod Ltd. has three divisions –X, Y and Z, which make products X, Y and Z respectively. For Division Y, the only direct material is product X and for Z, the only direct material is product Y. Division X purchases all its raw material from outside. Direct selling overhead, representing commission to external sales agents are avoided on all internal transfers. Division Y additionally incurs₹ 10 per unit and ₹ 8 per unit on units delivered to external customers and Z respectively. Y also incurs ₹ 6 per unit picked up from X, whereas external suppliers supply at Y's factory at the stated price of ₹ 85 per unit.

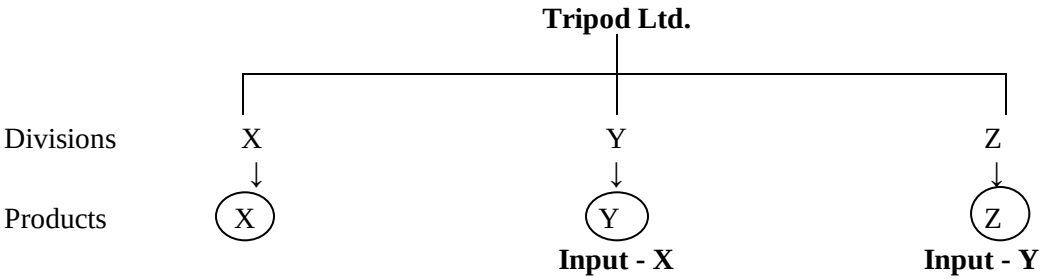
Additional information is given below:

	Figures (₹) / unit		
	X	Y	Z
Direct Materials (external supplier rate)	40	85	135
Direct Labour	30	50	45
Sales Agent's Commission	15	15	10
Selling Price (in external market)	110	170	240
Production Capacity (units)	20,000	30,000	40,000
External Demand (units)	14,000	26,000	42,000

Required:

Discuss the range of negotiation for Managers X, Y and Z, for the number of units and the transfer price for internal transfers.

Given



Material	→	Outsider		
Commission :				
(Internal)	→	No	No	No
External	→	Yes	Yes	Yes
External Customer	→		(10 + 8) To '2' (Incurs) (6 Picked -Up Cost Material Cost = @ **85.00**	

Division – 'X'

Statement Showing Analysis of Proposal

	Sales to Outsider	Sales to Y	Sales to Y
		On Variable Cost	Opposition Cost
Revenue	(Selling Price)	(Variable Price)	Purchase Price -6
	110	**70**	**(85 - 6) = 79**
Variable Cost			
Direct Material	(40)	(40)	(40)
Direct Labour	(30)	(30)	(30)
Sales Commission	(15)	–	–
Contribution (P.U)	**25**	**0**	**9.00**
Production / Demand	x 14,000 (Demand)	x 6,000 (Balance)	x 6,000 (Balance)
Total Contribution	3,50,000	0	54,000

Range of Negotiations

Manager of Division X will sell 14,000 units outside at ₹ 110 per unit and earn contribution of ₹ 3.50 lakhs. Excess capacity of 6,000 units can be offered to Division Y at a price between ₹ 70 (variable manufacturing cost to Division X) and ₹ 95 (maximum amount to equal outside contribution). But

Division Y can get the material outside at ₹ 85. So, Division Y will not pay to Division X anything above ₹ 79 (₹ 85 - ₹ 6) to match external available price.

Division X will be attracted to sell Division Y only in range of ₹ 71 -₹ 79 per unit at a volume of 6,000 units. At ₹ 70, Division X will be indifferent, but may offer to sell to Division Y to use idle capacity.

Division –Y

	Outside Sales			**Sale to Division**		
	From Division X		**From Outsider**	**From Division X**		**From Outsider**
	Selling Price	**Selling Price**	**Selling Price**	**Transfer Price**	**Transfer Price**	**Transfer Price**
Revenue	170	170	170	135	135	135
Material Cost	(70)	(79)	(85)	(70)	(79)	(85)
Transport	(6)	(6)	–	(6)	(6)	–
Direct Labour Cost	(50)	(50)	(50)	(50)	(50)	(50)
Delivery Cost	(10)	(10)	(10)	(8)	(8)	(8)
Commission	(15)	(15)	(15)	–	–	–
	151	**160**	**160**	**134**	**143**	**143**
Contribution (P.U)	**19**	**10**	**10**	**1**	**(8)**	**(8)**

Division Z will not buy form Division Y at anything above ₹ 135. If Division X sells to Division Y at 80 per unit, Division Y can sell to Division Z at ₹ 134 and earn no contribution, only for surplus capacity and if units transferred by Division X to Division Y at ₹ 70 per unit.

	Division Y	**Division Z**
Provided Division X sells to Division Y at ₹ 70 per unit	Sell 4,000 units to Division Z at ₹ 134 (Indifferent)	Buy 4,000 units from Division Y at ₹ 134 (attracted)
	Sell 4,000 units to Division Z at ₹ 135 (Willingly for a contribution of ₹ 1)	Indifferent, since market price is also ₹ 135

For buying from X at ₹ 71 -₹ 79 price range, Y will be interested in selling to Z only at prices ₹ 136 - ₹ 143, which will interest Z.

Thus Y will sell to Z only if X sells to Y at ₹ 70 per unit and Y will supply to Z maximum 4,000 units.

Case Study-9

Tycoon Ltd. has two manufacturing departments organized into separate profit centresknown as Textile unit and Process House. The Textile unit has a production capacity of 5 lacsmetres cloth per month, but at present its sales is limited to 50 % to outside market and 30 % to process house.

The transfer price for the year 2014 was agreed at ₹ 6 per metre .This price has been fixed in line with the external wholesale trade price on 1st January, 2014. However, the price of yam declined, which was the raw material of textile unit, with effect, that wholesale trade price reduced to ₹ 5.60 per metre with effect from 1st June, 2014. This price was however not made applicable to the sales made to the processing house of the company. The textile unit turned down the processing house request for revision of price.

The Process house refines the cloth and packs the output known as brand Rayon in bundles of 100 metres each. The selling price of the Rayon is ₹825 per bundle. The process house has a potential of selling a further quantity of 1,000 bundles of Rayon provided the overall prices is reduced to ₹ 725per bundle. In that event it can buy the additional 1,00,000metres of cloth from textile unit, whose capacity can be fully utilized. The outside market has no further scope.

The cost data relevant to the operations are:

	Textile unit (₹)	**Process house (₹)**
Raw material (per metre) on 1st June,2014	3.00	Transfer price
Variable cost	1.20 (per metre)	80 (per bundle)
Fixed cost (per month)	4,12,000	1,00,000

You are required to:

i. Prepare statement showing the estimated profitability for June,2014 for Textile unit and Process house and company as a whole on the following basis:
   a. At 80% and 100% capacity utilization of the Textile unit at the market price (external wholesale trade price on 1st January, 2014) and the transfer price to the Processing house of ₹ 6 per metre.
   b. At 80% capacity utilisation of the Textile unit at the market price of ₹ 5.60per metre and the transfer price of the Processing house of ₹ 6 per metre.
   c. At 100% capacity utilisation of the Textile unit at the market price of ₹ 5.60 per and the transfer price of the Processing house of ₹ 5.60 per metre.

ii. Comment on the effect of the company's transfer pricing policy on the profitability of processing house.

(Given) Solution 146 (P)

TYCON LTD.

Textile units — Process house

CAPACITY = 5,00,000 MTRS

Out-sider	Process house	Idle- capacity
(50 % 5,00,000)	(30 % 5,00,000)	(20 % 5,00,00)
2,50,000	1,50,000	1,00,000

Raw material V.cost = 3.00
V.cost = 1.20
4.20
Fixed cost = 4,12,000

PROCESS – HOUSE

100 (MTRS) 1 BUNDLE

INPUT	**OUTPUT**	**Sales Price**
1,50,000	1,500 BUNDLES	@ 825
2,50,000	2,500 BUNDLES	@ 725

Variable cost = 80.00 per bundle
Fixed cost = **1,00,000**

Statement Showing Analysis Of Profit

(A) textile units	Ans no (a) 80%	Ans no (a) 100%	Ans (b) 80%	Ans (b) 100%
(i) Sales	= 15,00,000 (2,50,000 x 6)	15,00,000 (2,50,000 x 6)	14,00,000 (2,50,000 x 5.60)	14,00,000 (2,50,000 x 5.60)
(ii) Transfer price	= 9,00,000 (1,50,000 x 6)	15,00,000 (2,50,000 x 6)	9,00,000 (1,50,000 x 6)	14,00,000 (2,50,000 x 5.60)
Variable cost	(16,80,000) (4,00,000 x 4.20)	(21,00,000) (5,00,000 x 4.20)	(16,80,000) (4,00,000 x 4.20)	(21,00,000) (5,00,000 x 4.20)
Fixed cost	(4,12,000)	(4,12,000)	(4,12,000)	(4,12,000)
(A) Profit/Loss	**308,000**	**4,88,000**	**208,000**	**2,88,000**
(B) Process House				
Sales	12,37,500 (1,500 x 825)	18,12,500 (2500 x 725)	14,00,000 (2,50,000 x 5.60)	14,00,000 (2,50,000 x 5.60)
Variable cost	(1,20,000) (1,500 x 80)	(20,00,000) (2,500 x 80)	(1,20,000) (1,500 x 80)	(20,00,000) (2,500 x 80)
Transfer price	(9,00,000)	(15,00,000)	(9,00,000)	(14,00,000)
Fixed cost	(1,00,000)	(1,00,000)	(1,00,000)	(1,00,000)
(B) Profit / Loss	**1,17,500**	**12,500**	**1,17,500**	**12,500**
A + B = Profit /Loss	4,25,500	500,500	3,25,500	400,500

Comments On Profitability Of Processing House

Capacity	Transfer Pricing	Profit & Loss
		₹
80%	6.00	1,17,500
100%	6.00	12,500
80%	6.00	1,17,500
100%	5.60	1,12,500

If Capacity is 80% & Transfer Pricing 6.00 there Process House will get Maximum Profit

Case Study-10

The two manufacturing division of a company are organized on profit centre basis. Division X is the only source of a component required by Division Y for their product 'P'. Each unit of P requires one unit of the said component. As the demand of the product is not steady, orders for increased quantities can be obtained by manipulating prices.

The manager of Division Y has given the following forecast:

Sales per Day (units)	Average Price per Unit of P (₹)
5,000	393.75
10,000	298.50
15,000	247.50
20,000	208.50
25,000	180.00
30,000	150.75

The manufacturing cost (excluding the cost of the component from Division X) of P in Division Y is₹ 14,06,250 on first 5,000 units and₹ 56.25 per unit in excess of 5,000 units.

Division X incurs a total cost of ₹5,62,500 per day for an output upto 5,000 components and the total costs will increase by ₹3,37,500 per day for every additional 5,000 components manufactured. The Manager of Division X has set the transfer price for the component at ₹90 per unit to optimize the performance of his Division.

Required:

1. Prepare a divisional profitability statement at each level of output, for Division X and Y separately;
2. Find out the profitability of the company as a whole at the output level where
   i. Division X's net profit is maximum;
   ii. Division Y's net profit is maximum.
3. Find out at what level of output, the company will earn maximum profit, if the company is not organized on profit centre basis.

Q No. (11) Solution

A-COMPANY

Division- 'x' Division-'y'

Component

			Input component			**Output 'p'**
			1	:		1
Up-to-5000	=	5,62,500	Up-to-5000 units	=		1,406,250
		+				
5,000		3,37,500	5,000	=		2,81,250
Transfer Pricing =						
						(5000 x 56.25)

Ans No. (1)Statement Showing Analysis Of Profit/Loss – Division- 'X'

Units	Transfer Price	Man Cost- Division 'X'	Profit Loss
5,000	4,50,000 (5,000 x 90)	(5,62,500)	= (1,12,500)
10,000	9,00,000 (10,000 x 90)	(9,00,000) (56,2500 + 337500)	= –
15,000	13,50,000 (15,000 x 90)	(12,37,500) (9,00,000 + 3,37,500)	= 1,12,500
20,000	18,00,000 (20,000 x 90)	(15,75,000) (1237500 + 3,37,500)	= 2,25,000
25,000	22,50,000 (25,000 x 90)	(1,91,2500) (15,75,000 + 3,37,500)	= 3,37,500
30,000	27,00,000 (30,000 x 90)	(22,50,000) (19,12,500 + 3,37,500)	= 4,50,000

Statement Showing Analysis Of Profit/Loss Division -Y

Units	Sales	Transfer Price	Man - Cost	Profit Loss
5,000	19,68,750 (5000 x 393.75)	(4,50,000)	(14.06.250)	= 1,12,500
10,000	2,98,5000 (10,000 x 298.50)	(9,00,000)	(16,87,500) (14,06,250 + 2,81,250)	= 3,97,500
15,000	3,71,2500 (15,000 x 247.50)	(13,50,000)	(19,68,750) (16,87,500 + 2,81,250)	= 3,93,750
20,000	41,70,000 (20,000 x 208.50)	(18,00,000)	(22,50,000) (19,68,750 + 2,81,250)	= 1,20,000
25,000	45,00,000 (25,000 x 18.00)	(22,50,000)	(25,31,250) (22,50,000 + 2,81,250)	= (2,81,250)
30,000	45,22,500 (30,000 x 150.75)	(27,00,000)	(28,12,500) (25,31,250 + 2,81,250)	= (9, 90,000)

Ans No. (ii) Statement Showing Analysis Of Profit/Loss

	Ans No. (ii) (A)	Ans No. (ii) (B)
	Division 'X' Profit (Maximum)	Division - 'Y' Profit (Maximum)
Division 'x' profit	4,50,000	—
Division 'y' profit	(9,90,000)	3,97,500
Profit loss	**(5,40,000)**	**3,97,500**

Statement Showing Analysis Of Profit / Loss

Unit	Sales	Man-Cost 'X'	Man-Cost 'Y'	Profit/Loss
5,000	19,68,750	(5,62,500)	(14,06,250)	—
10,000	29,85,000	(9,00,000)	(16,87,500)	39,75,00
15,000	37,12,500	(12,37,500)	(19,68,750)	**50,6,250**
20,000	41,70,000	(15,75,000)	(22,50,000)	3,45,000
25,000	45,00,000	(19,12,500)	(25,31,250)	56,250
30,000	45,22,500	(22,50,000)	(28,12,500)	(5,40,000)

The Level of Output The Company Will Earn Maximum Profit If The Company Is Not Organized On Profit Centre Basis Are 15,000

Case Study-11

PEX is a manufacturing company of which Division PQR manufactures a single standardized product. Some of the output is sold externally whilst the remainder is transferred to Division RPQ where it is a sub –assembly in the manufacture of that division's product. PQR has the capacity (annual) to produce 30,000 units of the product. The unit cost of Division PQR's products is as under:

	(₹)
Direct Material	40
Direct Labour	20
Direct Expenses	20
Variable Manufacturing Overheads	20
Fixed Manufacturing Overheads	40
Sells and Packaging Expenses - Variable	10
	150

Annually 20,000 units of the product are sold externally at the standard price of ₹ 300 per unit.

In addition to the external sales, 10,000 units are transferred annually to Division at an internal transfer price of ₹ 290 per unit. This transfer price is obtained by deducing variable selling and packing expenses from the external price since those expenses are not incurred for internal transfers.

Division RPQ incorporates the transferred –in goods into a more advanced product. The unit costs of this product are as follows:

	(₹)
Transferred -in -item (from Division PQR)	290
Direct Material and Components	230
Direct Labour	30
Variable Overheads	120
Fixed Overheads	120
Selling & Packaging Expenses -Variable	10
	800

Division RPQ's manager disagrees with the basis used to set the transfer price. He argues that the transfers should be made at variable cost plus an agreed (minimal) mark up because his division is taking output that Division PQR would be unable to sell at the price of ₹ 300.

Partly because of this disagreement, a study of the relationship between selling price and demand has recently been carried out for each division by the company's sales director. The study has brought out the following demand schedule:

Division PQR			
Selling Price (₹)	200	300	400
Demand (units)	30,000	20,000	10,000
Division RPQ			
Selling Price (₹)	800	900	1,000
Demand (units)	14,400	10,000	5,600

The manager of the Division RPQ claims that this study supports his case. He suggests that a transfer price of ₹ 120 would give Division PQR a reasonable contribution to its fixed overheads while allowing Division RPQ to earn a reasonable profit. He also believes that it would lead to an increase of output and an improvement in the overall level of company profits.

Required:

(i) Calculate the effect of the transfer price of ₹ 290 per unit on company's operating profit. Calculate the optimal product mix.

(ii) Advise the company on whether the transfer price should be revised to ₹ 120 per unit.

(i) Statement Showing Analysis of Division Contribution –P.Q.R

(₹)

Selling Price (P.U)	200	300	400
Variable Price (P.U)	(110)	(110)	(110)
Contribution (P.U)	**90**	**190**	**290**
Demand	x 30,000	x 20,000	x 10,000
Total Contribution	27,00,000	38,00,000 (Optimal)	29,00,000

(ii) Contribution –Division RPQ (Transfer Price ₹ 290)

(₹)

Selling Price (P.U)	800	900	1,000
Variable Price (P.U)	(680)	(680)	(680)
(290 + 230 + 30 + 120 + 10)			
Contribution (P.U)	120	220	320
Demand	x 14,400	x 10,000	x 5,600
Total Contribution	17,28,000	22,00,000 (Optimal)	17,92,000

(iii) Contribution Division –R.P.Q (At Alternative Transfer Price ₹ 120

(₹)

Selling Price (P.U)	800	900	1,000
Variable Price (P.U)	(510)	(510)	(510)
(120 + 230 + 30 + 120 + 10)			
Contribution	290	390	490
Demands	x 14,400	x 10,000	x 5,600
Total Contribution	41,76,000 (Optimal)	39,00,000	27,44,000

The maximum capacity of the Division PQR is given as 30,000 units. Hence there is no question of internal transfer if the entire 30,000 units are sold by Division PQR in the external market. However, from the above computations it is clear that Division PQR would sell 20,000 units in the external market to optimize its profit and therefore the maximum transfer to Division RPQ is 10,000 units only. The question of transferring 14,400 units would arise as an alternative to analyze the overall profitability only when Division PQR sells 10,000 units in the external market. Based on the demand projection of Division RPQ, the demand level of 5,600 units is not relevant. It can be further noted from the problem that Division RPQ will purchase the entire quantity only from Division PQR and not externally. Hence the various options would be as follows-

	Option -1	**Option -2**	**Option -3**
PQR External Sales (units)	20,000	10,000	10,000
Transfer to RPQ (units)	10,000	14,400	10,000

If Transfer Price -@ 290.00 Statement Showing Analysis of Profit/Loss

PQR (External) Sales	**20,000 Units**	**10,000Units**	**10,000 Units**
Transfer R.P.Q	**10000 Units**	**14,400Units**	**10,000Units**
Contribution	38,00,000	29,00,000	29,00,000
To P.Q.R	(20,000 x 190)	(10,000 x 290)	
Contribution	19,00,000	27,36,000	19,00,000
P.Q.R	(10,000 x 190)	(14,400 x 190)	(10,000 x 190)
Contribution of Division R.P.Q	22,00,000	17,28,000	22,00,000
	(220 x 10,000)	(14,400 x 120)	(220 x 10,000)
Total Contribution			
Fixed Cost :-	( )	( )	( )
P.Q.R	(12,00,000)	(12,00,000)	(12,00,000)
	(30,000 x 40)		
R.P.Q	(12,00,000)	(12,00,000)	(12,00,000)
	(10,000 x 120)		
	55,00,000	**49,64,000**	**46,00,000**

If Transfer Price = 120.00 Statement Showing Analysis of Profit/Loss

PQR (External) Sales	**20,000 Units**	**10,000 Units**	**10,000 Units**
Transfer Price To R.P.Q	**10,000 Units**	**14,400 Units**	**10,000 Units**
Contribution (External)	38,00,000	29,00,000	29,00,000
	(20,000 x 190)	(10,000 x 290)	(10,000 x 290)
Contribution P.Q.R Transfer			
Price	(2,00,000)	(2,88,000)	(2,00,000)
	(10,000 x 20)		
(120 - 100)			
Contribution R.P.Q	39,00,000	41,76,000	39,00,000
	(10,000 x 390)	(14,400 x 290)	(10,000 x 390)
Fixed Cost			
P.Q.R	(12,00,000)	(12,00,000)	(12,00,000)
	(30,000 x 40)	(30,000 x 40)	(30,000 x 40)
R.P.Q	(12,00,000)	(12,00,000)	(12,00,000)
	(10,000 x 120)	(10,000 x 120)	(10,000 x 120)
Total Company Profit	**55,00,000**	**49,64,000**	**46,00,000**

Advice

The revision of transfer price has no impact on the overall profitability of the company. However, it will alter the profitability of the Divisions.

(*)The optimal level is 30,000 of Division PQR of which 20,000 units are for external sale and 10,000 units are transferred to Division RPQ under both the transfer prices.

(#)On internal transfers, Division PQR's variable cost per unit is₹ 100, since the ₹ 10 on selling is not incurred.

Case Study-12

Four Products P, Q, R and S are produced by profit centre Division A. Each product is sold in the external market also. Data for the period are as follows:

	P	Q	R	S
Market Price per unit (₹)	70	69	56	46
Variable Cost of Production per unit (₹)	66	59	36	37
Labour Hours per unit	3	2	2	3
Specific Fixed Costs (₹) per 10,000 units of product	2,500	12,600	15,000	18,000

Product S can be transferred to Division B but the maximum quantity that might be required for transfer is 20,000 units of S. The specific fixed costs given above are avoidable if a product is not made. They are incurred for every 10,000 units.

The maximum sales (units) in the external market are:

P	……	30,000
Q	……	31,000
R	……	28,000
S	……	18,000

Division B can purchase the same product at a slightly cheaper price of ₹ 45 per unit instead receiving transfers of product S from division A without any extra transport/inspection costs. B can also take partial supplies from A.

The total labour hours available in Division A is 1,92,000 hrs.

Required:

i) What is A's optimal product mix and the corresponding contribution net of specific fixed costs?
ii) How many units should A transfer to B and at what price?
iii) Is it in the company's interest to transfer 20,000 units of S to B?

Step No. 1 Statement Showing Contribution Per Unit As Well as Contribution Per Hr.

Units	**30,000**	**31,000**	**28,000**	**18,000**
	P	**Q**	**R**	**S**
Market Price (P.U)	70	69	56	46
Variable Price (P.U)	(66)	(59)	(36)	(37)
Contribution (P.U)	**4.00**	**10.00**	**20.00**	**9.00**
Labour Hrs. P.U	÷ 3	÷ 2	÷ 2	÷ 3
Contribution Per Hr.	1.33	5.00	10.00	3.00
Rank	IV	II	I	III
Specific Cost	2,500	12,600	15,000	18,000
Net Contribution	1,20,000 (30,000 x 4)	(30,000 x 10)	5,60,000 (2,80,000 x 20)	1,62,000 (18,000 x 9)
Specific Cost	(7,500)	(6,45,000) (12,600 x 3)	(45,000)	(36,000)
	1,12,500 IV	**2,65,000** II	**5,15,000** I	**1,26,000** III

Step No. 2Statement Showing Production Plan For

Maximum - Hrs.	Products	Units x Hrs. P.U	Total	Balance Hrs.
1,92,000	P	28,000 x 2 =	56,000	(1,92,000 - 56,000)
	Q	* 30,000 x 2 =	60,000	(1,36,000 - 60,000)
	S	18,000 x 3 =	54,000	(76,000 - 54,000)
	P	7,333.33 x 3 =	22,000	(22,000 - 22,000)

	P	Q	R	S	Total
Units	7,333.33	30,000	28,000	18,000	
x Contribution P.U	x 4	x 10	x 20.00	x 9.00	
Total Contribution	29,333.33	3,00,000	5,60,000	1,62,000	10,51,333.32
Specific Cost	(2,500)	(37,800)	(45,000)	(36,000)	(1,21,300)
		(12,600 x 3)	(15,000 x 3)	(18,000 x 2)	**930,033.33**

Statement Showing Computation of Computation of Quantity Transfer To

Division 'B'

Hours Required For 'S' (20,000 x 3) = 60,000
Cut Down 'P' & Save Hours
(7,333.33 x 3) = 22,000 hrs.

Opp –Cost –'P'

		₹
(7,333.33 x 4)=	(29,333.33 - 2,500) =	26,833
Variable Man -cost 'S'	(7,333.33 x 37) =	2,71,333.33
$\left(\frac{22,000 \text{ hrs.}}{3}\right)$	= Fixed Cost	18,000
		3,16,166.66
		÷ 7,333.33
Transfer Price (P.U)		= 43.11

Ans No. 3

Statement Showing Analysis of Proposal

Total Hrs. Required 'S' = 60,000
(20,000 x 3)
Cut Down 'P' = (22,000)
(7,333.33 x 3)
38,000
Cut Down 'S'
(12,666.67 x 3) **= 38,000**

Opposition Cost

(Contribution - Fixed Cost) =	**Opp - Cost (₹)**
'P' (7,333.33 x 4) = (29,333.33 - 2,500) =	26,833.33
'S' (12,666.67 x 9) = (1,13,999.99 - 18,000) =	95,999.99
Variable Cost 'S' (20,000 x 37) =	7,40,000
Fixed Cost 'S' (18,000 + 18,000) =	36,000
	8,98,833.32
Purchase Cost (20,000 x 45)	9,00,000

Net - Gain = (9,00,000 - 8,98,833.32)

= **1,166.68 (Net - Gain)**

Pricing Model

Case Study-13

Eastern Company Ltd. has two Divisions namely Casnub Bogie Division (CBD) and Wagon Division (WD). CBD manufactures Casnub Bogies and WD manufactures BOBN type of Wagons. To manufacture a Wagon WD needs four Casnub Bogies. CBD is the only manufacturer of the Casnub Bogies and supplies both WD and outside customers. Details of CBD and WD for the coming financial year 2014 -15 are as follows:

	CBD	**WD**
Fixed Costs (₹)	9,20,20,000	16,45,36,000
Variable Cost per unit (₹)	2,20,000	4,80,000 *
Capacity per month (units)	320	12

* excluding transfer costs

Market research has indicated that the demands in the market for Eastern Company Ltd.'s products at different quotations are as follows –

For Casnub Bogies : Quotation price of ₹ 3,20,000 no tender will be awarded, but demand will increase by 30 Casnub Bogies with every ₹ 10,000 reduction in the unit quotation price below ₹ 3,20,000.

For Wagons: Quotation price of ₹ 17,10,000 no tender will be awarded, but the demand for Wagons will be increased by two Wagons with every ₹ 50,000 reduction in the unit quotation price below ₹ 17,10,000.

Required:

(i) Calculate the unit quotation price of the Wagon that will maximize Eastern Company Ltd.'s profit for the financial year 2014 -15.

(ii) Calculate the unit quotation price of the Wagon that is likely to emerge if the divisional managers of CBD and WD both set quotation prices calculated to maximize divisional profit from sales to outside customers and the transfer price is set at market selling (quotation) price.

[Note: If P = a –bQ then MR = a -2bQ]

Eastern -Company Ltd.

(C.B.D) Casnub Bogile Division	(W.D) Wagon Division
↓	↓
Manufactures	BOBN Type Wagon
↓	
Cansub Bogers	Input 4 (C.B) / Output 1 (W.D)

Fixed cost	9,20,20,000	16,45,36,000
Variable Cost	2,20,000	4,80,000
Capacity	320	12

Price

3,20,000	(C.B)	WD → Price =	17,10,000
			- 50,000
3,10,000	CB + 10,000	(+ 2)	**16,60,000**

P = Price

b = Slope of Demand Curve $\left(\frac{\text{b = Change in Price}}{\text{Change in Quantity}}\right)$

Q = Quantity Demanded

a = Price at which demand is Zero

P = [a - bQ] MR= [a - 2bQ]

Assumed Quotation Price 'P' =

Quantity 'Q' =

Marginal Cost of Wagon =	13,60,000
	(₹)
Casnub Bogies = (4 x 2,20,000)	8,80,000
=	4,80,000
	13,60,000

Demand function For Wagon

$$P = 17,10,000 - \left(\frac{50,000}{2}\right) \text{ x } Q$$

Revenue (R) = Q (17,10,000 -25,000 x Q)

MR = (17,10,000 Q – 25,000 Q^2)

MR = 17,10,000 – 50,000 Q

MC = 13,60,000

17,10,000 -50,000 Q = 13,60,000

-50,000 Q = 3,50,000

Q = <u>7 Units</u>

$$P = 17,10,000 - \left(\frac{50,000}{2}\right) \text{ x } Q$$

= 17,10,000 -25,000 x 7

= 15,35,000 [Maximum Profit]

At CBD the Divisional Manager would ensure that Divisional Marginal Revenue should be equal to Division's Marginal Cost so that Profit can be Maximum.

MR of a Casnub Bogies	=	MC of Manufacturing a Casnub Bogies
3,20,000 - 2(10,000 / 30) x Q	=	2,20,000
Q	=	150 units
Selling Price of a Casnub Bogie 'P' is P	=	3,20,000 - (10,000 / 30) x 150
	=	₹ 2,70,000

CBD will earn Maximum Profit when it will Quote ₹ 2,70,000 to the Outside Market. Since, Outside Market Quotation is Transfer Price as well, so Transfer Price to WD will be ₹ 2,70,000 and it forms part of WD's Marginal Cost.

At WD, Division Manager would ensure that Divisional Marginal Revenue should be equal to Division's Marginal Cost so that Profit can be Maximum.

MR of a Wagon	=	MC of Manufacturing a Wagon
17,10,000 - 50,000 x Q	=	(₹ 2,70,000 x 4 Casnub Bogies) + ₹ 4,80,000
Q	=	3.00 units
Quotation Price of a Wagon 'P' should be :		
P	=	₹ 17,10,000 - 25,000 x 3.00
	=	₹ 16,35,000

The unit Quotation Price of Wagon that emerges as a result of Market Based Transfer Price is ₹ 16,35,000.

Multinational Transfer Pricing

Case Study-14

Celestial Electronics and Consumer Durables Corporation (CECDC), is a Taiwan (a state Republic of China) based consumer electronics manufacturer. To expand its market share in South Asia it has formed CECDC India Pvt. Ltd. (CIPL) in India. For the purpose of performance evaluation, the Indian party is treated as responsibility centre. CIPL imports components from the CECDC and assembles these components into a LED TV two units of component 'L_x' are required. The following cost is incurred by the CECDC to manufacture a unit of component 'L_x'.

	Amount (TWD)
Direct Material*	440.00
Direct Labour (3 hours)	120.00
Variable Overheads	40.00

(*) purchased from domestic market.
CECDC incurs TWD 30 per unit as Wharfage Charges.

CECDC has a normal manufacturing capacity of 5,00,000 units of component 'L_x' per annum, 70% of its production is exported to CIPL and rest are sold to the other South –east Asian countries at TWD 750 per component. The tax authorities both in Taiwan and India, consider TWD 750 (=₹ 1,500) per component 'L_x' as arm's length price for all transfers to CIPL. CIPL incurs ₹ 10 per unit as shipment charges.

The cost data relevant to the LED TVs are as follows:

	Amount (₹)
Variable Costs per unit:	
Direct Material (Excluding component	6,200
Direct Labour	115
Fixed Cost:	
Office and Administrative Overheads	1,18,00,000
Selling & Distribution Overheads	2,58,00,000

CIPL can sell 1,75,000 units of LED TV at ₹ 11,000 per unit.

There is a dispute on the transfer pricing of component 'L_x' between the CECDC and CIPL.CECDC is in favour of charging TWD 750 per component to CIPL as it is the arm's length price and it has to pay tax on this. On the other hand CIPL in its argument saying that the substitute of component 'L_x' can be purchased from the Indian market at ₹ 1,490 only and moreover it has to pay import duty on import of component 'L_x' so the transfer price suggested by CECDC is not acceptable.

The following are the direct/indirect tax structure in India and Taiwan:

Type of Tax / Duty	**India**	**Taiwan**
Corporate Tax Rate	30%	25%
Import (Custom) Duty	10%	15%
Export Duty	Nil	Nil

Required:

From the above information, Calculate:

(i) Minimum Price at which CECDC can transfer component 'L_x' to CIPL.
(ii) Maximum Price that can be paid by CIPL to CECDC for each component 'L_x'
(iii) Profitability Statement for the group in TWD.

Note:

(i) For Duty and Tax calculation, consider arm's length price only.
(ii) Ignore the DTAA and other tax provisions.
(iii) Conversion Rate 1 INR = 0.50 TWD

Solution

(i) The minimum price at which CECDC can transfer component 'L_x' to CIPL is Variable Cost per unit plus Corporate Tax attributable to per unit of component 'L_x'

Minimum Transfer Price per unit of component 'L_x'

	Amount (TWD)
Direct Material	440.00
Direct Labour	120.00
Variable Overheads	40.00
Wharfage Charges	30.00
Corporate Tax attributable to per unit of component 'L_x'(W.N.1)	30.00
Total	**660.00**

Minimum Transfer Price per unit of component 'L_x' is 660 TWD or ₹ 1,320

(ii)Maximum Transfer Price that CIPL can pay to CECDC for every unit of component 'L_x' is the market price of component 'L_x' in domestic market minus cost of import (if any).

Maximum Transfer Price per unit of component 'L_x'

Market Price of component 'L_x' (Indian Market)	1,490
Less: Import Duty (750 TWD x 2x 10%)	150
Less: Shipment Cost	10
Total	**1,330**

Maximum Transfer Price that CIPL can pay to CECDC for every unit of component 'L_x' is ₹ 1,330 or 665 TWD.

(iii)Profitability Statement for the Group (TWD' 000)

Particulars	LED TV	Component 'L_x'	Total
Sales Revenue	9,62,500 (1,75,000 units x ₹ 11,000 x 0.50)	1,12,500 (1,50,000 units x 750 TWD)	10,75,000
Total Revenue…(A)			**10,75,000**
Variable Manufacturing Cost (component 'L_x')	2,10,000 (3,50,000 units x 600 TWD)	90,000 (1,50,000 units x 600 TWD)	3,00,000
Wharfage Charges	10,500 (3,50,000 units x 30 TWD)	4,500 (1,50,000 units x 30 TWD)	15,000
Other Variable Manufacturing Cost (excluding 'L_x')	5,52,562.50 (1,75,000 units x ₹ 6,315 x 0.50)	----	5,52,5652.50
Import Duty	26,250 (10% x 3,50,000 units x 750 TWD)	----	26,250
Shipment Cost	1,750 (3,50,000 units x ₹ 10 x 0.50)	----	1,750
Office and Admin Overheads	5,900 (₹ 1,18,00,000 x 0.50)	----	5,900
Selling & Distribution Overheads	12,900 (₹ 2,58,00,000 x 0.50)	----	12,900
Corp Taxes (W.N. 2 & 3)	30,191.25 (₹ 60,382.50 x 0.50)	15,000	45,191.25
Total Cost …(B)			**9,59,553.75**
Profit…(A) - (B)			1,15,446.25

Working Notes

W.N. -1 Corporate Tax Attributable to per unit of Component 'L_x' (TWD)

	Amount
Profit per unit (750 TWD - 440 TWD - 120 TWD -40 TWD - 30 TWD)	120
Corporate tax per unit (25% on 120 TWD)	30

W.N. -2 Calculation of Corporate Tax paid by CIPL (₹' 000)

	Amount
Sales Revenue (1,75,000 units x ₹ 11,000)	19,25,000
Less : Variable Costs:	
Component (3,50,000 units x 750 TWD x ₹ 2)	5,25,000
Other Variable Costs: (1,75,000 units x ₹ 6,315)	11,05,125
Less : Import Duty 10% of (3,50,000 units x 750 TWD x ₹ 2)	52,500
Less : Shipment Cost (3,50,000 units x ₹ 10)	3,500
Less : Fixed Overheads	
Office and Administrative Overheads	11,800
Selling and Distribution Overheads	25,800
Taxable Profit	2,01,275
Tax Payable @ 30%	**60,382.50**

W.N. -3

Calculation of Corporate Tax paid by CECDC (TWD)

	Amount
Profit per unit (750 TWD - 440 TWD - 120 TWD - 40 TWD - 30 TWD)	120
No. of units to be sold	5,00,000
Total Profit (120 TWD x 5,00,000 units)	6,00,00,000
Corporate Tax @ 25%	1,50,00,000

Case Study-15

Standard Corporation Inc. (SCI) is a US based multinational company engaged in manufacturing and marketing of Printers and Scanners. It has subsidiaries spreading across the world which either manufactures or sales Printers and Scanners using the brand name of SCI.

The Indian subsidiary of the SCI buys an important component for the Printers and Scanners from the Chinese subsidiary of the same MNC group. The Indian subsidiary buys 1,50,000 units of components per annum from the Chinese subsidiary at CNY (¥) 30 per unit and pays a total custom duty of 29.5% of value of the components purchased.

A Japanese MNC which manufactures the same component which is used in the Printer and Scanners of SCI, has a manufacturing unit in India and is ready to supply the same component to the Indian subsidiary of SCI at ₹ 320 per unit.

The SCI is examining the proposal of the Japanese manufacturer and asked its Chinese Subsidiary to presents its views on this issue. The Chinese subsidiary of the SCI has informed that it will be able to sell 1,20,000 units of the components to the local Chinese manufacturers at the same price i.e. ¥30 per unit but it will incur inland taxes @ 10% on sales value. Variable cost per unit of manufacturing the component is ¥ 20 per unit. The Fixed Costs of the subsidiaries will remain unchanged.

The Corporation tax rates and currency exchange rates are as follows:

Corporation Tax Rates		**Currency Exchange Rates**	
China	25%	1 US Dollar ($) =	₹ 61.50
India	34%	1 US Dollar ($) =	¥ 6.25
USA	40%	1 CNY (¥) =	₹ 9.80

Required:

(i) Prepare a financial appraisal for the impact of the proposal by the Japanese manufacturer to supply components for Printers and Scanners to Indian subsidiary of SCI. [Present your solution in Indian Currency and its equivalent.]
(ii) Identify other issues that would be considered by the SCI in relation to this proposal.

(Note: While doing this problem use the only information provided in the problem itself and ignore the actual taxation rules or treaties prevails in the above mentioned countries)

Given

Standard Corporation Inc
(SCI) - U.S. Based →
↓
Output → Printers / Scanners
Brand Name [SCI]

Indian Subsidiary →
Buys → Important - Component - For Printers & Scanners
(From Chinese Subsidiary)

Buys From - Chinese
1,50,000 Nos. (p.a) CNY ¥ 30 (P.U)
(+) Custom Duty @ 29.5% - Value

A Japanese –MNC

Manufacturers
↓ @ 320.00 P.U
Same Component

Statement Showing Analysis

(I) On Indian Subsidiary of SCI

	₹
Cost of Purchase From Chinese Manufacturer (1,50,000 x ¥ 30 x 9.80)	4,41,00,000
Duty @ (29.5% x 4,41,00,000)	1,30,09,500
Total Cost of Purchase From (A) Chinese Manufacturer	**5,71,09,500**

Cost Of Purchase –From Japanese Manufacturer In India

Invoice Amount (1,50,000 Units x 320)	48,000,000
Saving Of Purchase = (57,109,500 - 48,000,000)	91,09,500
Tax (34 % x 91,09,500)	(30,97,230)
Savings After Tax	**60,12,270**

On Chinese Subsidiary of SCI

Particulars	**Amount (₹)**
Loss of Contribution [{(1,50,000 - 1,20,000 units) x ¥ (30 - 20)}x ₹ 9.80]	29,40,000
Add: Inland taxes on Local Sale - Chinese Manufacturer [{(1,20,000 units x ¥ 30) x 10%} x ₹ 9.80]	35,28,000
Total Loss Before Corporate Taxes	64,68,000
Less: Tax Savings on the Losses (₹ 64,68,000 x 25%)	16,17,000
Net Loss after Corporate taxes	48,51,000

On SCI Group

Particulars	Amount (₹)
Saving from Indian Subsidiary	60,12,270
Loss from Chinese Subsidiary	48,51,000
Net Benefit to SCI Group	11,61,270

From the above analysis it can be seen that the proposal from the Japanese manufacturer in India is beneficial for the SCI as it give a net benefit of ₹ 11,61,270.

The SCI need to consider various other issues befo0re reaching at a final decision of accepting the proposal of the Japanese manufacturer in India. The few suggestive issues that should be considered are as follows:

- The longevity of the proposal of the Japanese manufacturer: Whether Japanese manufacturer will supply the components in the future also. For this purpose a long term agreement between the Indian Subsidiary of SCI and Japanese manufacturer in India needs to be entered.
- Certainty of the fiscal policy in India: The Japanese manufacturer will not be able to supply the component at the present price if the fiscal policy of India will change in the future.
- Repatriation of Profit earned in India: Though the Indian subsidiary is making profit but it depends on the Government policy on the repatriation of profit from India to USA.
- Operating Conditions in China: the SCI has to make sure that the Chinese subsidiary is operating profitably and able to use the spare capacity in the future as well.
- The fiscal policy in China: If the Government of China liberalize its fiscal policies in China in future then the manufacturing cost will be cheaper than the today's cost.

Apart from above suggestive points the foreign relations and other tax treaties and accords should also be kept in consideration.

Transfer Pricing –Miscellaneous

Case Study-16

Fox -2 – Tec Ltd. (F2TL) has Division 'Dx' and Division 'Dz' with full profit responsibility. The Division 'Dx' produces Component 'X' which it sells to 'outside' customers only. The Division 'Dz' produces a product called the 'Z' which incorporates Component 'X' in its design. 'Dz' Division is currently purchasing 2,500 units of Component 'X' per year from an outside supplier at a cost of ₹ 35 per unit, less a 10 per cent quantity discount. 'Dx' Division can sell its entire Component 'X' to outside customers at the normal ₹ 35 price. Costs associated with manufacturing of a unit of Component 'X' are as follows:

Variable Expenses	₹ 21
Fixed (based on a capacity of 25,000 units per year)	₹ 9

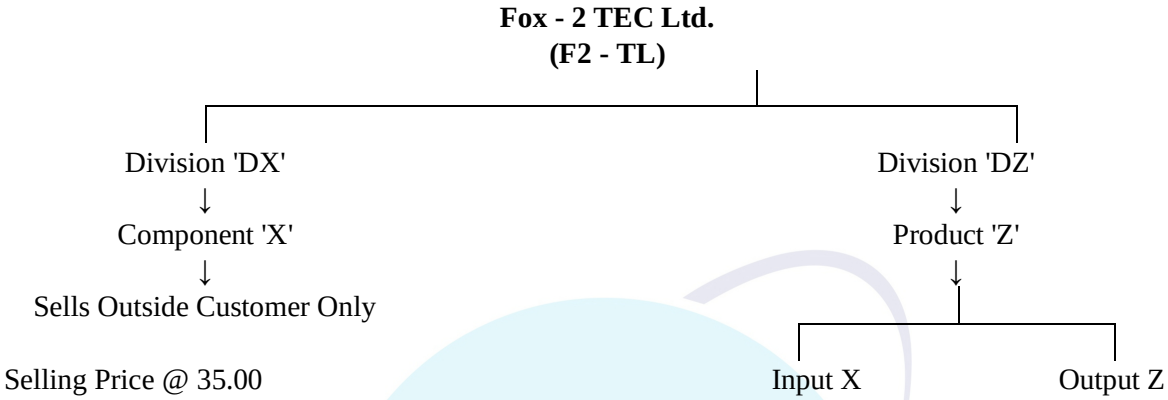
F2TL's new managing director agrees for internal transfer if an acceptable transfer price can be worked out. Accordingly, he requires solution of following questions:-

(i) If the 'Dz' Division purchases 2,500 units of 'X' per year from the 'Dx' Division, what price should control the transfers? Why?
(ii) Refer to your computations in (1). What is the lower limit and the upper limit for a transfer price? Is an upper limit relevant in this situation?

(iii) If the 'Dx' Division meets the price that the 'Dz' Division is currently paying to its supplier and sells 2,500 units of Component 'X' to the 'Dz' Division each year, what will be the effect on the profits of the 'Dx' Division, the 'Dz' Division, and the company as a whole?

(iv) If the intermediated market price for Component 'X' is ₹ 35 per unit, is there any reason why the 'Dx' Division should sell to the 'Dz' Division for less than ₹ 35? Explain.

Given



Entire Production

Variable Cost (P.U) = 21.00
Fixed Cost = 9.00 (P.U)
(25,000 Units)

Purchase Price = **2,500 (Units)**
35.00 (P.U)

10 % Quantity Discount Net Price =
(35 x 90 %) = 31.50

Solution

The transfer price should be ₹35 per unit, the regular price charged to other customers. Since the 'Dx' Division is operating at capacity, it will lose ₹14 in contribution margin for each outside sale given up in favor of sales to the 'Dz' Division (₹35 - ₹21 = ₹14).

Transfer Price = Variable Cost per unit + Lost Contribution Margin per unit on Outside Sales
= ₹ 21 + ₹ 14
= ₹ 35

The lower limit is ₹ 35, the price obtained in (1). The upper limit is also ₹ 35 is the intermediate market price. That is, it would not be fair to charge the other Division more than the price being charged to regular customers. However, an upper limit is not really relevant in this situation since no transfers will be made between the two Divisions.

The price being paid to the outside supplier, net of the quantity discount, is only ₹ 31.50. if this price is met by the 'Dx' Division, then profits in the 'Dx' Division and in the company as a whole will drop by ₹ 8,750 per year.

Minimum Transfer Price	₹ 35
Outside Supplier's Price	₹ 31.50
Loss in Contribution Margin per unit	₹ 3.50
No. of units per year	2,500
Total Loss in Profits	**₹ 8,750**

Profits in the 'Dz' Division will remain unchanged, since it will be paying the same price internally as it is now paying externally.

Yes, if costs can be avoided as a result of the inside business. The price would then be ₹ 35 less the avoided costs.

Case Study-17

Division X and Y are two divisions of ZIOMI Ltd., which operates as profit centres. Division X makes and sells product X. The budgeted Income statement of Division X, based on a sales volume of 30,000 units, is given below:

Budgeted Income Statement of Division X

Particulars	**₹ In '000**
Sales Revenue	6,000
Component purchase costs	1,050
Other variable costs	1,680
Fixed costs	480
Variable marketing costs	270
Fixed marketing overheads	855
Operating profit	1,665

The manager of Division X suggests that sales can be increased by 9,600 units, if the selling price is reduced by ₹ 20 per unit from the present price of ₹ 200 per unit and that for this additional volume, no additional fixed costs will be incurred.

Division Y makes a component Y which is sold outside at a price of ₹ 50 per unit.

Division X presently uses a component which is purchased from outside at ₹ 35 per unit. This component is similar to component made by Division Y. Division Y can make this component for Division X with a minor modification in specification which would cause reduction in direct material cost for the Division Y by ₹ 1.5 unit and would require extra labour hour of 1 per unit at the rate of 1.5 per hour.

Further the Division Y will not incur variable selling marketing cost on units transferred to the Division X. Division X's manager has offered to buy the component from Division Y at ₹ 25.00 per unit. Division Y has the capacity to produce 85,000 units.

The current budgeted information of Division Y are as follows:

Number of units sold outside 60,000 units @ ₹ 50 per unit, variable cost including material and labour ₹ 15 per unit, variable marketing cost ₹ 3 per unit, operating profit ₹ 12,00,000 and fixed overheads ₹ 7,20,000.

Advise

i) Should the Division X reduce the selling price by ₹ 20 per unit even if it is not able to procure the component from Division Y at ₹ 25 per unit?
ii) Should the Division Y be willing to supply 39,600 units to Division X at ₹ 25 per unit?
iii) Support each of your conclusions with appropriate calculations.

Manager –X

Sales Can be Increased by 9,600 units

If @ (200 – 20) = 180 p.u

Division –Y Selling Price (P.U) = 50.00 P.U

Component

Direct Material Cost (Reduced by 1.50)

Extra Labour Hr. 1 Per Unit @ 1.50 Per Hour

Capacity = **85,000 Units.**

Current / Present

		P.U
60,000 Sold @		50
Variable Cost (Material + Labour)	=	15
Variable Cost (Marketing)	=	3
Operating Profit	=	12,00,000
Fixed Overheads		**7,20,000**

Ans No. (i)

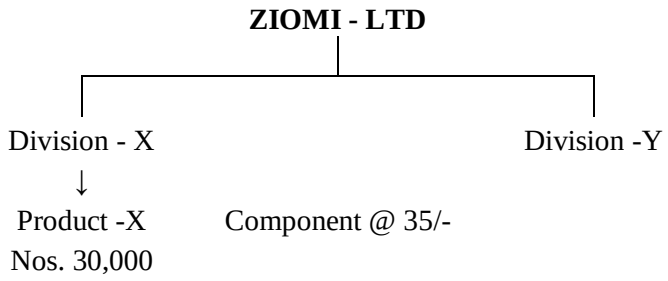
Statement Showing Impact of Selling Price Reduction

	(₹)
Incremental Revenue	
Incremental Sales Revenue (9,600 x 180)	17,28,000
Loss of Revenue (30,000 x 20)	(6,00,000)
Total (A)	11,28,000
Incremental Cost	
Component Purchase Cost (9,600 x 35)	(3,36,000)
Variable Marketing Cost (9,600 x 9)	(86,400
Other Variable Cost (56 x 9,600)	(5,37,600)
Saving / Loss	**1,68,000**

Advice

Above incremental analysis clearly indicates that the reduction of Selling Price by ₹ 20 per unit shall be accepted as it increases the Profit of the concern by ₹ 1,68,000.

Given



Budgeted Income Statement

	30,000 Units	
	Total	**P.U.**
Sales	60,00,000	200
Component Purchase Cost	(10,50,000)	(35)
Other Variable Cost	(16,80,000)	(56)
Fixed Cost	(4,80,000)	(16)
Variable Minimum Cost	(2,70,000)	(9)
Fixed Marketing Overheads	(8,55,000)	(28.50)
Operating Profit	**16,65,000**	**55.50**

Should the Division Y be willing to supply 39,600 units to Division X…?

Statement Showing 'Minimum Average Transfer Price' per component (39,600)

Particulars	**(₹)**
Variable Cost	15
Loss of Contribution *[14,600 units x (₹ 50 - ₹ 15 - ₹ 3)/ 39,600 units]	11.8
Transfer Price	26.8

(*) Division Y has surplus capacity to the extent of 25,000 units, for additional 14,600 units the Transfer Price must consider the Division Y's Variable Costs of Manufacturing the Component plus the Lost Contribution Margin (that will result from losing outside sales).

Company's Perspective

Particulars	**(₹)**
Market Price per component	35.00
Relevant Cost for Transfer per component (from above)	26.80
Saving per component	8.20
Units	39,600
Total Savings	3,24,720

Advice

It is not in the interest of the Division Y to transfer 39,600 units to Division X at Price below the Minimum Average Transfer Price based on Opportunity Cost. However, from the Concern's Perspective, Internal transfer between Divisions is beneficial as each unit to be transferred is offering a saving of ₹ 8.20.

Case Study-18

A company has two Divisions, Division 'A' and Division 'B'. Division 'A' has a budget of selling 2,00,000 nos. of a particular component 'x' to fetch a return of 20% on the average assets employed. The following particulars of Division 'A' are also known:

Fixed Overhead	₹ 5 lakhs
Variable Cost	₹ 1 per unit
Average Assets :	
Sundry Debtors	₹ 2 lakhs
Inventories	₹ 5 lakhs
Plant &Equipment's	₹ 5 lakhs

However, there is constraint in Marketing and only 1,50,000 units of the component 'x' can be directly sold to the Market at the proposed price.

It has been gathered that the balance 50,000 units of component 'x' can be taken up by Division 'B' Division 'A' wants a price of ₹4 per unit of 'x' but Division 'B' is prepared to pay ₹ 2 per unit of 'x'.

Division 'A' has another option in hand, which is to produce only 1,50,000 units of component 'x'. This will reduce the holding of assets by ₹ 2 lakhs and fixed overhead by₹ 25,000.

You are required to advise the most profitable course of action for Division 'A'.

Solution

Note No.(1)(Given)

A-COMPANY

Division- A Division - B

		2,00,000
PRODUCTION	**=**	**Nos.**
		₹
Vcost = (2,00,000 x 1)	=	2,00,000
Fcost	=	5,00,000
R.OI	=	2,40,000
(2,00,000 + 5,00,000 + 5,00,000) x 20 %		94,00,000
		÷ 2,00,000
		= 4.70

OPTION (I)

Out - sider = 1,50,000 @ 4.70

Division B = 50,000 @ 4.00

OPTION (II)

Produce = 1,50,000

Saving in fix overhead = 25,000

Saving in investment = 2,00,000

Statement Showing Analysis Of Profit/Loss

	Produce 2,00,000	**Produce 1,50,000**
Sales	705000 (1,50,000 x 4.70)	705000 (1,50,000 x 4.70)
Transfer price	1,00,000 (50,000 x 2)	–
Variable cost	(2,00,000) (2,00,000 X 1)	(1,50,000) (1,50,000 x 1)
Fixed cost	(5,00,000)	(4,75,000)
Profit / loss	**105000**	**80,000**

Case Study-19

AB Cycles Ltd. has 2 divisions. A and B which manufacture bicycle. Division A produces bicycle frame and Division B assembles rest of the bicycle on the frame. There is a market of sub- assembly and the final product. Each division has been treated as a profit centre. The transfer price has been set at the long-run average market price. The following data are available to each division:

Estimated selling price of final product	₹ 3,000 per unit
Long run average market price of sub - assembly	₹ 2,000 per unit
Incremental cost of completing sub- assembly in division B ₹ 1,500 per unit.	
Incremental cost in Division A	₹ 1,200 per unit

Required:

i. If Division A's maximum capacity is 1,000 p.m and sales to the Intermediate are now 800 units, should 200 units be transferred to B on long-term average price basis.
ii. What would be the transfer price, if manager of Division B should be kept motivated.
iii. If outside market increases to 1,000 units, should Division A continue to transfer 200 units to Division B or sell entire production to outside market.

Note No.(1)Given

AB-CYCLE LTD.

Division- A Division - B

Sub -Assembly **Final Product**

	Per Unit		**Per Unit**
t.p/s.p	= 2,000	s.p	= 3,000
v.p	= 1,200	v.p	= 1,500

CAPACITY = 1,000

Out - sider 800 Balance 200

Ans No.(1)

YES – A – SHOULD TRANSFER – B

Inc- profit (2,000 – 1,200) x 200 units = 1,60,000

Ans No. (2) Statement Showing Calculation Of Transfer Pricing

A.	METHOD (1)	50 : 50
	S.P =	3,000
	V.P (A)	(1,200)
	V.P (B)	**(1,500)**
	CONT =	300

50	50
150	150
T.P (A TO B) = (1200 + 150) = 1,350	

B.	Method (2)	Vcost - Contribution
	S.P =	3,000
	V.P (A)	(1,200)
	V.P (B)	**(1,500)**
	CONT =	300

1,200	1,500
133	167
T.P (1200 + 133) = 1,333	

C. **NO**

If transfer to out sider profit is more

(2,000 – 1,200) = 800 (per unit) ₹ 250.

Case Study-20

X Ltd. has two divisions, A and B, which manufacture products A and B respectively. A and B are profit centres with the respective Divisional Managers being given full responsibility and credit for their performance.

The following figures are presented:

	Division A (₹) Per Unit	**Division B (₹) Per Unit**
Direct Material Cost	50	24*
Material A, if transferred from Division A	----	144
Material A, if purchased from outside	----	160
Direct Labour	25	14
Variable Production Overhead	20	2
Variable Selling Overhead	13	26
Selling Price in outside market	160	300
Selling Price to B	144	----
Selling Price to S Ltd.		250
(*) Other than A		

Other Information:

To make one unit of B, one unit of component A is needed. If transferred from Division A, Division B presently takes product A ₹ 144 per unit, with Division A not incurring variable selling overheads on unit transferred to Division B.

Product A is available in the outside market at ₹ 160 per unit for competitors.

Division B can sell its product in the external market at ₹ 300 per unit, whereas, if it supplied to X Ltd.'s subsidiary, S Ltd., it supplies at ₹ 250 per unit, and need not incur variable selling overhead on units transferred to S Ltd. S Ltd. requires 6,000 units and stipulates a condition that either all 6,000 units be taken from Division B or none at all.

	Division A (units)	**Division B (units)**
Manufacturing Capacity	20,000	28,000
Demand in external market	18,000	26,000
S Ltd.'s Demand	----	6,000 or zero

Assume that Divisions A and B will have to operate during the year.

Required:

Identify best strategy for:

i) Division A?

ii) Division B, given that Division A will use its best strategy?

Given

X - Ltd.

Division - A
↓
Product - A

Transfer Price →To B @ 144
(No Variable Selling Expenses)

Division - B
↓

Input		**Output**
1	:	1
'A'		'B'

Product A is Available Outside = 160
↓
Selling Price B→ 300
↓
Sub - Company's
Price = 250
6,000 Units

	Division A	Division b If Product A Is Taken Out From Division A	Division - B IF Product A Is Purchase From Outside Market
Direct Material (Other Than Product A)	50	24	24
Direct Labour	25	14	14
Variable Overhead (Production)	20	2	2
Variable Cost Product (Excluding A)	**95**	**40**	**40**
Product -A (Division A)		144	
Product -A (Purchased From Outside)	–	–	160
Variable Cost (Product)	**95**	**184**	**200**
Selling Price			

Statement Showing Contribution Per Unit

	If Sold to Outside Market			If Sold to Division B & 'S' Ltd.		
	A	**B**	**B**	**A**	**B**	**B**
Selling Price (P.U)	160	300	300	144	250	250
Variable Price (P.U)	(95)	(184)	(200)	(95)	(184)	(200)
Variable Price (Selling)	(13)	(26)	(26)	–	–	–
Contribution	**52**	**90**	**74**	**49**	**66**	**50**

(i) Best Strategy for Division A: Division A should produce as its full capacity of 20,000 units and sell 18,000 units to the outside market and remaining 2,000 units to Division B. The total contribution for Division A will be as calculated below:

Total Contribution

	(₹)
Sell to Outside Market (18,000 units x ₹ 52)	9,36,000
Sell to Division B (2,000 units x ₹ 49)	98,000
Total Contribution	10,34,000

(ii) Best Strategy for Division B when Division A will use its Best Strategy : Division B will procure 2,000 units from Division A and balance units by choosing best option from the two options calculates as below:

Option –I: Sell 6,000 units to S Ltd. and 22,000 units to Outside Market

Option –II: Only to Outside Market Sale

Production Capacity			
Option - I	**(₹)**	**Option - II**	**(₹)**
Sales to Outside Market : (20,000 units x ₹ 74 + 2,000 units x ₹ 90)	16,60,000	Sales to Outside Market : (24,000 units x ₹ 74 + 2,000 units x ₹ 90)	19,56,000
Sales to S Ltd.: (6,000 units x ₹ 50)	3,00,000	Sales to S Ltd:	----
Total	**19,60,000**	**Total**	**19,56,000**

Division B should produce at full capacity and choose option –I i.e. get 2,000 units from Division a, sell 6,000 units to S Ltd. and 20,000 units to outside market. Total contribution to Division B will be ₹ 19,60,000.

(iii) If Division A and B are allowed to act independent of the group synergy, total contribution to X Ltd. will be –

	(₹)
Division A	10,34,000
Division B	19,60,000
Total Contribution for X Ltd.	**29,94,000**

Cost from X Ltd.'s Perspective

	IF 'A' made in Division A (₹)	**IF 'A' purchased from outside market (₹)**
Variable Cost of Production in Division A	95	----
Variable Cost of Production in Division B	40	40
Purchase Cost from Outside	----	160
Total	**135**	**200**

Option - I	**(₹)**	**Option - II**	**(₹)**
Sales to Outside Market : [20,000 units x (₹ 274 - ₹ 135) + 2,000 units x (₹ 274 - ₹ 200)]	29,28,000	Sales to Outside Market: [20,000 units x (₹ 274 - ₹ 135) + 6,000 units x (₹ 274 - ₹ 200)]	32,24,000
Sales to S Ltd: [6,000 units x (₹ 250 - ₹ 200)]	3,00,000	Sales to S Ltd.:	----
Total	**32,28,000**	**Total**	**32,24,000**

Choose Option –I, where X Ltd. earns a contribution₹ 32,28,000. At this option Division A transfers all products i.e. 20,000 units to Division B and Division B transfers 6,000 units to S Ltd and 22,000 units to the outside market. Division B purchases 2,000 units of Product –A from the outside market.

At this option X Ltd. earns ₹ 2,34,000 more than Division A & B's individual earnings i.e. ₹ 32,28,000 -₹ 29,94,000.

Case Study-21

Hardware Ltd. manufactures computer hardware products in different divisions which operate as profit centres. Printer Division makes and sells printers. The Printer Division's budgeted income statement, based on a sales volume of 15,000 units is given below. The Printer Division's Manager believes that sales can be increased by 2,400 units, if the selling price is reduced by ₹20 per unit from the present price of ₹400 per unit, and that, for this additional volume, no additional fixed costs will be incurred.

Printer Division presently uses a component purchased from an outside supplier at ₹70 per unit. A similar component is being produced by the Components Division of Hardware Ltd. and sold outside at a price of ₹100 per unit. Components Division can make this component for the Printer Division with a small modification in the specification, which would mean a reduction in the Direct Material cost for the

Components Division by ₹1.5 per unit. Further, the Component Division will not incur variable selling cost on units transferred to the Printer Division. The Printer Division's Manager has offered the Component Division's Manager a price of ₹50 per unit of the component.

Component Division has the capacity to the produce 75,000 units, of which only 64,000 units can be absorbed by the outside market.

The current budgeted income statement for the Components Division is based on a volume of 64,000 units considering all of it as sold outside.

	Printer Division (₹ '000)	**Component Division (₹ '000)**
Sales Revenue	6,000	6,400
Manufacturing Cost		
Component	1,050	–
Other Direct Materials, Direct Labour& Variable Overhead	1,680	1,920
Fixed Overhead	480	704
Variable Marketing Costs	270	384
Fixed Marketing and Administration Overhead	855	704
Operating Profit	1,665	2,688

Required:

i) Should the Printer Division reduce the price by ₹ 20 per unit even if it is not able to procure the components from the Component Division at ₹ 50 per unit?

ii) Without prejudice to your answer to part (i) above, assume that Printer Division needs 17,400 units and that, wither it takes all its requirements from Component Division or all of it from outside source. Should the Component Division be willing to supply the Printer Division at ₹ 50 per unit?

iii) Without prejudice to your answer to part (i) above, assume that Printer Division needs 17,400 units. Would it be in the best interest of Hardware Ltd. for the Components Division to supply the components to the Printer Division at ₹ 50 ?

(Given)

Hardware Ltd.

Output Computer Hardware Product

Printer Division

Makes & Sales Printers

Present Sales = 15,000 - Nos. @400

+

It can be increased by 2,400 @ 380

Input -Purchases (Out - Side)

(Component) @ 70.00 Per - Unit

Hardware Components Division

Sales Price = **100 P.U**

Capacity

75,000 units

Outsider

64,000 Nos.

Balance

11,000

Transfer Pricing = 50.00 Per (Component)

Reduction In -Direct Material Cost @ 1.50 (P.U)

Statement Showing Present Cost –Sheet

	Printer Division		Component Division	
	15,000 Nos.		64,000 Nos.	
	Total	**P.U**	**Total**	**P.U**
Sales	60,00,000	400	64,00,000	100
Manufacturing Cost				
Component	(10,50,000)	(70)		
Other Direct Material, Direct Labour and Variable Overhead	(16,80,000)	(112)	(19,20,000)	(30
Manufacturing Cost	(4,80,000)	(32)	(704,000)	(11)
V.M Cost	(2,70,000)	(18.00)	(3,84,000)	(6)
Fixed Marketing and Admin Overheads	(8,55,000)	(57.00)	(704,000)	(11)
Operating Point	**(16,65,000)**	**111**	**20,88,000**	**42**

Statement Showing Analysis of Profit / Loss

	Printer Division			Component Division	
	Exiting Price	**Reduction in Sales Price**	**If Component Purchase Internally**	**Existing**	**If Transfer Effected**
(A) Sales	60,00,000 (15,000 x 400)	66,12,000 (17,400 x 380)	66,12,000 (17,400 x 380)	64,00,000 (64,000 x 100)	8,70,000 (17,400 x 50)
Component	(10,50,000) (15,000 x 70)	(12,18,000) (17,400 x 70)	(8,70,000) (17,400 x 50)		
Direct Material , Direct Labour& Variable Overhead	(16,80,000 (15,000 x 112)	(19,48,800) (17,400 x 12)	(19,48,800) (17,400 x 12)	(19,20,000) (64,000 x 30)	(4,95,900) (17,400 x 28.50)
Variable Marketing Cost	(2,70,000 (15,000 x 18)	(3,13,200) (17,400 x 18)	(3,13,200) (17,400 x 18)	(3,84,000) (64,000 x 6)	—
Contribution	**30,00,000**	**31,32,000**	**34,80,000**	**40,96,000**	**3,74,100**
Contribution Lost					4,096,000 (6,400 x 64)

(i) **Yes,** Printer Division should reduce price of its Printer by ₹ 20, as there is an increment in net income by ₹ 1,32,000 (₹ 31,32,000 - ₹ 30,00,000). Incremental operating profit can be found in the as below :

	(₹)
Contribution Margin of Sales increase (₹ 180 x 2,400 units)	4,32,000
Less : Loss in Contribution Margin on Original Volume arising from decrease in Selling Price (15,000 units x ₹ 20)	**3,00,000**
Increase in Operating Profit	**1,32,000**

(ii) **No,** The Component Division should not sell all 17,400 to Printer Division for ₹ 50. If the Component Division does sell all 17,400 units to Printer Division, Component Division will only be able to sell 57,600 units to outside customers instead of 64,000 units due to the capacity restrictions. This would decrease Component Division's profit by ₹35,500. Supporting calculations are as follows:

	(₹)
Contribution from Sales to Printer (₹ 21.50 x 17,400 units)	3,74,100
Less : Loss in Contribution from Loss of Sales to outsiders (₹ 64 x 6,400 units)	**4,09,600**
Decrease in Operating Profit	**35,500**

(iii) **Yes,** it would be in the best interest of Hardware Ltd. for the Component Division to sell the units to the Printer Division at ₹50 each. The net advantage to the Hardware Ltd. is ₹ 3,12,500as shown below. The net advantage is the result of the cost savings from purchasing the Component unit internally and the contribution margin lost from 6,400 units that the Component Division otherwise would sell to outsiders.

Total Company	**(₹ '000)**
Incremental Contribution - If the component is transferred within ₹ (3,480 - 3,132)	348
Contribution to the Component Division	**374.10**
Total incremental Contribution	722.10
Less : Contribution Lost by the Component Division	**409.60**
Net Contribution Gain	**312.50**

Case Study-22

B Ltd. makes three products X, Y and Z in Divisions X, Y and Z respectively. The following information is given:

	X	**Y**	**Z**
Direct Material (₹ / Unit) (excluding material X for Divisions Y and Z)	8	22	40
Direct Labour (₹ / Unit)	4	6	8
Variable Overhead (₹ / Unit)	2	2	2
Selling price to outside customers (₹ / Unit)	25	65	90
Existing capacity (no. of units)	6,000	3,000	3,000
Maximum external Market demand (no. of units)	5,000	5,500	5,000
Additional fixed cost that would be incurred to install additional capacity (₹)	45,000	9,000	23,100
Maximum additional units that can be produced by additional capacity	6,000	2,000	2,250

Y and Z need material X as their input. Material X is available in the market at ₹ 23 per unit. Defectives can be returned to suppliers at their cost. Division X supplies the material free from defects and hence is able to sell at ₹ 25 per unit. Each unit of Y and Z require one unit of X as input with slight modification.

If Y purchases from outside at ₹ 23 per unit, it has to incur ₹ 3 per unit as modification and inspection cost. If Y purchases from Division X, it has to incur, in addition to the transfer price, ₹ 2 per unit to modify it.

If Z gets the material from Division X, it can use it after incurring a modification cost, of ₹ 1 per unit. If Z buys material X from outside, it has to either inspect and modify it at its own shop floor at ₹ 5 per unit or use idle labour from Division X at ₹ 3 per unit. Division X will lend its idle labour as per Z's requirement even if Z purchases the material from outside.

The transfer prices are at the discretion of the Divisional Managers and will remain confidential. Assume no restriction on quantities of inter –division transfers or purchases.

Required:

Discuss with relevant figures the best strategy for each division and for the company as a whole.

Given Note No. (i)

B - Ltd.

Products →	(X)	(Y)		(Z)	
		Input - X		Input - X	
		Input	**Output**	**Input**	**Output**
		1 'X'	1 'Y'	1 'X'	1 'Z'

Market Price -X = 23.00 (Material 'X')
Selling Price 'X' = 25.00

Y

Purchase From Outside		Purchase From 'X'	
Variable Price	23.00	(Balance Figure) Variable Price =	24.00
Modification & Inspection	3.00	Modify =	2.00
	26.00	Maximum	**26.00**

Z

Purchase From Division 'X'			Outsider	
Variable Cost	=			
Modification	=	**1.00**		
		Purchase Cost	23	Balance Pg 25
		Modification Own	5	'X' = 3
			28	**28**

Statement Showing Contribution P.U

	Division - X			Division - Y		Division - Z
	Sale to Outsider	Internal Transfer		Purchase From Outside	Transfer 'X'	Transfer 'Z'
		Y	Z			
Revenue	**Selling Price**	**Transfer Price**	**Transfer Price**	**Selling Price**	**Selling Price**	**Selling Price**
	25 (Given)	24 (Note No. 1)	25 (Note No. 1)	65 (Given)	65 (Given)	90 (Given)
Direct Material	(8)	(8)	(8)	(22)	(22)	(40)
Direct Labour	(4)	(4)	(4)	(6)	(6)	(8)
Variable Overhead	(2)	(2)	(2)	(2)	(2)	(2)
Purchase Price	–	–	–	(23)	–	–
Transfer Price 'X'	–	–	–	–	(24)	(25)
Modification Cost	–	–	–	(3)	(2)	(1)
Contribution	**11.00**	**10.00**	**11.00**	**9.00**	**9.00**	**14.00**

Purchase Price 'X'	----	----	----	23.00	----	----
Transfer Price 'X'	----	----	----	----	24.00	25.00
Modification Cost	----	----	----	3.00	2.00	1.00
Contribution	11.00	10.00	11.00	9.00	3.00	14.00

(*) Division 'Y' will not pay Division 'X' anything more than ₹ 24, because at 24, it will incur additional cost of ₹ 2 per unit to modify it, ₹ 23 + ₹ 3 = ₹ 26, the outside cost.

(#) To purchase material X from outside is costly for Division 'Z' as after modification at own shop floor, cost of the same comes to Division 'Z' is ₹ 28 (₹ 23 + ₹ 5).

If Division 'X' goes to utilize its full capacity in that case labour would not be available for modification to Department 'Z'.

Accordingly Division 'Z' may purchase material X at ₹ 25 from Division 'X' i.e. market price to outsiders.

Statement Showing "Internal Transfer Decision (units)"

Particulars	X	Y	Z
Existing Capacity …(A)	6,000 units	3,000 units	3,000 units
Maximum Capacity that can be added …(B)	6,000 units	2,000 units	2,250 units
Total Maximum that can be produced …(C)= (A) + (B)	12,000 units	5,000 units	5,250 units
Maximum External Demand …(D)	5,000 units	5,500 units	5,000 units
Balance …(C) - (D)	7,000 units		250 units
Internal Transfer to Other Divisions	5,000 units to Z* 2,000 units to Y	N.A.	N.A.
Internal Transfer From Other Divisions	N.A.	2,000 units transfer from X (material X)	5,000 units transfer from X (material X)

(*) Division 'X' will supply its production to Division 'Z' first (after meeting its external requirement) as contribution from product Z is high.

Statement Showing "Decision Whether to Expand or Not"

Particulars	X	Y	Z
Additional Fixed Cost on Expansion	₹ 45,000	₹ 9,000	₹ 23,100
Contribution that can be earned by expansion	₹ 64,000 (4,000 units x ₹ 11 + 2,000 units x ₹ 10)	₹ 18,000 (2,000 units x ₹ 9)	₹ 28,000 (2,000 units x ₹ 14)
Net Benefit from Expansion	₹ 19,000	₹ 9,000	₹ 4,900
Decision	Expansion	Expansion	Expansion

(*) As maximum demand of product Z is 5,000 units which Division 'Z' first complete with existing capacity of 3,000 units. Balance 2,000 units from expansion.

Statement Showing "Net Revenue Addition"

Particulars	X	Y	Z	Total
Contribution	55,000	45,000	70,000	1,70,000
− External Sales	(5,000 units x ₹ 11)	(5,000 units x ₹ 9)	(5,000 units x ₹ 14)	
Contribution	75,000			75,000
− Internal Transfer	(2,000 units x ₹ 10 ÷ 5,000 units x ₹ 11)			
Additional Fixed Cost	45,000	9,000	23,100	77,100
Net Revenue Addition				1,67,900

Strategy for Company & Divisions

Division 'X' will transfer maximum possible material to Division 'Z' as Division 'Z' is offering maximum transfer price to Division 'X'. At the same time Division 'Z' is fetching maximum contribution for the organization so it is beneficial for the both Divisions as well as organization as a whole.

As shown above all the three Divisions are getting net benefit when they are taking decision to expand and hence, all three Divisions should expand their activity by incurring additional fixed cost on expansion.

CHAPTER -10

PERFORMANCE MEASUREMENT & EVALUATION

Profitability Analysis –Product Wise/Direct Product Profitability

Case Study-1

A company produces and sells four types of dolls for children. It also produces and sells a set of dress kit for the dolls.

The company has worked out the following estimates for the next year:

Doll	Estimated Demand	Standard Material Cost (₹)	Standard Labour Cost (₹)	Estimated Sales Per Unit (₹)
A	50,000	20	15	60
B	40,000	25	15	80
C	35,000	32	18	100
D	30,000	50	20	120
Dress Kit	2,00,000	15	5	50

To encourage the sale of dress kits, a discount of 20% in its price is offered if it were to be purchased along with the doll. It is expected that the entire customer, buying dolls will also buy the dress kit.

The company's factory has effective capacity of 2,00,000 labour hours per annum on a single shift basis and it produces all the products on that basis. The labour hour rate is ₹ 15. Overtime of labour has to be paid at double the normal rate.

Variable cost works out to 50% of direct labour cost. Fixed costs are ₹ 30 lakhs per annum.

There will be no inventory at the end of the year.

Required:

Draw a conservative estimate of the year's profitability.

Statement Showing Analysis of Profit / Loss

Products	Units		P.U (Refer No. 1)		Total Contribution
A	50,000	×	19	=	9,50,000
B	40,000	×	34	=	13,60,000
C	35,000	×	42.8	=	14,98,000
D	30,000	×	42	=	12,60,000
Dress Kit (with disc)	1,55,000	×	18	=	27,90,000
Dress Kit (without disc)	45,000	×	28	=	12,60,000
				Total Contribution	91,18,000
				(-) Fixed Cost	(30,00,000)
				(-) Overtime Cost	(5,80,000)
				NP	**55,38,000**

Contribution (P.U)

	Dress Kit (With Disc)	Dress Kit (Without Disc)	A	B	C	D
Sales Price (P.U)	40 (50 x 80%)	500	60	80	100	120
Material Cost	(15)	(15)	(20)	(25)	(32)	(50)
Lab	(5)	(5)	(15)	(15)	(18)	(20)
Variable Overheads (40 % of lab)	(2)	(2)	(6)	(6)	(7.2)	(8)
Contribution (P.U)	**18**	**28**	**19**	**34**	**42.8**	**42**

Statement Showing Overtime Cost If Any

Products	Labour Cost P.U	÷ 15	x Units	Total Lab. hours
A	15	15	50,000	50,000
B	15	15	40,000	40,000
C	18	15	35,000	42,000
D	20	15	30,000	40,000
Dress Kit	5	15	2,00,000	66,666.67
			Hours Required	**2,38,666.67**
			Hours Available	**2,00,000**
			Shortage	38,666.67
			Overtime Cost (38,666.67 x 15)	**5,80,000**

Explanation :- Of Why 15 and not 30 is taken (15 is already paid we have to paid additional 15)

2,38,666.67

(2,00,000 x 15) = 30,00,000 + Overtime (38,66,667 x 30) = 41,60,000

11,60,000

Product	Units			
A	50,000	15	7,50,000	
B	40,000	15	6,00,000	
C	35,000	18	6,30,000	(35,80,000) (2,38,666.67 x 15)
D	30,000	20	6,00,000	5,80,000 i.e. (38,666.67 x 15)
Dress Kit	2,00,000	5	10,00,000	

Case Study-2

The following information regarding retail stores are gathered:

	Butter Jelly	Fruits & Nuts	Icy Cool
No. of Cartons per cubic metre (m^3)	42	28	40
No. of Items per cartons (units)	300	144	72
Sales per month (units)	18,000	4,608	1,152
Time in Warehouse (in months)	1	1.5	0.5
Time in Retail Stores (in months)	1	2	1
Selling Price per unit (₹)	84	42	26
Purchase Price per unit (₹)	76	34	22

Butter Jelly and Icy-Cool are required to be kept under refrigerated conditions.

Additional Information:

Total Volume of All Goods Sold Per Month	40,000 m^3
Total Volume of Refrigerated Goods Sold per month	25,000 m^3
Carrying volume of each van	64 m^3

Required:

CALCULATE the Profit per using Direct Product Profitability (DPP) method.

Jigyasa India Ltd. (JIL) has 30 retail stores of uniform sizes 'Fruity & Sweety Retails' across the country. Mainly three products namely 'Butter Jelly', 'Fruits Nuts' and 'Icy Cool' are sold through these retail stores. JIL maintains stocks for all retail stores in a centralized warehouse. Goods are released from the warehouse to the retail stores as per requisition raised by the stores. Goods are transported to the stores through two types of vans i.e. normal and refrigerated. These vans are to be hired by the JIL.

Costs per month of JIL are as follows:

	(₹)
Warehouse Costs:	
Labour & Staff Costs	27,000
Refrigeration Costs	1,52,000
Material Handling Costs	28,000
Total	2,07,000
Head Office Cost :	
Salary & Wages to Head Office Staff	50,000
Office Administration Costs	1,27,000
Total	1,77,000
Retail Stores Costs:	
Labour Related Costs	33,000
Refrigeration Costs	1,09,000
Other Costs	47,000
Total	**1,89,000**

Average transportation cost of JIL per trip to any retail stores are as follows:

Normal Van	₹ 3,200
Refrigerated Van	₹ 4,900

The Chief Financial Manager asked his Finance managers to calculate profitability on three products sold through Fruit & Sweety retails stores rather than traditional method of calculating profitability.

Statement Showing Direct Product Profitability (D.P.P)

	Butter Jelly	Fruits & Nut	Icy Cool
Selling Price	**(P.U)**	**(P.U)**	**(P.U)**
	84	42	26
Purchase Price	(76)	(34)	(22)
Gross Profit	**8**	**8**	**4**
Direct -Product Cost			
(1) Warehouse Cost Per m^3 (Note No. 1)	7.46	2.07	3.73
(2) Retail - Stores- Cost Per m^3 (Note No. 2)	6.36	4	6.36
(3) Transport Cost Per m^3 (Note No. 3)	76.56	50	76.56
	90.38	56.07	86.65
Cost Per Unit	÷ 12,600 = .007	÷ 4,032 = .014	÷ 2,880 = .030
Direct -Product Profit	7.993 (8 - .007)	7.986 (8 - 0.14)	3.97 (4 - .030)

Statement Showing No. of Items Per m^3

	Butter Jelly	Fruits & Nut	Icy Cool
No. of Cartons	42	28	40
x No. of Items	x 300	x 144	x 72
No. of Items Per m^3	**= 12,600**	**= 4,032**	**= 2,880**

Note No. 1 **Warehouse Related Cost - Per Month**

		Butter Jelly	Fruits & Nut	Icy Cool
Warehouse				
(1) Gen - Cost (P.M)		1.38 x 1	1.38 x 15	0.5 x 1.38
(Note No. 1)		1.38	2.07	0.69
(2) Cost Related		6.08 x 1		5 x 6.08
with Ref (P.M)		6.08		3.04
(Note No. 3)		**7.46**	**2.07**	**3.73**
Items m^3				
(Note No. 4)				
Gen Cost		Cost to Ref		
Warehouse				
Labour Staff	27,000	–		
Reference Cost	–	1,52,000		
M HAND	28,000			
	55,000	1,52,000		
	÷ 40,000	÷ 25,000		
	= 1.375	= 6.08		
	@ 1.38			

Note No.2	Butter Jelly	Fruits & Nut	Icy Cool
Retail - Stores			
Gen Cost	2.00 x 1	2.00 x 2	2.00 x 1
(Note No. 6)		4	
Cost Relate With Reference	4.36 x 1		4.36 x 1
	6.36	**4**	**6.36**

	GEN Cost	Cost Related
Labour Cost	33,000	
Reference Cost		109,000
Other Cost	47,000	
	80,000	109,000
	÷ 40,000	÷ 25,000
	2.00	4.36

Note No. 3 Transport Cost

	Normal Van	Reference Van
Cost Per (Trip)	3,200	4,900
Volume	64	64
Cost Per (Trip)	50	76.56

Case Study-3

Illustration

A and B are two customers of XYZ Electronics Ltd., a manufacturer of audio players. Selling price per unit is ₹ 5,400. Its cost of product per unit is ₹ 4,420.

Additional costs are:

Order Processing Cost	…….	₹ 2,000 per order
Delivery Costs	…….	₹ 3,500 per delivery

	Customer A	Customer B
Audio Players purchased (nos.)	350	500
No. of Orders	5 (Each of 70 units)	10 (Each of 50 units)
No. of deliveries	5	0

The company's policy is to give a discount of 5% on the selling price on orders for 50 units or more, and to further give 8% discount on the undiscounted selling price if a customer uses his own transport to collect the order. Assume that production levels are not altered by these orders.

Required:

1. ANALYSE the profitability by comparing profit per unit for each customer.
2. COMMENT on the discount policy on delivery.

Statement Showing Analysis of Profit/ Loss

	Customer A	Customer B
Sales Units	350	500
	₹	₹
Selling Price (P.U)	5,400	5,400
Qty-Discount	(270)	(270)
	(5,400 x 5%)	(5,400 x 5%)
Discount - Delivery	–	(432)
		(5,400 x 8%)
Net -Selling Price	5,130	4,698
Variable Cost (P.U)	(4,420)	(4,420)
	710	278
Total Contribution	2,48,500	1,39,000
(Units x Cont P.U)	(350 x 710)	(500 x 278)
Indirect Cost		
(1) Delivery Cost	(17,500)	–
	(5 x 3,500)	
(2) Ordering Cost	(10,000)	(20,000)
	(5 x 2,000)	(10 x 2,000)
Profit -Per -Customer	2,21,000	1,19,000
Profit -Per -Unit	(2,21,000 ÷ 350) = 631.43	(1,19,000 ÷ 500) = 238

Analysis

Even though A has lower sales volume (30% lesser from B), it is contributing almost double profit that is being contributed by B as overall discount offered to customer A is quite less.

Comments on the "Discount Policy on Delivery"

Discount on delivery offered to customer B is ₹ 432 per unit. If transport for delivery is provided to customer B then the cost would have been ₹ 70 per unit (10 deliveries × ₹ 3,500 / 500 units) which is lesser by ₹ 362. It may also be noted that delivery cost in case of customer A is only ₹ 50 per unit (₹ 17,500 ÷ 350 units). Hence, company needs to review discount policy on delivery but significance of profitability of customer B should also be kept in mind while doing so.

Case Study-4

Edward Ltd. manufactures weighing machines of standard size and sells its products to two industrial customers namely MT Ltd. and KG Ltd. and to a dealer MG Bros. having shops in different cities. The maximum retail price per unit of weighing machine is ₹ 11,000 and per unit average cost of production is ₹ 5,500 (40% is general fixed overhead cost).

The Finance Officer has been asked to undertake a customer profitability analysis and calculate and compare the profit margin per customer (before deducting general fixed overhead) to know about the real customer profitability.

Following are the additional overhead information:

Delivery Costs	₹ 200 per Kilometer
Emergency Delivery Cost (in addition to Delivery Cost)	₹ 21,000 per Delivery
Order Processing Cost	₹ 6,000 per Order
Specific Discount and Sales Commission	As per Negotiation
Product Advertisement Cost	Actual Cost

The following data are available for each customer:

Particulars	**MT Ltd.**	**KG Ltd.**	**MG Bros.**
Sales (in units)	2,000	1,000	800
Total Delivery Kilometer Travelled	1,000	800	900
No. of Emergency Delivery	2	1	0
No. of Orders Processed	4	2	8
Specific Discount (Percentage of Sales Revenue)	25%	20%	15%
Sales Commission (Percentage of Sales Revenue)	15%	10%	5%
Advertisement Costs (₹)	8,75,000	6,15,000	4,30,000

Required:

Analyze the profitability for each customer, which customer is the most profitabl

Statement Showing Customer Profitability

	MT Ltd.	**KG Ltd.**	**MG Bros.**
	₹	**₹**	**₹**
(A) Sales	2,20,00,000 (2,000 units x 11,000)	1,10,00,000 (1,000 units x 11,000)	88,00,000 (800 units x 11,000)
(B) Relevant -Cost			
Variable Cost (5,500 x 60%) = 3,300	(66,00,000) (3,300 x 2,00 units)	(33,00,000) (3,300 x 1,000 units)	(26,40,000) (3,300 x 800 units)
Contribution	**154,00,000**	**77,00,000**	**61,60,000**
Overheads			
(1) Delivery Cost (Kms x 200)	(2,00,000) (1,000 x 200)	(1,60,000) (800 x 200)	(1,80,000) (900 x 200)
(2) Emergency Delivery Cost (No. of x 21,000 Delivery)	(42,000) (2 x 21,000)	(21,000) (1 x 21,000)	 (0 x 21,000)
(3) Order Processing Cost (No. of Orders x 6,000)	(24,000) (4 x 6,000)	(12,000) (2 x 6,000)	(48,000) (8 x 6,000)
Specific Discount (25 % x 2,20,00,000)	(55,00,000)	(22,00,000) (20 % x 1,10,00,000)	(13,20,000) (15% x 88,00,000)
Sales Commission (15% x 2,20,00,000)	(33,00,000)	(11,00,000) (10% x 1,10,00,000)	(4,40,000) (5% x 88,00,000)
Advertisement Cost	(8,75,000)	(6,15,000)	(4,30,000)
Profit Per Customer	**54,59,000**	**35,92,000**	**37,42,000**
$\left(\frac{\text{Profit}}{\text{Sales}} \text{x } 100\right)$ (%)	24.82%	32.65%	42.52%
	III	**II**	**I**

- Before Deducting General Fixed Overhead Cost

Analysis

The Contribution Margin is 70% for each Customer but when the other Overheads Costs per customer is included in the above Profitability Statement the Profitability of the three Customers before different. MG Bros. is the most Profitable Customer.

Case Study-5

Oxford Medical Care Co. (OMCC) is a pharmaceutical firm, operating its entire business through its four customers Ox_1,Ox_2,Ox_3 and Ox_4. Ox_1 and Ox_2 are small pharmaceutical stores while Ox_3 and Ox_4 are large discount stores with attached pharmacies. OMCC uses discount pricing strategy and prices its products at variable cost plus 25%.

Item	Small Pharmaceuticals		Large Pharmaceuticals		Activity Rate
	Ox_1	Ox_2	Ox_3	Ox_4	
Number of Orders	4	9	6	3	₹ 750
Order Size	₹ 40,000	₹ 20,000	₹ 4,25,000	₹ 4,00,000	n / a
Average Discount	4.50%	9.50%	17.50%	11.50%	n / a
Regular Deliveries	4	9	6	3	₹ 375
Expedited Deliveries	2	0	2	0	₹ 1,250
General Administration Cost	₹ 20,250		₹ 48,375		

Required:

i. Prepare a 'Customer Profitability Statement' that shows the profit from each customer and each customer channel.
ii. Recommend some points to improve OMCC's profit.

Recommendations

Small Pharmaceuticals

Even though Ox_1 has lower sales volume (11% lesser from Ox_2), it is contributing around 67% of small store's profit as its order is for larger quantities and discount offered is very less.

OMCC is only just at breakeven point with small pharmaceuticals. To improve profit OMCC should:

a) Coordinate with Ox_2 to increase order size and try to negotiate a smaller discount.
b) Try to work with Ox_1 to reduce expedited deliveries.

Large Pharmaceuticals

OMCC makes substantial profit from the large pharmaceuticals. Ox_4 alone contributing around 55% of total customer's profit and its order is for larger quantities. Therefore, Ox_4 is most favorable customer and may be given little extra attention. For Ox_3, OMCC may have no options but to treat is as less profitable customer as Ox_3 accounts more than 60% of sales.

Statement Showing Customer Profitability Analysis

Item	Small Pharmaceuticals		Large Pharmaceuticals		Total
	Ox_1	Ox_2	Ox_3	Ox_4	
(A) Revenues	1,60,000 (40,000 x 4)	1,80,000 (20,000 x 9)	25,50,000 (6 x 4,25,000)	12,00,000 (3 x 4,00,000)	40,90,000
Discount	(7,200 (1,60,000 x 45%)	(17,100 (1,80,000 x 9.5%)	(4,46,250 (25,50,000 x 77.5%)	(1,38,000 (12,00,000 x 11.5%)	(608,550
Net- Revenues	1,52,800)	1,62,900	2,103,750	10,62,000	34,81,450
Variable Cost Price = (Cost + 25%)	(1,28,000) $\left(\frac{1,60,00 \times 100}{100+25}\right)$	(1,44,000 $\left(\frac{1,80,000 \times 100}{100+25}\right)$	(20,40,000 $\left(\frac{25,50,000 \times 100}{125}\right)$	(9,60,000 $\left(\frac{12,00,000 \times 100}{125}\right)$	(32,72,000
Contribution	24,800	18,900	63,750	102,000	209,450
Order Processing	(3,000) (4 x 750)	(6,750) (9 x 750)	(4,500) (6 x 750)	(2,250) (3 x 750)	(16,500)
Regular Deliveries	(1,500) (4 x 375)	(3,375) (9 x 375)	(2,250) (6 x 375)	(1,125) (3 x 375)	(8,250)
Expected Deliveries	(2,500) (2 x 1,250)	(0 x)	(2,500) (2 x 1,250)	– (0 x)	(5,000)
Customer Profit	17,800	8,775	54,500	98,625	1,79,700
Channel Total	26,575 (17,800 + 8,775)		1,53,125 (54,500 + 98,625)		1,79,700
General Admin Cost	(20,250		(48,375)		(68,625)
	6,325		104,750		1,11,075

Case Study-6

PQR Ltd. specializes in the distribution of pharmaceutical products. It buys from pharmaceutical companies and resells to each of the three different markets:

i) General Supermarket Chains
ii) Drug Store Chains
iii) Chemist Shops

The company plans to use activity based costing for analyzing the profitability of its distribution channels. The following data for the quarter ending March 2014 is given:

	General Supermarket Chains	Drug Store Chains	Chemist Shops
Average Sales per delivery	₹ 96,500	₹ 32,450	₹ 6,225
Average cost of goods sold per delivery	₹ 94,650	₹ 31,800	₹ 5,950
Number of deliveries	960	2,470	8,570
Total number of orders	1,000	2,650	9,500
Average number of cartons shipped per delivery	250	75	12
Average number of hours of shelf stocking per delivery	2	0.5	0.1

The following information is available in respect of operating costs (other than cost of goods sold) for the quarter ending March 2014:

Activity Area	Cost Driver	Total Cost (₹)
Customer purchase order processing	Purchase order by customers	5,91,750
Customer Store delivery	Number of deliveries	9,60,000
Cartons dispatched to customer stores	Number of Cartons dispatched to customer stores	7,92,135
Shelf stocking at customer store	Hours of shelf stocking	80,240

Required:

Compute the operating income of each distribution channel for the quarter ending March 20134 using activity based costing.

Step No. 1 Statement Showing Cost Driver Rate

Activity	Cost - Driver Used	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$ = Cost Driver Rate
(1) Customer Purchase Order Processing	Purchase Order by Customer (1,000 + 2,650 + 9,500) = 45.00	$\left(\frac{5,91,750}{13,150}\right)$
(2) Customer Store Delivery	Number of Deliveries (960 + 2,470 + 8,570) = 80.00	$\left(\frac{9,60,000}{12,000}\right)$
(3) Cartons Dispatched to Customer Stores	No. of Cartons Dispatched to Customer Stores (Note no. 1)	$\left(\frac{7,92,135}{528,090}\right)$ = 1.50
(4) Shelf Stocking At Customer Stores	Hrs. of Self Stocking (Note no.2)	$\left(\frac{80,240}{4,012}\right)$ = 20.00

Note No. 1

Number of Cartons dispatched to Customer Stores:-

Product	No. of Deliveries x Average Cartons Shipped	= Total
(1) General Supermarket Chains	(960 x 250) =	2,40,000
(2) Drug Stores Chains	(2,470 x 75) =	1,85,250
(3) Chemist Shop	(8,570 x 12) =	102,840
		528,090

Note No. 2

Hours for Self Stocking

Product	No. of Deliveries x Hours	= Total
(1) General Supermarket Chains	(960 x 2) =	1,920
(2) Drug Stores Chains	(2,470 x 0.5) =	1,235
(3) Chemist Shop	(8,570 x 0.10) =	857
		4,012

Statement Showing Operating Income of Distribution Channels of PQR Ltd.

	General Supermarket Chain	Drug Stores Chain	Chemist Shop	Total
	₹	₹	₹	₹
(A) Sales	9,26,40,000	80,151,500	5,33,48,250	22,61,39,750
(No. of deliveries x Average Sales Per Delivery)	(960 x 96,500)	(2,470 x 32,450)	(8,570 x 6,225)	
(B) Cost of Goods Sold	(90,864,000)	(78,546,000)	(50,991,500)	(220,401,500)
(No. of Deliveries x Average Cost of Goods Sales per delivery)	(960 x 94,650)	(2,470 x 31,800)	(8,570 x 5,950)	
Gross - Margin	17,76,000	1,605,500	23,56,750	57,38,250
Operating Cost				
(1) Customer Purchase	(45,000)	(1,19,250)	(4,27,500)	(5,91,150)
Order Processing	(1,000 x 45)	(2,650 x 45)	(9,500 x 45)	
(2) Customer Store	(76,800)	(1,97,600)	(6,85,600)	(9,60,000)
Delivery	(960 x 80)	(2,470 x 80)	(8,570 x 80)	
(3) Carton Dispatched To Customer Stores	(3,60,000)	(27,78,775)	(1,54,260)	(7,92,135)
	(2,40,000 x 1.50)	(1,85,250 x 1.50)	(102,840 x 1.50)	
(4) Shelf Stocking At Customer Stores	(38,400)	(24,700)	(17,140)	(80,240)
	(1,920 x 20)	(1,235 x 20)	(857 x 20)	
Operating Income	**12,55,800**	**9,86,075**	**10,72,250**	**33,14,125**

Activity Based Costing

Case Study -7

Catalyst Ltd. makes a single product with the following details:

Description	Current Situation	Proposed Change
Selling Price (₹/unit)	10	
Direct Costs (₹/unit)	5	
Present number of setups per production period, (before each production run, setup is done)	42	
Cost per set up (₹)	450	Decrease by ₹ 90
Production units per run	960	1,008
Engineering hours for production per period	500	422
Cost per engineering hour (₹)	10	

The company has begun Activity Based Costing of fixed costs and has presently identified two cost drivers, viz. production runs and engineering hours. Of the total fixed costs presently at ₹ 96,000, after the

above, ₹ 72,100 remains to be analyzed. There are changes as proposed above for the next production period for the same volume of output.

Required:

(i) How many units and in how many production runs should Catalyst Ltd. produce in the changed scenario in order to break-even?
(ii) Should Catalyst Ltd. continue to break up the remaining fixed costs into activity based costs? Why?

Ans No.1

B.E.P Analysis

Selling Price 10.00 P.U

Variable Price (Direct - Cost)	Contribution	
5.00	5.00 x 18,144 = 90,720	
	Fixed Cost	Profit
	(Note No. 1) 90,720	0

Note No. 1

		₹
Fixed Cost		72,100
Setup Cost		14,400
No. of Setup	x Production	Units
42	x 960	40,320
$\left(\frac{40{,}320 \text{ units}}{1{,}008}\right)$	x (450 - 90)	

Engg- Cost

Engg hrs.	x 10	= Engg Cost	4,220
422	x 10	= 4,220	
		Total	**90,720**

(II)

$$\text{Production Runs} = \left(\frac{18{,}144}{1{,}008}\right) = 18 \text{ Nos.}$$

(B.E.P Units ÷ Production Units Per Run)

Case Study -8

Linex Limited manufactures three products P, Q and R which are similar in nature and are usually produced in production runs of 100 units. Product P and R require both machine hours and assembly hours, whereas product Q requires only machine hours. The overheads incurred by the company during the first quarter are as under:

		₹
Machine Department expenses	…….	18,48,000
Assembly Department expenses	…….	6,72,000
Setup costs	…….	90,000
Stores receiving cost	…….	1,20,000
Order processing and dispatch	…….	1,80,000
Inspect and Quality control cost	…….	36,000

The date related to the three products during the period are as under:

	P	Q	R
Units produced and sold	15,000	12,000	18,000
Machine hours worked	30,000 hrs.	48,000 hrs.	54,000 hrs.
Assembly hours worked (direct labour hours)	15,000 hrs.		27,000 hrs.
Customers orders executed (in numbers)	1,250	1,000	1,500
Number of requisitions raised on the stores	40	30	50

Required:

Prepare a statement showing details of overhead costs allocated to each product type using activity based costing.

Step No.1 Statement Showing Cost Driver Rate

Activity	**Cost Driver Used**	$\left(\frac{\textbf{Activity Cost}}{\textbf{Cost Driver Used}}\right)$ = Cost Driver Rate
1. Machine Department	$\left(\frac{\text{No. of M} - \text{Hrs.}}{1{,}32{,}000}\right)$ (30,000 + 48,000 + 54,000)	$\left(\frac{18{,}48{,}000}{1{,}32{,}000}\right)$ = 14.00
2. Ass- Department Exp	$\left(\frac{\text{No. of Ass} - \text{Hrs.}}{42{,}000}\right)$ (15,000 + 17,000)	$\left(\frac{6{,}72{,}000}{42{,}000}\right)$ = 16.00
3. Setup Cost	$\left(\frac{\text{No. of Production Rank}}{* = 450}\right)$	$\left(\frac{90{,}000}{450}\right)$ = 200

No. of Production Runs

* P	15,000 Units	÷ 100	= 150
Q	12,000 Units	÷ 100	= 120
R	18,000 Units	÷ 100	= 180
			450

No. of Required

4. Stores - REC $\left(\frac{\text{Raised}}{40+30+50}\right)$ $\left(\frac{1,20,000}{120}\right)$ = 1,000

5. Order Processing Dispatch $\frac{\text{No. of Orders}}{(1,250+1,000+1,500)}$ $\left(\frac{1,80,000}{3,750}\right)$

6. Inspection Quality $\left(\frac{\text{No. of Production Runs}}{\text{Inspect Quality Control}}\right)$ $\left(\frac{36,000}{450}\right)$

Step No.2

Activity	**Product**	**Cost Driver Used x Cost Driver Rate**	**÷ Production =**	**Cost Driver Rate P.U**
(1) Machine Dept.		No. of Machine hours		
	P	30,000 x 14	÷ 15,000	28
	Q	48,000 x 14	÷ 12,000	16
	R	54,000 x 14	÷ 18,000	42
(2) Ass Dept.		No. of Ass hours		
	P	15,000 x 16	÷ 15,000	16
	Q		÷	
	R	27,000 x 16	÷ 18,000	24
(3) Setup Cost		No. of Production Runs		
	P	150 x 200	÷ 15,000	2
	Q	120 x 200	÷ 12,000	2
	R	180 x 200	÷ 18,000	2
(4) Stores REC		No. of Requisitions Raised		
	P	40 x 1,000	÷ 15,000	2.67
	Q	30 x 1,000	÷ 12,000	2.5
	R	50 x 1,000	÷ 18,000	2.77
(5) Order Processing & dispatch				
	P	1,250 x 48	÷ 15,000	4
	Q	1,000 x 48	÷ 12,000	4
	R	1,500 x 48	÷ 18,000	4
(6) Inspect Quality		No. of Production Runs		
	P	150 x 80	÷ 15,000	0.8
	Q	120x 80	÷ 12,000	0.8
	R	180 x 80	÷ 18,000	0.8

Case Study – 9

G-2020 Ltd. is a manufacturer of a range of goods. The cost Structure of its different products is as follows:

Particulars	Product A	Product B	Product C	
Direct Material	50	40	40	₹/u
Direct Labour @₹10/hour	30	40	50	₹/u
Production Overhead	30	40	50	₹/u
Total cost	110	120	140	₹/u
Quantity	10,000	20,000	30,000	Units

G-2020 Ltd. was Absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC System and has identified cost drivers and cost pools as follows:-

Activity cost pool	Cost driver	Associated cost
Stores receiving	Purchase Requisitions	2,96,000
Inspection	Number of production Runs	8,94,000
Dispatch	Order executed	2,10,000
Machine Setup	Number setups	12,00,000

The Following Information is also supplied:

Details	Product A	Product B	Product C
No Of Setups	360	390	450
No of orders Executed	180	270	300
No of Productions runs	750	1,050	1,200
No of purchase requisition			

Required:

Calculate activate based production cost of all the three products.

Activity	Cost Driver Used	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$ = Cost Driver Rate
(1) Stores Recovery	No. of Purchase Required (300 +450+500)	$\left(\frac{2,96,000}{1,250}\right)$ = 236.80
(2) Inspection	No. of Production Runs (750+1,050+1,200)	$\left(\frac{8,94,000}{3,000}\right)$ = 298
(3) Dispatch	No. of Orders Executed (180+270+300)	$\left(\frac{2,10,000}{750}\right)$ = 280
(4) Machine Setup	No. of setups (360+390+450)	$\left(\frac{12,00,000}{1,200}\right)$ = 1,000

Activity	Product	Cost Driver Used x Cost Driver Rate	÷ Production =	Cost Driver Rate P.U
(1) Stores REC		No. of Purchase Required		
	A	300 x 236.80	÷ 10,000	7.10
	B	450 x 236.80	÷ 20,000	5.33
	C	500 x 236.80	÷ 30,000	3.95
(2) Insp				
	A	750 x 298	÷ 10,000	22.35
	B	1,050x298	÷ 20,000	15.65
	C	1,200 x 298	÷ 30,000	11.92
(3) Disp				
	A	180 x 280	÷ 10,000	5.04
	B	270 x 280	÷ 20,000	3.78
	C	300 x 280	÷ 30,000	2.80
(4) M- Setup				
	A	360 x 1,000	÷ 10,000	36
	B	390 x 1,000	÷ 20,000	19.5
	C	450 x 1,000	÷ 30,000	15.00

Statement Showing Cost Sheet As Per ABC

Direct Cost		A P.U	B P.U	C P.U
	Direct Mat	50	40	40
	Dir Lab	30	40	50
IND Cost		80	80	80
	Activity (1)	7.1	5.33	3.95
	Activity (2)	22.35	15.65	11.92
	Activity (3)	5.04	3.78	2.8
	Activity (4)	36	19.5	15
	Total Cost	**150.49**	**124.25**	**123.67**

Case Study - 10

Chicago Manufacturing Co. (CMC) manufactures several product of varying levels of designs and models. It uses a single overhead recovery rate based on direct labour hours. The overheads incurred by the CMC in the half of the year as under:

Machine operation expenses	10,12,500
Machine maintenance expenses	1,87,500
Salaries of technical staff	6,37,500
Wages and salaries of stores staff	2,62,500

During this period, CMC introduced activity based costing system and the following significant activities were identified:

- Receiving materials and components.
- Set up of machines for productions runs.
- Quality inspection

It is determined that:

- The machine operation and machine maintenance expenses should be apportioned between stores and production activity in 20:80ratio.
- The technical staff salaries should be apportioned between machine maintenance, set up and quality inspection in 30:40:30 ratio.

The Consumption of activities during the period under review are as under:

- Direct labour hours worked 40,000
- Direct wage rate₹ 6 per hour
- Production set-ups 2,040
- Material and component consignments from received from suppliers 1,960
- Number of quality inspections carried out 1,280

The data relating to two product manufactured by the CMC during the period as under:

	Product 'P'	**Product 'Q'**
Direct material costs (₹)	6,000	4,000
Direct labour hours	960	100
Direct material consignments received	48	52
Production runs	36	24
Number of quality inspections done	30	10
Quantity produced (units)	15,000	5,000

A potential customer has approached CMC for the supply of 24,000 units of a component K to be delivered in lots of 3,000 units per quarter. The job will involve an initial design cost of ₹ 60,000 and the manufacture will involve the following per quarter:

Direct material costs	₹ 12,000
Direct labour hours	300
Production runs	6
Inspections	24
Number of consignments of Direct materials to be received	20

CMC desires a markup of 25% on cost.

Required:

(i) Calculate the cost of product P and Q based on the existing system of single overhead recovery rate.
(ii) Determine the cost of product P and Q using activity based costing system.
(iii) Compute the sales value per quarter of component K using activity based costing system.

Traditional Method

$$(\text{RecoveryRate}) = \left(\frac{\text{Total Overheads}}{\text{Total Labour Hrs.}}\right)$$

$$\left(\frac{10,12,500 + 1,87,500 + 6,37,500 + 2,62,500}{40,000 \text{ Hrs.}}\right)$$

$$= \left(\frac{₹\ 21,00,000}{40,000}\right)$$

= 52.50 per hr.

Statement Showing Cost Sheet (As per Traditional Method)

Product/Production	**P = 15,000 Units**		**5,000 Units**	
	Total	**P.U**	**Total**	**P.U**
Direct Cost				
Direct Material	6,000	0.40	4,000	0.80
Direct Labour	5,760	0.384	600	0.12
(Hrs. x Rate)	(960 x 6)		(100 x 6)	
Prime Cost	11,760	0.784	4,600	0.92
Ind- Cost				
Factory O.H	50,400	3.36	5,250	1.05
(Hrs. x Rate)	(960 x 52.50)		(100 x 52.50)	
Total Cost	**62,160**	**4.144**	**9,850**	**1.97**

Step No.1 Statement Showing Cost Driver Rate

	$\left(\frac{\textbf{Activity Cost}}{\textbf{Cost Driver}}\right)$	$\left(\frac{\textbf{Cost Driver Used}}{\textbf{Cost Driver}}\right) = \textbf{Cost Driver Rate}$
(1) Setup	Production Runs (Note No. 1)	$\left(\frac{13,68,000}{2,040}\right) = 670.59$
(2) Quality Inspection	No. of Inspection (Note No. 1)	$\left(\frac{1,91,250}{1,280}\right) = 149.41$
(3) Stores	No. of Con-Recd (Note No. 1)	$\left(\frac{5,40,750}{1,960}\right) = 275.89$

Statement Showing Reallocation of Overheads

	Technical Staff	Machine Operation	Machine Maintenance	Setup	Quality Inspection	Stores
	Salaries	Exp	Exp			
Exp Re- (30:40:30)	6,37,500 (6,37,500)	10,12,500	18,75,00 1,91,250	25,50,000	1,91,250	26,250
Reallocation (20:80)		10,12,500 (10,12,500)	3,78,750 (3,78,750)	11,13,000		2,78,250
				13,68,000	1,91,250	5,40,750

Step No. (2) Statement Showing Cost Driver Rate

		Per Unit	Per Product		
Activity	Product	Cost Driver used x Cost Driver Rate		÷ Production	Cost Driver Rate P.U/R.P
(1) Setup		No. of Product Runs			
	P	36 x 670.59		÷ 15,000	= 1.61
	Q	24 x 670.59		÷ 5,000	= 3.22
(2) Quality Inspection		No. of Inspection			
	P	30 x 149.4		÷ 15,000	= .28
	Q	10 x 149.41		÷ 5,000	= .30
(3) Stores		No. of Cons Recd			
	P	48 x 275.89		÷ 15,000	= .88
	Q	52 x 275.89		÷ 5,000	= 2.87

Final Ans. (ii) Statement Showing Cost Sheet As Per ABC

	Product	15,000		5,000	
	Production	Total	P.U	Total	P.U
Direct Cost			.40		
	Dmat	6,000		4,000	.80
	Dlabour	3,760	384	600	.12
		(960 x 6)		(100 x 6)	
Prime		**11,760**		**4,600**	**0.92**
IND Cost					
Activity (1)		24,150	1.61	16,100	3.22
Activity (2)		4,200	.28	1,500	30
Activity (3)		13,200	.88	14,350	2.87
Total Cost		**53,310**	**3.554**	**36,550**	**7.31**

Statement Showing Sales Value Per Qtr-Component 'K'

	Production = 3,000 Nos.	
	Total	**P.U**
Direct Cost Dmat Dlab	 12,000 1,800 (300 x 6)	 4.00 .60
Prime Cost	13,800	4.60
Initial Des-Cost	7,500	
Indirect Cost	(60,000 ÷8)	2.50
Activity (1)	= 4,024 (6 x 670.59)	1.34
Activity (2)	= 3,586 (24 x 149.41)	1.19
Activity (3)	= 5,518 (20 x 275.89)	1.83
Total Cost Profit	34.428 8,607 (34.428 x 25÷100)	11.478 2.87
Sales	43,035	14.35

Case Study – 11

During the last 20 years. JPY Ltd's manufacturing operation has become increasingly automated with Computer-controlled robots replacing operators. JPY currently manufactures over 100 products of varying levels of design complexity. A single plant wise overhead absorption rate, based on direct labour hours, is used to absorb overhead costs.

In the quarter ended March, JPY's manufacturing overhead costs were:

	(₹'000)
Equipment Operation Expenses	125
Equipment Maintenance Expense	25
Wages paid to Technicians	85
Wages paid to Store Men	35
Wages Paid to Dispatch Staff	40

During the quarter, the company reviewed the Cost Accounting System and concluded that absorbing overhead costs to individual products on a labour hour absorption basis is meaningless. Overhead costs should be attributed to products using an Activity Based Costing (ABC) system and the following was identified as the most significant activities:

a) Receiving component consignments from suppliers.
b) Setting up equipment for production runs.
c) Quality inspections.
d) Dispatching goods as per customer's orders.

It was further observed that in the short-term JPY's overheads are 40% fixed and 60% variable. Approximately, half the variable overheads vary in relating to direct labour hours worked and half vary in relation to the number if quality inspections.

Equipment operation and maintenance expenses are apportioned as:

- ☐ Component stores 15%, manufacturing 70% and goods dispatch 15%.

Technician's wages are apportioned as:

- ☐ Equipment maintenance 30% set up equipment for production runs 40 % and quality inspections 30%.

During the quarter:

1. A total of 2,000 direct labour hours were worked (paid at ₹ 12 per hr.)
2. 980 components consignments were received from suppliers.
3. 1,020 production runs were set up.
4. 640 quality inspections were carried out.
5. 420 orders were dispatched to customers.

JPY's production during the quarter included components R,S and T. the following information is available:

	Components 'R'	**Components 'S'**	**Components 'T'**
Direct Material	₹ 1,200	₹ 2,900	₹ 1,800
Direct Labour Hrs. worked	25	480	50
Component Consignments Recd.	42	24	28
Production Runs	16	18	12
Quality Inspections	10	8	18
Orders (goods) Dispatched	22	85	46
Quantity Produced	560	12,800	2,400

Required:

1. Calculate the unit cost of R,S and T components, using JPY's existing cost accounting system.
2. Explain how an ABC system would be developed using the information given.

Calculate the unit cost of components R,S and T using ABC system.

Traditional Method

Recovery Rate $\left(\frac{\text{Total Over Head}}{\text{Total Labour Hrs.}}\right)$

$= \left(\frac{125{,}000 + 25{,}000 + 85{,}000 + 35{,}000 + 40{,}000}{2{,}000}\right)$

= 155.00 per hr.

Statement Showing Cost Sheet As Per- Traditional Method

	560 Units		12,800 Units		2,400 Units	
	Product R		S		T	
	Total	P.U	Total	P.U	Total	P.U
Direct cost						
DM	1,200	2.14	2,900	.23	1,800	.75
DL	300 (25 x 12)	0.54	5,760 (480 x 12)	.45	600 (50 x 12)	.25
Prime Cost	1,500	2.68	8,660	.68	2,400	1.00
Ind Con	3,875	6.92	74,400	5.81	7,750	3.22
F.O	(25 x 155)		(480 x 155)		(50 x 155)	
Fixed cost	**5,375**	**9.60**	**83,060**	**6.49**	**10,150**	**4.23**

Statement Showing Cost Driver Rate

Action	**Cost Driver**	$\left(\frac{\textbf{Activity Cost}}{\textbf{Cost Driver}}\right)$
1) Receiving Component	Cons- Recd	$\left(\frac{61,325}{980}\right)$ = 62.58
2) Setting Up	Production Runs	$\left(\frac{1,56,850}{1,020}\right)$ = 153.77
3) Qlty Cont	Qlty Inspection	$\left(\frac{25,500}{640}\right)$ = 39.84
4) Dispatch Goods	Order Dispatch	$\left(\frac{66,325}{420}\right)$ = 157.92

Note No.1 Statement Showing Reallocation of Overheads

	Wages	**Operation & Maintenance**	**Receiving Component and Consignment**	**Setting up for production runs**	**Inspection**	**Dispatch goods**
	85,000	1,25,000 +	35,000			40,000
		25,000				
Reallocation						
	85,000	25,500		34,000	25,500	
Total	—	1,75,500	35,000	34,000	25,500	40,000
Reallocation		(1,75,500)	26,325			26,325
			(1,75,500 x 15/)	(1,75,500 x 70/)		(1,75,500 x 15/)
Total	x	x	61.325	1,56,850	25,500	66,325

Step No.2 Statement Showing Cost Driver Rate P.U/P.P

Activity	Product	Cost Driver used x Cost Driver Rate	÷ Production	Cost Driver Rate P.U
		No. of Cons		
(1) Re-Component	R	42 x 62.58	÷ 560	= 4.69
	S	24 x 62.58	÷ 12,800	= .12
	T	28 x 62.58	÷ 2,400	= .73
		Production Runs		
(2) Setting Up	R	16 x 153.77	÷ 560	= 4.39
	S	18 x 153.77	÷ 12,800	= .22
	T	12 x 153.77	÷ 2,400	= .77
		No. of Orders		
(3) Qlty Cont	R	10 x 39.84	÷ 560	= .71
	S	8 x 39.84	÷ 12,800	= .02
	T	18 x 39.84	÷ 2,400	= .30
		No. of Inspection		
(4) Des-Goods	R	22 x 157.92	÷ 560	= 6.204
	S	85 x 157.92	÷ 12,800	= 1.04
	T	46 x 157.92	÷ 2,400	= 3.03

Step No.3 Statement Showing Cost Sheet As Per A.B.C

Product	**R**		**S**		**T**	
Production	**560**		**12,800**		**2,400**	
	Total	**P.U**	**Total**	**P.U**	**Total**	**P.U**
Direct Cost						
DM	1,200	2.14	2,900	.23	1,800	0.75
DL	300	.54	5,760	.45	600	0.25
Prime Cost	1,500	2.68	8,660	.68	2,400	1.00
Indirect Cost						
Activity (1)	2,626	4.69	1,536	.12	1,752	.73
Activity (2)	2,458	4.39	2,816	.22	1,848	.77
Activity (3)	398	0.71	256	.02	720	.30
Activity (4)	3,473	6.20	13,312	1.04	7,272	3.03
Factory Cost	**10,455**	**18.67**	**26,580**	**2.08**	**13,992**	**5.83**

Step No.2 Statement Showing Cost Driver Rate Per Unit/Per Production

Activity Product	**Cost Driver used x Cost Driver Rate**	**÷ Production**	**Cost Driver Rate P.U/P.P**
(1) Machine Setup	**Hrs.**		
P	3,000 x 70	÷ 1,00,000	2.10
Q	3,600 x 70	÷ 50,000	5.04
(2) Testing Time	**Testing Hrs.**		
P	5,00,000 x 2.50	÷ 1,00,000	12.50
Q	4,50,000 x 2.50	÷ 50,000	22.50

Case Study -12

Super Food Ltd. Manufacture 3 types of biscuits, A, B and C, in a fully mechanised factory. The company has been following conventional method of costing and wishes to shift to Activity Based Costing System and therefore wishes to have the following data presented under both the systems for the month.

Inspection Cost	₹ p.m.	73,000
Machine - Repairs & Maintenance	₹ p.m.	1,42,000
Dye Cost	₹ p.m.	10,250
Selling Overheads	₹ p.m.	1,62,000

	Product A	**Product B**	**Product C**
Prime Cost (₹ per unit)	12	9	8
Selling Price (₹ per unit)	18	14	12
Gross Production (units/ production run)	2,520	2,810	3,010
No. of Defective (units / production run)	20	10	10
	Product A	**Product B**	**Product C**
Inspection: No. of Hours/Production Run	3	4	4
Dye Cost/Production Run (₹)	200	300	250
No. of Machine Hours/Production Run	20	12	30
Sales - No. of Units/Month	25,000	56,000	27,000

The following additional information is given:

1. No accumulation of inventory is considered. All good units produced are sold.
2. All manufacturing and selling overheads are conventionally allocated on the basis of units sold.
3. Product A needs no advertisement. Due to its nutritive value, it is readily consumed by diabetic patients of a hospital. Advertisement costs included in the total selling overhead is ₹ 83,000.
4. Product B needs to be specially packed before being sold, so that it meets competition. ₹ 54,000 was the amount spent for the month in specially packing B, and this has been included in the total selling overhead cost given.

Required:

Present product wise profitability of statements under the conventional system and the ABC system and accordingly rank the products.

Statement Showing Gross Margin As Per- ABC

	A	**B**	**C**	**Total**
Revenues (Sales Units x S.P)	= 4,50,000 (25,000 x 18)	= 7,84,000 (56,000 x14)	= 3,24,000 (27,000 x12)	= 15,58,000
Prime Cost	(3,02,400) $\left(\frac{25,000}{2,520-20}\right)$ x $\frac{2,520}{12}$ x	(5,05,800) $\left(\frac{56,000 \text{ x } 2,810}{2,810-10 \text{ x } 9}\right)$	(2,16,720) $\left(\frac{27,000}{3,010-10}\right)\frac{\text{x } 3,010}{\text{x } 8}$	(10,24,920)
Gross-Margin	**1,47,600**	**2,78,200**	**1,07,280**	**5,33,080**

Statement Showing "Production & Selling Overheads"

Particulars	A	B	C	Total
Inspection Cost	15,000	40,000	18,000	73,000
$\left(\frac{73,000}{146} \text{ x } 30\|80\|36 \text{ respectively}\right)$				
Machine Maintenance	40,000	48,000	54,000	1,42,000
$\left(\frac{1,42,000}{710} \text{ x } 200\|240\|270 \text{ respectively}\right)$				
Dye Cost	2,000	6,000	2,250	10,250
Production Overheads	57,000	94,000	74,250	2,25,250
Advertisement	……..	56,000	27,000	83,000
$\left(\frac{83,000}{56,000 + 27,000} \text{ x } 56\|27 \text{ respectively}\right)$				
Packing	…….	54,000	…..	54,000
Other Overheads	5,787	12,963	6,250	25,000
$\left(\frac{25,000}{108} \text{ x } 25\|56\|27 \text{ respectively}\right)$				
Selling Overheads	5,787	1,22,963	33,250	1,62,000

Workings

No.	Particulars	A	B	C	Total
(1)	Gross Production (unit/run)	2,520	2,810	3,010	
(2)	Defectives/Run	20	10	10	
(3)	Good Units/Run	2,500	2,800	3,000	
(4)	Sales(goods units)	25,000	56,000	27,000	
(5)	No. of Runs	10	20	9	
(6)	Gross Production…(1 x 5)	25,200	56,200	27,090	
(7)	Prime Cost/Unit	12	9	8	
(8)	Prime Cost(₹)	3,02,400	5,05,800	2,16,720	10,24,920
(9)	Inspection Hours/Run	3	4	4	
(10)	Inspection Hours …(9 x 5)	30	80	36	146
(11)	M/c Hours/Run	20	12	30	
(12)	M/c Hours …(11 x 5)	200	240	270	710
(13)	Dye Cost/Run	200	300	250	
(14)	Dye Cost …(13 x 5)	2,000	6,000	2,250	10,250

"Statement Showing Rank – Conventional Accounting System"

Particulars	A	B	C	Total
Sales- Units /Production (good units)	25,000	56,000	27,000	1,08,000
Gross margin (₹) … (A)	1,47,600	2,78,200	1,07,280	5,33,080
Production Overheads (₹)	52,141	1,16,797	56,313	2,25,250
Selling Overheads	37,500	84,000	40,500	1,62,000
Sub- Total Overheads(₹) …(B)	89,641	2,00,797	96,813	3,87,250
Net Profit (₹) …(A) - (B)	57,959	77,403	10,467	1,45,830
Ranking	II	I	III	

Statement Showing "Rank – Activity Based System"

Particulars	A	B	C	Total
Sales- Units /Production (good units)	25,000	56,000	27,000	1,08,000
Gross margin (₹) … (A)	1,47,600	2,78,200	1,07,280	5,33,080
Production Overheads (₹)	57,000	94,000	74,250	2,25,250
Selling Overheads	5,787	1,22,963	33,250	1,62,000
Sub- Total Overheads(₹) …(B)	62,787	2,16,963	1,07,500	3,87,250
Net Profit (₹) …(A) - (B)	84,813	61,237	(220)	1,45,830
Ranking	I	II	III	

Case Study -13

A bank offers three products, viz., deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget:

Activity	Present Cost (₹)	Estimation for the budget period
(i) **ATM Services:**		
(a) Machine maintenance	4,00,000	(all fixed, no change)
(b) Rents	2,00,000	(fully fixed; no change)
(c) Currency Replenishment Cost	1,00,000	(expected to double during budget period)
	7,00,000	(This activity is driven by no. of ATM transactions)
(ii) Computer Processing	5,00,000	(Half this amount is fixed and no change is expected) (The variable portion is expected to increase to three times the current level). This activity is driven by the number of computer transactions.
(iii) Issuing Statements	18,00,000	Presently, 3 lac statements are made. Inthe budget period, 5 lac statements are expected; For every increase of one lac statement, one lac rupees is the budgeted increase (this activity is driven by the number of statements)
(iv) Computer Inquiries	2,00,000	Estimated to increase by 80% during the budget period. (This activity is driven by telephone minutes).

The activity drivers and their budgeted quantifies are given below:

	Deposits	Loans	Credit Cards
No. of ATM Transactions	1,50,000	–	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts, and 14,000 Credit Card Accounts.

You are required to:

(i) Calculate the budgeted rate for each activity.
(ii) Prepare the budgeted cost statement activity wise.
(iii) Find the budgeted product cost per account for each product using (i) and (ii) above.

Solution:-

Budget Cost Statement

Sr No.	Activity	Activity Cost (₹) (Budgeted)	Activity Driver	No. of Units of Activity Driver (Budget)	Activity Rate (₹)	Deposits	Loans	Credit Cards
1	ATM Services	8,00,000	ATM Transaction	2,00,000	4.00	6,00,000	–	2,00,000
2	Computer Processing	10,00,000	Computer Transaction	20,00,000	0.50	7,50,000	1,00,000	1,50,000
3	Issuing statements	20,000,000	No. of Statements	5,00,000		14,00,000	2,00,000	4,00,000
4	4. Customer Inquiries	3,60,000	Telephone Minutes	7,20,000		1,80,000	90,000	90,000
	Budgeted Cost	41,60,000				29,30,000	3,90,000	8,40,000
Units of product as estimated in the budget period						58,600	13,000	14,000
Budgeted Cost per unit of the product						50	30	60

Working Notes:

(i) ATM	4,00,000 + 2,00,000 + 2x 1,00,000	8,00,000
(ii) Computer	5,00,000 (Fixed = 2,50,000) Variable	10,00,000
	2,50,000 increase to 3 times = 7,50,000	
(iii) Customer Inquiries	2,00,000 + 80% x 2,00,000 = 2 +1.6	3,60,000

Case Study – 14

Bank of HK operated for years under the assumption that profitability can be increased by increasing Rupee volumes. But that has not been the case. Cost analysis has revealed the following:

Activity	Activity Cost (₹)	Activity Driver	Activity Capacity
Providing ATM Service	1,00,000	No. Of Transactions	2,00,000
Computer Processing	10,00,000	No. Of Transactions	25,00,000

Issuing Statements	8,00,000	No. of Statements	5,00,000
Customer Inquiries	3,60,000	Telephone Minutes	6,00,000

The following annual information on three products was also made available:

Activity Driver	Checking Accounts	Personal Loans	Gold Visa
Units of Product	30,000	5,000	10,000
ATM Transactions	1,80,000	0	20,000
Computer Transactions	20,00,000	2,00,000	3,00,000
Number of Statements	3,00,000	50,000	1,50,000
Telephone Minutes	3,50,000	90,000	1,60,000

Required:

Calculate rates for each activity.

Using the rates computed in requirement (i) Calculate the cost of each product.

Step No.1 Statement Showing Cost Driver Rate

Activity	Cost Driver Used	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$ = Cost-Driver Rate
(1) Providing A.T.M- Services	No. of Transaction	$\left(\frac{1,00,000}{2,00,000}\right)$ = 0.50
(2) Computer Processing	No. of Transaction	$\left(\frac{10,00,000}{25,00,000}\right)$ = 0.40
(3) Issuing Statement	No. of Statements	$\left(\frac{8,00,000}{5,00,000}\right)$ = 1.60
(4) Customer INQ	No. of Mints	$\left(\frac{3,60,000}{6,00,000}\right)$ = 0.60

Step No.2 Statement Showing Cost Driver Rate Per Unit/ Per – Product

Activity	Product	Cost Driver used x Cost Driver Rate	÷ Units	Cost Driver Rate P.U/P.P
		No. of Traditional		
(1) A.T.M Services	Checking Accounts	1,80,000 x .5	÷ 30,000	= 3.00
	Personal Loan		÷ 5,000	=
	Gold-Visa	20,000 x .5	÷ 10,000	= 1.00
		No. of Traditional		
(2) Comp Processing	Checking Accounts	20,00,000 x .40	÷ 30,000	= 26.67
	Personal Loan	2,00,000 x .40	÷ 5,000	= 16.00
	Gold-Visa	3,00,00 x .40	÷ 10,000	= 12.00
		No. of Statement		
(3) Issuing Statement	Checking Accounts	3,00,000 x 1.60	÷ 30,000	= 16.00
	Personal Loan	50,000 x 1.60	÷ 5,000	= 16.00
	Gold-Visa	1,50,000 x 1.60	÷ 10,000	= 24.00

		Telephone - Mints		
(4) Customer INQ	Checking Accounts	3,50,000 x .60	÷ 30,000	= 7.00
	Personal Loan	90,000 x .60	÷ 5,000	= 10.8
	Gold-Visa	1,60,000 x .60	÷ 10,000	= 9.6

Ans No.2 Statement Showing Cost of Each Product P.U/Total

	Checking Accounts	**Personal Loan**	**Gold Visa**
(Units) Nos.	30,000	5,000	10,000
	(P.U) ₹	**(P.U) ₹**	**(P.U) ₹**
(1) ATM Services	3.00		1.00
(2) Computer Processing	26.67	16.00	12.00
(3) Issuing Statement	16.00	16.00	24.00
(4) Customer INQ	7.00	10.8	96.00
Total	**52.67**	**42.80**	**46.60**

Case Study - 15

PQR Limited sells two versions: Deluxe and Premium of its only product GoGo Juicer. The GoGo Juicer uses patented technology to extract the last drop of juice from most fruits. The 'Premium' version can handle larger fruit and has more options relative to the 'Deluxe' version. The following table provides the financial results of the most recent year of operations:

Particulars	**Deluxe 90,000 units**	**Premium 10,000 units**	**Total 1,00,000 units**
Revenue (₹)	63,00,000	9,00,000	72,00,000
Material Cost (₹)	10,80,000	2,50,000	13,30,000
Direct Labour cost (₹)	14,40,000	1,60,000	16,00,000
Contribution margin (₹)	37,80,000	4,90,000	42,70,000
Allocated fixed manufacturing overhead (₹)	34,20,000	3,80,000	38,00,000
Allocated fixed selling and administrative Overheads (₹)	2,51,563	35,397	2,87,500
Profit margin (₹)	1,08,437	74,063	1,82,500
Profit margin per unit (₹)	1.2048	7.4063	

Labour cost is ₹ 16 per hour and each product requires one hour of labour. The company currently allocates all fixed manufacturing overheads, using labour hours as the allocation basis. It allocates fixed selling and administrative overheads, using revenue as the allocation base.

Although the profit margin per unit of 'Deluxe' juicer is rather low, PQR Limited believes that it is important to keep this model in the product mix. However, PQR can tailor its promotion and sales strategies to improves the sales mix to 16:4 ratio from the current 9:1 ratio of 'Deluxe' to 'Premium' juicers, with total volume staying at 1,00,000 units.

PQR Limited finds that ₹1.1 million of the ₹ 3.8 million of fixed manufacturing overheads pertains to batch related activities such as scheduling production runs. Similarly, ₹ 1,15,000 is the amount of administrative overheads out of the ₹ 2,87,500 of selling and administrative overheads.

It is found that the 'premium' juicer is produced in smaller batches (250 units per batch) than that of 'Deluxe' juicer (500 units per batch). Similarly, it takes 10 sales visits to sell 1,000 units of the 'Deluxe' juicer, while it takes 25 visits to sell 1,000 units of 'Premium' juicer.

Required:

1) Prepare a profitability statement based on the propose sales mix, using the most appropriate basis of allocating fixed overheads.
   (In absence of an appropriate basis, do not allocate overheads to products)
2) Advise the company on whether it should go ahead with the purpose change in sales mix

Solution:-

(i) **Profitability Statement New Mix-Most Appropriate Basis.**

Particulars	**Deluxe 80,000 Units**		**Premium 20,000 Units**		
	Per Unit(₹)	**Amount (₹)**	**Per Unit (₹)**	**Amount (₹)**	**Total (₹)**
Revenue	70.00	56,00,000.00	90.00	18,00,000.00	74,00,000.00
Material Cost	12.00	9,60,000.00	25.00	5,00,000.00	14,60,000.00
Direct Labour Cost (One hour per unit) 80,000 Hrs., 20,000 hrs.	16.00	12,80,000.00	16.00	3,20,000.00	16,00.000.00
Contribution Margin	42.00	33,60,000.00	49.00	9,80,000.00	43,40,000.00
Unit related Fixed Mfg. Overheads (Allocation on the basis of direct labour hours) 80,000:20,000 [W.N.1]		21,60,000		5,40,000.00	27,00,000.00
Batch- related Fixed Mfg. Overheads (Allocation on the basis no. of batches) 160:80 [W.N.1 & 4]		7,33,333.33		3,66,666.67	11,00,000.00
Fixed Selling Overheads (Allocated on the basis of sales visits) 800:500 [W.N.2&3]		1,06,153.85		66,346.15	1,72,500.00
Profit Margin Ex Admin Overheads		3,60,512.82		6,987.18	3,67,500.00
Admin Overheads [W.N.2]					1,15,000.00
Profit Margin					2,52,500.00

Working Note:-1

	₹
Fixed Mfg. Overheads	38,00,000.00
Less. Related to batch related activities	11,00,000.00
Fixed Mfg. Overheads - unit related	27,00,000.00

Working Note:-2

	₹
Selling &Admn. Overheads	2,87,500.00
Less. Related to batch related activities	1,15,000.00
Fixed Mfg. Overheads - unit related	1,72,500.00

Working Note:-3

No. of Visits	10 Sales Visit for 1,000 Units (Deluxe)	25 Sales Visit for 1,000 Units (Premium)	Total
For Proposed Mix-Sales Visit	800	500	1,300

Working Note:-4

No. of Batches	1 Batch for 500 Units (Deluxe)	1 Batch for 250 Units (Premium)	Total
For Proposed Mix- Batches	160	80	240

(ii) Change in product mix, yields profit of₹70,000/- (₹ 2,52,500 - ₹ 1,82,500). Accordingly company should go with proposed change mix.

- This problem can be solved by assuming that some portion of the fixed cost as fixed with respect to units of production, but variable with respect to certain activities. When the production size is altered, these activities are increased and therefore, the activity cost varies for the proposed production level. More batches of production and more sales visits will set off the incremental contribution.

Case Study -16

Asian Mfg. Co. had decided to increase the size of the store. It wants the information about the probability of the individual product lines: Lemon, Grapes and Papaya. It provides the following data for the 2013 for each product line:

Particulars	Lemon	Grapes	Papaya
Revenues (₹)	79,350	2,10,060	1,20,990
Cost of goods sold (₹)	60,000	1,50,000	90,000
Cost of bottles returned (₹)	1,200	0	0
Number of purchase orders placed	36	84	36
Number of deliveries received	30	219	66
Hours of shelf stocking time	54	540	270
Items sold	12,600	1,10,400	30,600

Asian Mfg. Co. also provides the following information for the year 2013:

Activity	Description of Activity	Total Costs (₹)	Cost Allocation Basis
Bottle returns	Returning of empty bottles to the store	1,200	Direct tracing to product line
Ordering	Placing of orders of purchases	15,600	156 purchase orders
Delivery	Physical delivery and the receipts of merchandise	25,200	315 deliveries
Self-Stocking	Stocking of merchandise on store shelves and ongoing restocking	17,280	864 hours of time
Customer support	Assistance provided to customers including bagging and checkout	30,720	1,53,600 items sold

Required:

1) Asian Mfg. Co. currently allocates store support costs (all costs other than the cost of goods sold) to the product line on the basis of the cost of goods sold of each product line. Calculate the operating income and operating income as the percentage of revenue of each product line.
2) If Asian Mfg. Co. allocates store support costs (all costs other than the cost of goods sold) to the product lines on the basis of ABC system, calculate the operating income and operating income as the percentage of revenue of each product line.
3) Compare both the systems.

Solution:- (ii) Modern-Method (A.B.C)

Statement Showing Cost Driver Rate

Activity	Cost Driver Used	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right) = C.D.R$
(1) Ordering	Purchase Orders	$\left(\frac{15,600}{156}\right)$ = 100
(2) Delivery	No. of Deliveries	$\left(\frac{25,200}{315}\right)$ = 80
(3) Self Stocking	No. of Hrs.	$\left(\frac{17,280}{864}\right)$ = 20
(4) Customer Support	Item- Sold	$\left(\frac{30,720}{1,53,600}\right)$ = .20

Solution:- No.(1) Traditional Costing System

				₹
	Lemon	**Grapes**	**Papaya**	**Total**
Revenues	79,350	2,10,060	1,20,990	4,10,400
Cost of Goods Sold	(60,000)	(1,50,000)	(90,000)	(3,00,000)
Stores Support	(18,000) (60,000 x 30 %)	(45,000) (1,50,000 x 30 %)	(27,000) (90,000 x 30 %)	(90,000)
Operating Income	1,350	15,060	3,990	20,400
(%)	$\left(\frac{1,350}{79,350} \text{x } 100\right)$	$\left(\frac{15,060}{2,10,060} \text{x } 100\right)$	$\left(\frac{3,990}{1,20,990} \text{x } 100\right)$	$\left(\frac{20,400}{4,10,400} \text{x } 100\right)$
	= 1.70%	**= 7.17%**	**= 3.30%**	**= 4.97 %**

Stores Support- Cost

Recovery Rate = $\left(\frac{\text{Support Cost}}{\text{Cost of Goods Sold}}\right) \text{x } 100$

= $\left(\frac{1,200 + 15,600 + 25,200 + 17,280 + 30,720}{60,000 + 1,50,000 + 90,000}\right) \text{x } 100$

= 30%

Statement Showing Operating Income (As Per A.B.C)

		Lemon	**Grapes**	**Papaya**	**Total**
	Revenues	79,350	210,060	120,990	410,400
	Revenue Cost				
	Cost of Goods Sold	(60,000)	(1,50,000)	(90,000)	(3,00,000)
		19,350	60,060	30,990	110,400
Activity	**Stores Supp-Cost Cost Driver Used x Cost Driver Rate**				
(1)	Bottle Returns	(1,200)	–	–	(1,200)
(2)	Ordering	(3,600) (36 x 100)	(8,400) (84 x 100)	(3,600) (36 x 100)	(15,600)
(3)	Delivery	(2,400) (30 x 80)	(17,520) (219 x 80)	(5,280) (66 x 80)	(25,200)
(4)	Self-Stocking	(1,080) (54 x 20)	(10,800) (54 x 20)	(5,400) (270 x 20)	(17,280)
(5)	Customer Support	(2,520) (12,600 x .20)	(22,080) (110,400 x .20)	(6,120) (30,600 x .20)	(30,720)
	Operating Income	8,550	1,260	10,590	20,400
	Operating Income (%)	= 10.78% $\left(\frac{8,550}{79,350} \text{x } 100\right)$	= 0.60% $\left(\frac{1,260}{210,060} \text{x } 100\right)$	= 8.75% $\left(\frac{10,590}{120,990} \text{x } 100\right)$	= 4.97% $\left(\frac{20,400}{410,400} \text{x } 100\right)$

iii.Comparison

Particulars	Lemon	Grapes	Papaya	Total
Under Traditional Costing System	1.70%	7.17%	3.30%	4.97%
Under ABC System	10.78%	0.60%	8.75%	4.97%

The grapes line drops sizeably when ABC is used. Although it constitutes 50 % of 'Cost of Goods Sold (COGS),' it uses a higher percentage of total resources in each activity area, especially the high cost of customer support area. In contrast, lemon line draws a much lower percentage of total resources used in each activity area than its percentage of total COGS. Hence under ABAC, Lemon is most profitable. Fruitolay can explore ways to increase sales of lemons and also explore price increases on grapes.

Operating Income Ranking is highest for Grapes under Traditional System because other products bear its overhead cost, whereas under ABC a more accurate picture shows Grapes as the lowest ranking product.

Case Study - 17

Golden North Ltd. manufactures four products, namely A, B, C and D using the same plant and process. The following information relates to a production period:

	Product A	Product B	Product C	Product D
Output in Units	720	600	480	504
Cost per unit:	₹	₹	₹	₹
Direct Material	42	45	40	48
Direct Labour	10	9	7	8
Machine hours per unit	4 hrs.	3 hrs.	2 hrs.	1 hr.

The four products are similar and are usually produced in production runs of 24 units and sold in batches of 12 units. Using machine hour rate currently absorbs the production overheads.

The total overheads incurred by the company for the period is as follows:

Machine operation and maintenance cost (₹)	63,000
Setup costs (₹)	20,000
Store receiving (₹)	15,000
Inspection (₹)	10,000
Material handling and dispatch (₹)	2,592

During the period the following cost drivers are to be used for the overhead cost:

Activity	Cost Driver
Setup costs	No. of production runs
Store receiving	Requisition raised
Inspection	No. of production runs
Material handling and dispatch	Orders executed

It is also determined that:

- ✓ Machine operation and maintenance cost should be apportioned between setup cost, store receiving and inspection activity in 4:3:2.
- ✓ Number of requisition raised on store is 50 for each product and the no. of order executed is 192, each order being for a batch of 12 of a product.

Required:

I. Calculate the total cost of each product, if all overhead costs are absorbed on machine hour rate basis.
II. Calculate the total cost of each product using activity base costing.
III. Comment briefly on differences disclosed between overhead traced by present system and those traced by activity based costing.

Ans No. 1

Traditional Method:-

Recovery Rate $\left(\frac{\text{Total Over Head}}{\text{Total Machine Hrs.}}\right)$

$= \left(\frac{63,000 + 20,000 + 15,000 + 10,000 + 2,592}{(720 \text{ x } 4) + (600 \text{ x } 3) + (480 \text{ x } 3) + (504 \text{ x } 1)}\right)$

$= \left(\frac{111,592}{6,144}\right)$

= 18.00

Statement Showing Cost Sheet As Per Traditional Method

				₹
Product	**A**	**B**	**C**	**D**
Units	**720**	**600**	**480**	**504**
Direct Cost	**P.U**	**P.U**	**P.U**	**P.U**
DM	42.00	45.00	40.00	48.00
DL	10.00	9.00	7.00	8.00
Prime Cost	52.00	54.00	47.00	56.00
IND Cost	72.00	54.00	36.00	18.00
(Hrs. x R.R)	(4 x 18)	(3 x 18)	(2 x 18)	(1 x 18)
Fcost x Units	124 x 720	108 x 600	83 x 480	74 x 504

ANS No.2 Modern- Method Statement Showing Re-allocation of Overheads

	Machine Opening& Manufacturing	**Setup**	**Stores Recovery**	**Inspection**	**Material Handling& DTS**
O.H (Given)	63,000	20,000	15,000	10,000	2,592
Reallocation (4:3:2)	(63,000)	28,000	21,000	14,000	
		48,000	36,000	24,000	2,592

Step No. 1 Statement Showing Cost Driver Rate

Activity	Cost Driver	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$
		= Cost Driver Rate
(1) Set- Up	No. of Production Runs (Note no.1)	$\left(\frac{48,000}{96}\right)$ = 500
(2) Store- Recovery	No. of Required Raised (Note no. 2)	$\left(\frac{36,000}{200}\right)$ = 180
(3) Inspection	No. of Production Runs (Note no. 1)	$\left(\frac{24,000}{96}\right)$ = 250
(4) Material Hand	No. of Orders Ex (Note no. 3)	$\left(\frac{2,592}{192}\right)$ = 135

Note No. 1
No. of Production Runs

Product	Units ÷ 24 Units	Nos.
A	720 ÷ 24	30
B	600 ÷ 24	25
C	480 ÷ 24	20
D	504 ÷ 24	21

Note No. 2
No. of Req-Raised

Product	For Each Product
A	50
B	50
C	50
D	50
	200

Note No.3
No. of Orders Expected

Product		
A	720 ÷ 12	60
B	600 ÷ 12	50
C	480 ÷ 12	40
D	504 ÷ 12	42
		192
		192

Step No.2 Statement Showing Cost Driver Rate

Activity	Product	Cost Driver used x Cost Driver Rate	÷ Production		Cost Driver Rate P.U
		No. of Product Runs			
(1) Set-Up	A	30 x 500	÷ 720	=	20.83
	B	25 x 500	÷ 600	=	20.83
	C	20 x 500	÷ 480	=	20.83
	D	21 x 500	÷ 504	=	20.83
	A	50 x 180	÷ 720	=	12.50
(2) Stores/RE	B	50 x 180	÷ 600	=	15.00
	C	50 x 180	÷ 480	=	18.75
	D	50 x 180	÷ 504	=	17.86
		No. of Product Runs			
	A	30 x 250	÷ 720	=	10.42
(3) Inspection	B	25 x 250	÷ 600	=	10.42
	C	20 x 250	÷ 480	=	10.42
	D	21 x 250	÷ 504	=	10.42

		No. of Orders			
		60 x 13.5	÷ 720	=	11.25
(4) Material Handling		50 x 13.5	÷ 600	=	11.25
		40 x 13.5	÷ 480	=	11.25
		42 x 13.5	÷ 504	=	11.25

Step No.3 Statement Showing Cost Sheet As-Per-A.B.C

Products	**A**	**B**	**C**	**D**
Units	720	600	480	504
Direct Cost				
DM	42.00	45.00	40.00	48.00
DL	10.00	9.00	7.00	8.00
Prime Cost	52.00	54.00	47.00	56.00
Ind Cost				
Activity (1)	20.83	20.83	20.83	20.83
Activity (2)	12.50	15.00	18.75	17.86
Activity (3)	10.42	10.42	10.42	10.42
Activity (4)	1.125	1.125	1.125	1.125
Factory Cost (P.U)	96.875	101.375	98.125	106.235
X Units	x 720	x 600	x 480	x 504
Total cost	= 69,750	= 60,825	= 47,100	= 53,542.90

Statement Showing Comparative Cost Sheet

	A	**B**	**C**	**D**
Trad - Method	124.00	108.00	83.00	74.00
A.B.C	96.875	101.375	98.125	106.23

The total overheads which are spread over the four products have been apportioned on different bases, causing the product cost to differ substantially: in respect of product A and D a change from traditional machine hour rate to an activity system may have effect on price and profits to the extent that pricing is based on cost plus approach**.**

Case Study – 18

Wool mark Ltd. manufactures three types of products namely P, Q and R. the data relating to a period are as under:

Particulars	**P**	**Q**	**R**
Machine hours per unit	10	18	14
Direct Labour hours per unit @ ₹ 20	4	12	8
Direct Material per unit (₹)	90	80	120
Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overhead is ₹ 6 per hour.

The company proposes to use activity based costing system and the activity analysis is as under:

Particulars	P	Q	R
Batch size (units)	150	500	1,000
Number of purchase order per batch	3	10	8
Number of inspections per batch	5	4	3

The total overheads are analyzed as under:

Machine set up costs	……..	20%
Machine operation costs	……..	30%
Inspection costs	……..	40%
Material procurement related costs	……..	10%

Required:

i. Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.

ii. Calculate the cost per unit of each product using activity based costing principles.

Ans No. 1 **Statement Showing Cost Sheet As Per Traditional Method**

Products	P	Q	R
Direct Cost	P.U	P.U	P.U
Dmat	90.00	80.00	120.00
(Hrs. x 20)Dlab	80	240.00	160.00
Prime Cost	170	320.00	280
IND Cost	= 60	= 108	= 84
(Hrs. x 6)	(10 x 6)	(18 x 6)	(14 x 6)
	330	408	364

(ii)**Modern Method**

Product	Units	M hrs P.U	R.R	Total (R_1)
P	3,000	x 10	x 6	1,80,000
Q	5,000	x18	x 6	5,40,000
R	20,000	x14	x 6	16,80,000
				24,00,000

Machine Setup Cost	Machine operation cost	Inspection cost	Material Proc-Cost
20 % x 24,00,000	30 % x 24,00,000	40 % x 24,00,000	10 % x 24,00,000
4,80,000	7,20,000	9,60,000	2,40,000

Step No.1 Statement Showing Cost Driver Rate

Activity	Cost Driver	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$
		= Cost Driver Rate
(1) Machine Set- Up	No. of Setup (Note no.1)	$\left(\frac{4,80,000}{50}\right)$ = 9,600
(2) Machine Operation	No. of M-hrs. (Note no. 2)	$\left(\frac{7,20,000}{4,00,000}\right)$ = 1.80
(3) Inspection	No. of Inspection (Note no. 3)	$\left(\frac{9,60,000}{200}\right)$ = 4,800
(4) Material Proc-Cost	No. of Purchase Orders (Note no. 4)	$\left(\frac{2,40,000}{320}\right)$ = 7,500

Note No. 1

No. of Setup

Product	Units ÷ Units	Nos.
P	3,000 ÷ 150	20
Q	5,000 ÷ 500	10
R	20,000 ÷ 1,000	20
		50

Note No. 2

No. of Machine Hrs.

Product	Units x Mhrs.p.u	Total
P	3,000 x 10	= 30,000
Q	5,000 ÷ 18	= 90,000
R	20,000 ÷ 14	= 2,80,000
		4,00,000

Note No. 3

Product	Units x Batch Size	No. of Inspection per Batch
P	3,000 x 10	100
Q	5,000 ÷ 18	40
R	20,000 ÷ 14	60
		200

Note No. 4

Product	Units ÷ Size	x	No. of Orders	
P	3,000 ÷ 150	x	3	60
Q	5,000 ÷ 500	x	10	100
R	20,000 ÷ 1,000	x	8	160
				320

Step No. 2

Activity	Product	Cost Driver used x Cost Driver Rate	÷ Production	Cost Driver Rate P.U
		No. of Setup		
(1) Machine Set-Up	P	20 x 9,600	÷ 3,000	= 64
	Q	10 x 9,600	÷ 5,000	= 19.25
	R	20 x 9,600	÷ 20,000	= 9.60
		No. of M-Hrs.		
	P	30,000 x 1.80	÷ 3,000	= 18
(2) Machine OP	Q	90,000 x 1.80	÷ 5,000	= 32.4
	R	2,80,000 x 1.80	÷ 20,000	= 25.20
		No. of Inspection		
	P	100 x 4,800	÷ 3,000	= 160
(3) Inspection	Q	40 x 4,800	÷ 5,000	= 38.40
	R	60 x 4,800	÷ 20,000	= 14.40
		No. of Purchase		
(4) Material Process	P	60 x 750	÷ 3,000	= 15
	Q	100 x 750	÷ 5,000	= 15
	R	160 x 750	÷ 20,000	= 6

Step no.3Statement Showing Cost Sheet As Per A.B.C

Products	**P**	**Q**	**R**
Units	3,000	5,000	20,000
	P.U	**P.U**	**P.U**
Direct Cost	**₹**	**₹**	**₹**
DM	90	80	120
DLab	80	240	160
Prime Cost	(4 x 20)	(12 x 20)	(8 x 20)
	170	320	280
Ind Cost			
Activity (1)	64	19.20	9.60
Activity (2)	18	32.40	25.20
Activity (3)	160	38.40	14.40
Activity (4)	15	15	6.00
Factory Cost (P.U)	427	425	335.20
X Units	x 3,000	x 5,000	x 20,000
Total cost	**= 12,81,000**	**= 21,25,000**	**= 67,04,000**

Case Study – 19

The following are Product Alpha's data for next year budget:

Activity	Cost Driver	Cost Driver Volume/Year	Cost Pool (₹)
Purchasing	Purchase orders	1,500	75,000
Setting	Batches produced	2,800	1,12,000
Materials Handling	Material movements	8,000	96,000
Inspection	Batches produced	2,800	70,000
Matching costs	Machine hours	50,000	1,50,000

Purchase orders	……..	25
Output	……..	15,000 units
Production batch size	……..	100 units
Materials movements per batch	……..	6
Machine hours per unit	……..	0.1

Required:

1. Calculate the budgeted overhead costs using activity based costing principles.
2. Calculate the budgeted overhead costs using absorption costing (absorb overhead using machine hours).
3. How can the company reduce the ABC for Product Alpha?

Ans No. 1 Statement Showing Budgeted Overheads Cost

Cost Driver Used x Cost Driver Rate	=	Total
(1) Purchasing 25 x 50	=	1,250
(2) Setting 150 x 40 (15,000 ÷ 100)	=	6,000
(3) Material Hand 900 x12 $\left(\frac{15,000}{100}\right)$ x 6	=	10,800
(4) Inspection 150 x 25 $\left(\frac{15,000}{100}\right) = 150$	=	3,750
(5) Machine Cost 1,500 x 3 (15,000 x . 10) = 1,500	=	4,500
		26,300

Ans No. 2 **Statement Showing Absorption Rate**

Step :-1 **Statement Showing Cost Driver Rate**

Activity	Cost Driver	$\left(\frac{\text{Activity Cost}}{\text{Cost Driver}}\right)$
		= Cost Driver Rate
(1) Purchasing	No. of Purchase Orders	$\left(\frac{75,000}{1,500}\right)$ = 50
(2) Setting	No. of Batches Produced	$\left(\frac{1,12,000}{2,800}\right)$ = 40
(3) Material Handling	No. of Material Movements	$\left(\frac{96,000}{8,000}\right)$ = 12
(4) Inspection	No. of Batches Produced	$\left(\frac{70,000}{2,800}\right)$ = 25
(5) Material Proc-Cost	No. of M-hrs.	$\left(\frac{1,50,000}{50,000}\right)$ = 3.00

CHAPTER – 11

BUDGET & BUDGETARY CONTROL

Case Study-1

The PLN Co. presents the following static budgets for 4,000 units and 6,000 units' activity levels for October 2013:

	Activity Level	
	4,000 units	6,000 units
Overhead A ₹ 12/hr. x 2 hr./unit	96,000	1,44,000
Overhead B	1,40,000	1,90,000

Overhead C was omitted to be listed out. It is a fixed plant overhead, estimated at ₹ 12.5/hr. at 4,000 units activity level. This has to also feature in the flexible budget. The actual production was 5,000 units and 9,600 hours were needed for production.

Required:

Present the flexible budget amount of each overhead to enable appropriate comparison with the actual figures.

Statement Showing Flexible Budget

	Nature of Expenses	4,000 units	6,000 units	5,000 units
Variable		96,000	1,44,000	= 1,20,000 $\left(\frac{96,000}{4,000} \text{ x } 5,000\right)$
Overhead 'B'	Semi-Variable (Note No. 1)	1,40,000	1,90,000	1,65,000
Overhead 'C'	Fixed	1,00,000 (4,000 units x 2 x 12.5)	1,00,000	1,00,000
		3,36,000	4,34,000	3,85,000

Note No. (1)

Let Variable Overhead = x Fixed Cost

4,000 x + ~~y~~ = 1,40,000

6,000 x + ~~y~~ = 1,90,000

− 2,000 x= − 50,000

$\therefore x = 25$

(4,000 x 25) + y = 1,40,000

y **= 40,000**

	Variable Cost	Fixed Cost	Total Cost
4,000 units	4,000 x 25	40,000	1,40,000
	= 1,00,000		
6,000 units	6,000 x 25		
	= 1,50,000	40,000	1,90,000
5,000 units	5,000 x 25		
	= 1,25,000	40,000	1,65,000

Case Study-2

Tricon Co. has prepared the following statement for the month of April 2015.

Particulars	Budget Details	Static Budget	Actual
Units produced & Sold		4,000	3,200
		₹	₹
Direct Materials	3 kg per unit @ ₹ 15 per kg.	1,80,000	1,55,000
Direct Labour	1 hr. per unit@ ₹ 36 per hour	1,44,000	1,12,800
Variable Overhead	1 hr. per unit@ ₹ 22 per hour	88,000	73,600
Fixed Overhead		90,000	84,000
Total Cost		5,02,000	4,25,400
Sales		6,00,000	4,48,000
Profit		98,000	22,600

During the month 10,000 kg.of materials and 3,100 direct labour hours were utilized.

Required:

a) Prepare a flexible budget for the month.
b) Determine the material usage variance and the direct labour rate variance for the actual Vs the flexible budget.

Statement Showing Flexible Budget

Nature of the Expenses	Budget 3,500 units	Actual 3,200	Variation
(1) Direct Material	1,44,000 $\left(\frac{1,80,000}{4,000} \text{ x } 3,200\right)$	1,55,000	(11,000)
(2) Direct Labour	1,15,200 $\left(\frac{1,44,000}{4,000} \text{ x } 3,200\right)$	1,12,800	2,400
(3) Variable Overhead	70,400 $\left(\frac{88,000}{4,000} \text{ x } 3,200\right)$	73,600	(3,200)
(4) Fixed Overhead	90,000	84,000	6,000
Total Cost	4,19,600	4,25,400	(5,800)
Profit/Loss	60,400	22,600	(37,800)
Sales	4,80,000 $\left(\frac{6,00,000 \text{ x } 3,200}{4,000}\right)$	4,48,000	(32,000)

Material Variance – Actual Units = 3,200

Standard			Actual		
Kg	**Rate**	**Amount**	**Kg**	**Rate**	**Amount**
9,600 (3,200 x 3 kg)	x 15	1,44,000	10,000	15.5	1,55,000

Labour Variance

Hours	**Rate**	**Amount**	**Hours**	**Rate**	**Amount**
3,200 (3,200 x 1)	x 36	1,15,200	3,100	36.39	1,12,800

Material Cost Variance (1,44,000 - 1,55,000)
11,000 (A)

- Material Usage Variance: (9,600 - 10,000) x 15 = 6,000 (A)
- Material Rate Variable: (15 - 15.50) x 10,000 = 5,000 (A)

Labour Cost Variance (1,15,200 - 1,12,800)
2,400 (F)

- Labour Efficiency Variance: (3,200 - 3,100) x 36 = (F)
- Labour Rate Variance: (36 - 36.39) x 3,100 = 1,200 (A)

Case Study-3

Satjuj Motors Ltd. had prepared fixed and flexible budget for the financial year 2013-14 as under:

	Fixed Budget for full Flexible Budget for 75 % level capacity	
	(₹)	**(₹)**
Sales	13,50,000	10,12,500
Direct Material	4,25,000	3,18,750
Direct Labour	1,85,000	1,38,750
Variable Overheads	2,15,000	1,61,250
Semi- Variable Overheads	3,65,000	3,23,750
Profit	1,60,000	70,000

After the closing of the financial year 2013-14, total actual sales stood at ₹ 11,07,000 and there was a favorable sales price variance of ₹ 17,000 (F).

Required:

Prepare a flexible budget for the actual level of sales.

Given : Activity Level $= \left(\frac{10,90,000}{13,50,000}\right)$ x $100 = 80.74$ %

Actual Sales = 1,107,000

Sales - Price Variance = 17,000

Normal Sales 10,90,000

Statement Showing Flexible Budget

	Nature of Expenses	100 % (Budget)	75 % (Budget)	(Actual)
		₹	₹	₹
(A) Sales		13,50,000	10,12,500	10,90,000
(B) Relevant Cost				
1) Direct Material	Variable	(4,25,000)	(3,18,750) $\left(\frac{4,25,000}{13,50,000}\text{ x } 10,12,500\right)$	(3,43,148) $\left(\frac{4,25,000}{13,50,000}\text{ x } 10,90,000\right)$
2) Direct Labour	Variable	(1,85,000)	(1,38,750) $1,85,000 \text{ x } \left(\frac{10,12,500}{13,50,000}\right)$	(1,49,370) $\left(1,85,000 \text{ x } \frac{10,90,000}{13,50,000}\right)$
3) Variable Overhead	Variable	(2,15,000)	(1,61,250) $\left(2,15,000 \text{ x } \frac{10,12,500}{13,50,000}\right)$	(1,73,593) $\left(2,15,000 \text{ x } \frac{10,90,000}{13,50,000}\right)$
4) S.V	Variable	(1,65,000)	(1,23,750) $\left(1,65,000 \text{ x } \frac{10,12,500}{13,50,000}\right)$	(1,33,222) $\left(1,65,000 \text{ x } \frac{10,90,000}{13,50,000}\right)$
(Note No.1)	fixed	(2,00,000)	(2,00,000)	(2,00,000)
	Profit	1,60,000	70,000	90,667

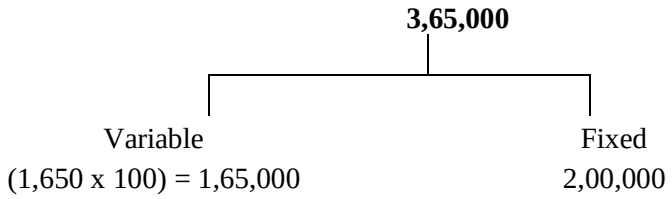
Note No.1

Variable Cost (per unit) = *x* Fixed Cost = *y*

OR

$$\left(\frac{\text{Overhead Full} - \text{cap} - \text{Overheads 75\% cap}}{\text{Difference Activity Level}}\right)$$

$$= \left(\frac{3,65,000 - 3,23,750}{100 - 75}\right) = 1,650$$



Case Study-4

The budgets for activity and cost of PQR Ltd. for the first three quarters of operation are shown below:

Period Covered Months	Budgets Quarters I-III		
	Q-I 1-3 ('000)	Q-II 4-6 ('000)	Q-III 7-9 ('000)
Activity:			
Sales (Units)	9	17	15
Production (Units)	10	20	15
Costs (₹):			
Direct Material			
A	60	120	90
B	50	100	75
Production Labour	180	285	230
Manufacturing Overheads Excluding Depreciation	90	120	105
Depreciation of Production Machinery	20	20	20
Administration Expenses	25	25	25
Selling & Distribution Expenses	38	54	50

The figures shown above represent the costs structure of PQR Ltd., which have the following major features:

1) Fixed element of any cost is completely independent of activity levels.
2) Any variable element of each cost displays a linear relationship with activity level, except that the variable labour cost become 50% higher for activity in excess of 19,000 units per quarter due to necessity for overtime working.
3) The variable element of selling and distribution expenses is a function of sales. All other costs with a variable element are a function of production volume.

Activity for each quarter is spread evenly throughout that quarter.

In Quarter IV Production level will be set equal to sales level. Production and sales in this quarter is expected to range between 15,000 units and 21,000 units. The most likely volume is 18,000 units. In month 9 it will be possible to accurately estimate the sales for Quarter IV.

Cost structure will remain the same as in Quarters I to III except the following:

i. Labour wage rate will rise by 12 ½ %.
ii. Variablelabour input per unit of output will decrease, due to learning curve effect, such that 80% of the previous labour input per unit of output will be required in Quarter IV. The threshold for overtime working remains at 19,000 units per quarter.

iii. Fixed factory overheads and the fixed element of selling and distribution costs will each rise by 20% (The variable element of selling and distribution costs will be unaltered.

Required:

1. Prepare a Statement to show, under each cost classification given in the budgets, the variable cost per unit and fixed costs which will be effective in Quarter IV.
2. Prepare a flexible budget of production costs for the Quarter IV.

Ans No.1

Statement Showing (1) Variable Cost (2) Fixed Cost Under Given Cost Classification Effective for Quarter IV

Nature of Expenses	Fixed Cost	Variable Cost
Direct Material A Variable	–	6.00
Direct Material B Variable		(60,000 ÷ 10,000)
	–	5.00
		(50,000 ÷ 10,000)
Production - Labour (Note No.-1)		
Labour	= 90,000	9.00
	(80,000 x 112.50)	
Man Overhead (Note No.-2)	72,000	3.00
	(60,000 x120 %)	
Depreciation Fixed	20,000	–
Administration Fixed	25,000	–
Selling & Distribution (Note No.-3)		

Note No.2

Production−Labour:-

Variable Cost per unit = x	Fixed Cost = y
10,000 x + ~~y~~	= 1,80,000
15,000 x + ~~y~~	= 2,30,000
− 5,000 x=	− 50,000

$\therefore x = 10$

(10,000 x 10) + y = 1,80,000

y = 80,000

Variable Cost (20,000 x 10)	=	2,00,000
Fixed	=	80,000
Overtime (1,000 x 5)	=	5,000
		2,85,000
Variable (18,000 x 9) (10 x 1.125 x .80)	=	1,62,000
Fixed (80,000 x 1.125)	=	90,000
		2,52,000

Note No.2 Manufacturing Overheads

10,000 x + ~~y~~	=	90,000
20,000 x + ~~y~~	=	1,20,000
− 10,000 x=		− 30,000

$\therefore x = 3$

(10,000 x 3) + y = 90,000

y = 60,000

Fixed = (60,000 x 120 %) = 72,000

Note No.4 Selling & Distribution Expenses

9,000 x + ~~y~~	=	38,000
17,000 x + ~~y~~	=	54,000
− 8,000 x=		− 16,000

$\therefore x = 2$

(9,000 x 2) + y = 38,000

y = 20,000

Fixed = (20,000 x 120 %) = 24,000

Ans No.2 Statement Showing Flexible Budget

Nature of Expenses	15,000 units	18,000 units	21,000 units
1) Direct Material			
A'	90,000	108,000	126,000
(60,000 ÷ 10,000) = 6.00	(15,000 x 6)	(18,000 x 6)	(21,000 x 6)
B'	75,000	90,000	105,000
(50,000 ÷ 10,000) = 5.00	(15,000 x 5)	(18,000 x 5)	(21,000 x 5)
2) Production Labour			
Semi-Variable			
(Note No.1)	1,35,000	1,62,000	1,89,000
Variable	(15,000 x 9)	(18,000 x 9)	(21,000 x 9)
Fixed	90,000	90,000	90,000
Overtime			9,000
Man-Overheads			(2,000 x 9 x 5)
S.V ⟶			
(Note No.2)	45,000	54,000	63,000
Variable	(15,000 x 3)	(18,000 x 3)	(21,000 x 3)
Fixed	72,000	72,000	72,000
Depreciation	20,000	20,000	20,000
	5,27,000	5,96,000	6,74,000

Cash Budget

Case Study-5

From the information given below:

A. Sales are both on credit and for cash, the latter being one third of the former;
B. Realizations from debtors are 25% in the month of sale; 60% in month following that and the balance in the month after that;
C. The company adopts a uniform pricing policy of the selling price being 25% over cost;
D. Budgeted sales of each month are purchased and paid for in the preceding month;

E. The company has outstanding debentures of ₹ 2 lakhs on 1st January, which carry interest at 15% per annum payable on the last date of each quarter on calendar year basis. 20% of the debentures are due for redemption, on 30th June 2014;
F. The company has to pay the last installment of advance tax, for assessment year 2014-15, amounting to ₹ 54,000;
G. Anticipated office costs for the six-month period are; January ₹ 25,000; February ₹ 20,000; March ₹ 40,000; April ₹ 35,000; May ₹ 30,000 and June ₹ 45,000;
H. The opening cash balance of ₹ 10,000 is the minimum cash balance to be maintained. Deficits have to be met by borrowings in multiples of ₹ 10,000 on which interest, on monthly basis, has to be paid on the first date of the subsequent month at 12% per annum. Interest is payable for a minimum period of one month.
I. Rent payable is ₹ 2,000 per month.
J. Sales forecast for the different months are:
Oct'13- ₹ 160,000; Nov'13-₹ 1,80,000; Dec'13- ₹ 2,00,000; Jan'14- ₹ 2,20,000; Feb'14- ₹ 1,40,000; Mar'14-₹ 1,60,000; April'14- ₹ 1,50,000; May'14 - ₹ 2,00,000; Jun'14- ₹ 1,80,000 and July'14- ₹ 1,20,000.

Required:

Prepare a Cash Budget of Excel Limited for the first half year of 2014, year of assuming that costs would remain unchanged.

Statement Showing Cash Budget Jan to June -14

Particulars	Jan	Feb	Mar	Apr	May	Jun
Opening Balance	10,000	77,500	110,250	44,500	10,875	17,775
Receipts						
Cash-Sales	55,000	35,000	40,000	3,750	50,000	455,000
(Note No.1)						
Collection From	1,51,500	1,47,750	1,17,750	1,15,875	1,23,000	1,40,625
Debtors (Note No.2)						
(A)	**2,16,500**	**2,60,250**	**2,68,000**	**1,97,875**	**1,83,875**	**203,400**
Payments						
1) Purchases	1,12,000	1,28,000	1,20,000	1,60,000	1,44,000	96,000
(Note No.3)						
2) Office Expenses	25,000	20,000	40,000	35,000	30,000	45,000
3) Rent	2,000	2,000	2,000	2,000	2,000	2,000
4) Interest on Borrowing					100	200
5) Interest on Debentures			7,500			7,500
(2,00,000 x 15/100 x 1/4)						
6) Advance Tax			54,000			
7) Redemption of Debtors	–	–	–	–	–	40,000
Minimum Cash	10,000	10,000	10,000	10,000	10,000	10,000
(B)	**1,49,000**	**1,60,000**	**2,33,500**	**207,000**	**18,61,000**	**(200,700)**
A - B = Closing Balance	**67,500**	**100,250**	**34,500**	**(9,125)**	**(2,225)**	**(2,700)**
Borrowing	**–**	**–**	**–**	**10,000**	**10,000**	**10,000**
Minimum Cash	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	
Balance c/f	**77,500**	**110,250**	**44,500**	**1.875**	**17,775**	**12,700**

Cash Sales/ Collection From Debtors

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sales	1,80,000	2,00,000	2,20,000	1,40,000	1,60,000	1,50,000	2,00,000	1,80,000
Note No.1								
Cash (1/4)	45,000	50,000	55,000	35,000	40,000	37,500	50,000	45,000
Note No.2								
Credit (3/4)	1,35,000	1,50,000	1,65,000	105,000	1,20,000	1,12,500	1,50,000	1,35,000
25%	33,750	37,500	41,250	26,250	30,000	28,125	37,500	33,750
60%		81,000	90,000	99,000	63,000	72,000	67,500	90,000
15%			20,250	22,500	24,750	15,750	18,000	16,875
			151,500	**147,750**	**117,750**	**115,875**	**123,000**	**140,625**
Note No.3								
Purchases								
$\left(\text{Sales x}\frac{25}{125}\right)$								
= Purchases								
(80%)								
=	1,44,000	1,60,000	1,76,000	1,12,000	1,28,000	1,20,000	1,60,000	1,44,000
	$\left(\frac{18,000 \text{ x } 25}{125}\right)$							
Purchased & Paid			1,12,000	1,28,000	1,20,000	1,60,000	1,44,000	96,000

Case Study-6

Sri Ganesh has given the sales forecast for Jan to Jul 2014 and actual sales for Nov, Dec. with the other particulars:

Sales (₹):

Nov'13	…….	80,000	Apr '14	…….	1,00,000
Dec'13	…….	70,000	May '14	…….	90,000
Jan'14	…….	80,000	June '14	…….	1,20,000
Feb'14	…….	1,00,000	Jul '14	…….	1,00,000
Mar'14	…….	80,000			

Sales 20% cash 80% credit payable in the third month (Jan sales in Mar)
Variable expenses 5% on turnover, time lag half month.
Commission 5% on credit sales payable in the third month.
Purchases 60% of the sales of the third month.
Payment 3rd month of purchases.
Rent and other expenses ₹ 3,000 paid every month.
Other payments: Fixed Assets Purchase March ₹ 50,000.
Taxes paid in April ₹ 20,000
Opening cash balance ₹ 25,000

Required:

Prepare cash budget for five months Jan to May 2014.

Cash Budget for Jan-14 to May-14

	Jan	Feb	March	April	May
Opening Balance	25,000	47,050	52,750	24,050	32,550
(A) Receipts					
Cash Sales (Note No.1)	16,000	20,000	16,000	20,000	18,000
Debtors Collection (Note No.1)	64,000	56,000	64,000	80,000	64,000
Total (A)	105,000	123,050	132,750	124,050	114,550
(B) Payments					
(1) Creditor	48,000	60,000	48,000	60,000	54,000
(2) Variable Expenses (Note No.3)	3,750	4,500	4,500	4,500	4,750
(3) Commission (5 %)	3,200 (64,000 x 5 %)	2,800 (56,000 x 5 %)	3,200 (64,000 x 5%)	4,000 (80,000 x 5%)	3,200 (64,000 x 5%)
(4) Rent	3,000	3,000	3,000	3,000	3,000
(5) Fixed Assets	–	–	50,000	–	–
(6) Taxes	–	–	–	20,000	–
Total (B)	57,950	70,300	108,700	91,500	64,950
A - B = Closing Balance	47,050	52,750	24,050	32,550	49,600

(Note No.1) **Cash – Sales/ Collection from Debtors**

		Nov	Dec	Jan	Feb	March	April	May
Sales	(Total)							
(Given)		80,000	70,000	80,000	1,00,000	80,000	1,00,000	90,000
Cash	20%	16,000	14,000	16,000	20,000	16,000	20,000	18,000
Credit	80%	64,000	56,000	64,000	80,000	64,000	80,000	72,000
				64,000	56,000	64,000	80,000	64,000
Note No. 2 Payment to Creditors								
Purchase (60 %)	48,000	48,000	60,000	48,000	60,000	54,000	72,000	60,000
	(80,000 x 60 %)							
Payment				48,000	60,000	48,000	60,000	54,000
Note No.3								
Variable Expenses	5%	4,000	3,500	4,000	5,000	4,000	5,000	4,500
	½	2,000	1,750	2,000	2,500	2,000	2,500	2,250
	½		2,000	1,750	2,000	2,500	2,000	2,500
			3,750	**3,750**	**4,500**	**4,500**	**4,500**	**4,750**

Case Study-7

You are given the following information:

(a) Estimated monthly sales are as follows:

	₹		₹
Jan	1,00,000	Jun	80,000
Feb	1,20,000	Jul	1,00,000
Mar	1,40,000	Aug	80,000
Apr	80,000	Sep	60,000
May	60,000	Oct	1,00,000

(b) Wages and Salaries are estimated to be payable as follows:

	₹		₹
Apr	9,000	Jul	10,000
May	8,000	Aug	9,000
Jun	10,000	Sep	9,000

(c) Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month and the balance in two months. There are no bad debt losses.

(d) Purchases amount to 80% of sales and are made and paid for in the month preceding the sales.

(e) The firm has taken a loan of ₹ 1,20,000. Interest @ 10% p.a. has to be paid quarterly in January, April and so on.

(f) The firm is to make payment tax of ₹ 5,000 in July, 2014.

(g) The firm had a cash balance of ₹ 20,000 on 1st April, 2014 which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

Required:

Prepare monthly cash budgets for six months beginning from April, 2014 on the basis of the above information.

Statement Showing Cash Budget April to September

	April	**May**	**June**	**July**	**Aug**	**Sep**
Opening Balance	20,000	20,000	20,000	20,000	20,000	20,000
Receipts						
Cash Sales	16,000	12,000	16,000	20,000	16,000	12,000
(Note No. 1)						
Collection From Debtors	108,000	76,000	52,000	60,000	76,000	68,000
(Note No. 1)						
Total - (A)	**1,44,000**	**108,000**	**88,000**	**1,00,000**	**1,12,000**	**1,00,000**
Payments						
Purchases						
(Note No. 2)	48,000	64,000	80,000	64,000	48,000	80,000
Wages & Sales	9,000	8,000	10,000	10,000	9,000	9,000
Interest on Loan	3,000			3,000		
$\left(1{,}20{,}000 \times \frac{10}{100} \times \frac{1}{4}\right)$						
Tax - Payment				5,000		
Minimum Balance	20,000	20,000	20,000	20,000	20,000	20,000
Total - (B)	**80,000**	**92,000**	**1,10,000**	**102,000**	**77,000**	**109,000**
A - B = Closing Balance	64,000	16,000	(22,000)	(2,000)	35,000	(9,000)
Investment/Loan	(64,000)	(16,000)	22,000	2,000	(35,000)	9,000
Closing Balance	0					
Minimum Balance	20,000	20,000	20,000	20,000	20,000	20,000
Balance C/F	**20,000**	**20,000**	**20,000**	**20,000**	**20,000**	**20,000**

Cash Sales/ Collection Debtors

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sales	1,20,000	1,40,000	80,000	60,000	80,000	1,00,000	80,000	60,000
20% (Cash)	24,000	28,000	16,000	12,000	16,000	20,000	16,000	12,000
80 % (Credit)	96,000	1,12,000	64,000	48,000	64,000	80,000	64,000	48,000
75%		72,000	84,000	48,000	36,000	48,000	60,000	48,000
25%			24,000	28,000	16,000	12,000	16,000	20,000
			108,000	76,000	52,000	60,000	76,000	68,000
Note No. 2 (Purchases)								
Purchases & Paid (80 %)		64,000	48,000	64,000	80,000	64,000	48,000	80,000

Cash Budget & Budgeted Income Statement

Case Study-8

On 30th September, 2013, the Balance Sheet of Dani Sugar & Co. retailers of sugar, was as under:

Liabilities	(₹)	Assets		(₹)
Capital	20,000	Equipment's (at cost)₹ 20,000		
		Less : Depreciation	5,000	15,000

Reserves and Surplus	10,000	Stock	20,000
Trade Creditors	40,000	Trade Debtors	15,000
Audit Fees	15,000	Balance at Bank	35,000
	85,000		85,000

The firm is developing a system of forward planning and on 1st October 2013 it supplies the following information:

Month	Credit Sales (₹)	Cash Sales (₹)	Credit Purchases (₹)
Sep '13 (Actual)	15,000	14,000	40,000
Oct '13 (Budgeted)	18,000	5,000	23,000
Nov'13 (Budgeted)	20,000	6,000	27,000
Dec'13 (Budgeted)	25,000	8,000	26,000

All trade debtors are allowed one month's credit and are expected to settle promptly. All trade creditors are paid in the month following delivery.

On 1st October 2013, all the equipment was replaced at a cost of ₹ 30,000. ₹ 14,000 was allowed in exchange for the old equipment and a net payment of ₹ 16,000 was made.

Depreciation is to be provided at the rate of 10% per annum.

The audit fees will be paid in December 2013.

The following expenses will be paid:

— Wage ₹ 3,000 per month.
— Administration ₹ 1,500 per month.

Rent ₹ 3,600 for the year to 30th September 2014 (to be paid in Oct'13)
The gross profit % on sale is estimated at 25%.

Required:

a) Prepare a Cash Budget for the month of Oct, Nov & Dec.
b) Prepare an Income Statement for the three months ending 31st Dec'13.

Statement Showing Cash Budget

	October	November	December
Opening Balance	35,000	(9,100)	(12,600)
Receipts			
Cash-Sales	5,000	6,000	8,000
Collection-from-Debtors (Note No.1)	15,000	18,000	20,000
	55,000	14,900	15,400
Payments			
Creditors	40,000	23,000	27,000
Equipment	16,000	–	–
Audit fees			15,000
Wages	3,000	3,000	3,000
Admin Overhead	1,500	1,500	1,500
Rent	3,600	–	–
	64,100	27,500	46,500
Closing Balance	(9,100)	(12,600)	(31,100)

Statement Showing Income – 3 Months Ended 31-12-2013

	₹		₹
To Material	52,500	By Sales	82,000
(20,000 + 23,000 + 27,000 + 26,000 - 43,500)		(18,000 + 20,000 + 25,000) + (5,000 + 6,000 + 8,000)	
To Wages	9,000		
(3,000 + 3,000 +3,000)	**20,500**		
To Gross Profit			
(82,000 x 25 %)			
To Admin	4,500		
(1,500 + 1,500 + 1,500)			
To Rent	900		
(300 + 300 + 300)			
To Depreciation (Note No.1)	750		
To Loss on Sale of Equipment	1,000		
To net profit	13,350		
	82,000		**82,000**

Equipment A/c. Debtors	30,000
Profit Loss A/c. Debtors	1,000 →
To Equipment A/c.	15,000
To Bank A/c.	16,000
$\text{Dep} = \left(30{,}000 \times \frac{10}{100} \times \frac{3}{12}\right)$	= 750

Functional Budgets

Case Study-9

DEF Ltd. manufactures and sells a single product and has estimated sales revenue of ₹ 397.80 lacs during the year based on 20% profit on selling price. Each unit of product requires 6 kg of material A and 3 kg of material B and processing time of 4 hours in machine shop and 2 hours in assembly shop. Factory overheads are absorbed at a blanket rate of 20% of direct labour. Variable selling & distribution are ₹ 6 per unit sold and fixed selling & distribution overheads are estimated to be ₹ 7,20,000.

The other relevant details are as under:

Purchase Price	……	Material A	₹ 16 per kg	
		Material B	₹ 10 per kg	
Labour Rate	……	Machine Shop	₹ 14 per hour	
		Assembly Shop	₹ 7 per hour	
		Finished Stock	Material A	Material B
Opening Stock	……	25,000 units	75,000 kg	40,000 kg
Closing Stock	……	30,000 units	80,000 kg	55,000 kg

Required:

1) Calculate number of units of product proposed to be sold and selling price per unit,
2) Production Budget in units and
3) Material Purchase Budget in units.

Statement Showing Variable Cost

Estimated Sales Revenue = 3,97,80,000

Variable Cost
3,11,04,000

Contribution
86,76,000

Fixed Selling and Distribution Cost
7,20,000

Profit
20 % x 39,780,000
79,56,000

Statement Showing Variable Cost (Per Unit)

	Per unit
Direct Material 'A' (6 kg x 16)	96
Direct Material 'B' (3 kg x 10)	30
Direct - Labour Cost	
Machine Shop (4 hrs. x 14)	56
Asset Shop (2 hrs. x 7)	14
Fixed Overhead (56 + 14) x 20 %	14
Variable Overhead	6.00
Total	**216**
Number of Units Sold $\left(\frac{31,104,000}{216}\right)$	
= 1,44,000 Units	

$$\text{Selling Price (P.U)} = \left(\frac{3,97,80,000}{1,44,000}\right) = 276.25$$

Ans No. 2

Statement Showing Product Budget

	Units
Sales	1,44,000
Closing Stock	30,000
Opening Stock	(25,000)
Production =	1,49,000

Statement Showing Purchase Budget

	Material - A	Material - B
Consumption	8,94,000	4,47,000
	(1,49,000 x 6 kg)	(1,49,000 x 3 kg)
Closing Stock	80,000	55,000
Opening Stock	(75,000)	(40,000)
	8,99,000	**4,62,000**

Case Study–10

A Company is engaged in manufacturing two products 'KX' and 'KY', Product 'KX' use one unit of component 'KP' and two units of component 'KQ', Product 'KY' uses two units of component 'KP', one unit of component 'KQ', and two units of component 'KR'. Component 'KR' which is assembled in the factory uses one unit of component 'KQ'.

Component 'KP' and 'KQ' are purchased from the market. The company has prepared the following forecast of sales and inventory for the next year:

Particulars	Product 'KX'	Product 'KY'
Sales (in units)	40,000	75,000
At the end of the year	5,000	k10,000
At the beginning of the year	15,000	25,000

The production of both the products and the assembling of the component 'KR' will be spread out uniformly throughout the year. The company at present orders its inventory of 'KP' and 'KQ' in quantities equivalent to 3 months production. The company has compiled the following data related to two components:

Particulars	'KP'	'KQ'
Price per unit (₹)	40	16
Order placing cost per order (₹)	3,000	3,000
Carrying cost per annum	10%	10 %

Required:

I. Prepare a Budget of production and requirements of components during next year.
II. Suggest the optimal order quantity of components 'KP' and 'KQ'.

Ans No.1 Part (i)

Statement Showing Production Budget

	KX	KY
	Units	Units
Sales	40,000	75,000
Closing Stock	5,000	10,000
Open- Stock	(15,000)	(25,000)
Production	30,000	60,000

Statement Showing Requirement Budget

KP (Note No.1) = (30,000 + 1,20,000) = 1,50,000
KQ (Note No.1) = (60,000 + 60,000 + 1,20,000) = 2,40,000

Note No.

KX 30,000 units

KP
1 x 30,000 = 30,000

KQ
2 x 30,000 = 60,000

KY 60,000 units

KP
2 x 60,000 = 1,20,000

KY
1 x 60,000 = 60,000

KR
2 x 60,000 = 1,20,000

Statement Showing E.O.Q

		KP	KQ
A =	Annual Demand	1,50,000	2,40,000
O =	Ordering Cost	3,000	3,000
C =	Carrying Cost	(10 % x 40) = 4	(16 x 10 %) = 1.60
	E.O.Q	$\frac{\sqrt{2 \times 1,50,000 \times 3,000}}{4}$ = 15,000	$\frac{\sqrt{2 \times 2,40,000 \times 3,000}}{1.60}$ = 30,000

Case Study– 11

Super Products Ltd. manufactures and sells a single product and has estimated a sales revenue of ₹ 126 lakhs this year based on a 20% profit in selling price. Each unit of the product requires 3 lbs. of material A and 1.1/2 lbs. of material B, for manufacture as well as a processing time of 7 hours in the Machine Shop and 2.1/2 hours on the Assembly Section. Overheads are absorbed at a blanket rate of 33.1/3 % on Direct Labour. The factory works 5 days of 8 hours a week in normal 52 weeks a year. On an average statutory holidays, leave and absenteeism and idle time amount to 96 hours, 80 hours and 64 hours respectively, in a year.

The order details are as under:

Purchase Price	Material A	₹ 6 per lb.	
	Material B	₹ 4 per lb.	
Comprehensive Labour Rate	Machine Shop	₹ 4.00 per hour	
	Assembly Section	₹ 3.20 per hour	
No. of employees	Machine Shop	600	
	Assembly Section	180	
	Finished Goods	Material A	Material B
Opening Stock	20,000 Units	54,000 lbs.	33,000 lbs.
Closing Stock (Estimated)	25,000 Units	30,000 lbs.	66,000 lbs.

Required:

i. Calculate the number of units of the product proposed to be sold,
ii. Purchase to be made of Materials A and B during the year in rupees and
iii. Capacity utilization of Machine Shop and Assembly Section, along with your comments.

Statement Showing ProductionAns No.1 Statement Showing Selling Price (Per Unit)

	(P.U)
Direct Material	₹
Material - A (6 x 3 lbs) =	18
Material - B (4 x 1.5 lbs) =	6
Direct - Labour	
Machine Shop - (7 hrs x 4) =	28
Assembly section (2.5 hr x 3.20)=	8
Overheads	
(33 1/3 % on Direct Labour) (28 + 8)	12
Fixed Cost	72
Profit $\left(72 \times \frac{20}{80}\right)$	18
Selling Price	90.00
Number of units sold $\left(\frac{1,26,00,000}{90}\right)$	1,40,000 units

Ans No. ii Statement Showing Purchase Budget

Materials	A	B
Consumption (Note No. a)	4,35,000	2,17,500
Closing Stock	30,000	66,000
Opening Stock	(54,000)	(33,000)
Purchases	4,11,000	2,50,500
x Rate	x 6	x 4
Purchase Value	= 24,66,000	= 10,02,000

Note No. I Statement Showing Consumption

	Units
Sales	1,40,000
Closing Stock	25,000
Opening stock	(20,000)
Production	1,45,000

Consumption:-

Material	Production x Material	= Consumption (lbs)
A	1,45,000 x 3 lbs	= 4,35,000
B	1,45,000 x 1.5 lbs	= 2,17,500
		6,52,500

Case Study– 12

Smart Electronics is manufacturing for export, four models of Television Sets. The major components viz., Cabinet, High Voltage Transformer and the Speaker are bought out by the Company. Picture tubes for three out of the four models are purchased from other firms. Four Cabinet styles (A, B, C and D), two kinds of Transformers (X and Y): Three kinds of speakers and three types of picture tubes are assembled in the following ways in the final product:-

Model	Cabinet	Transformer	Speaker	Picture Tube
Standard	A @ ₹ 200	X @ ₹ 200	5" Cone @ ₹ 300	OWN
Deluxe	B @ ₹ 300	X @ ₹ 200	5" Cone @ ₹ 300	BEL @ ₹ 1,200
Aristocrat	C @ ₹ 500	Y @ ₹ 300	6" Cone @ ₹ 400	BEL @ ₹ 1,200
Royal	D @ ₹ 700	Y @ ₹ 300	12" Cone @ ₹ 600	TELETUBE @ ₹ 1,600

The Company expects the following inventories in hand on 1st Jan 2014:-
Finished Sets:
Standard – 46; Deluxe – 73; Aristocrat – 54; Royal – 69
Sub- Assemblies:
Cabinet:
A –30; B – 40; C –20; D – 25
Transformers:
X – 31; Y– 17
Speakers:
5" Cone-27; 6"Cone – 47; 12"Cone – 18
Picture Tubes:
OWN– 20; BEL – 17; TELTUBE – 34
The Sales Manager estimates that sales of the quarter, January – March 2014, will be:–
Standard– 200; Deluxe– 600; Aristocrat – 500; Royal – 300
The following inventory quantities have been budgeted for 31st March 2014:–
Finished Sets:
25 in each model
Sub– Assemblies:
Cabinet – 15(each model)
Transformers – 20 (each type)
Speakers – 30 (each type)
Picture Tube
OWN – 30; BEL – 40; TELTUBE – 20

Required:

Prepare the purchase budget for the various items stated above for the quarter Jan – Mar'14.

Statement Showing Production Budget

	Standard	Deluxe	Aristocrat	Royal
Sales	200	600	500	300
Closing Stock	25	25	25	25
Opening Stock	(46)	(73)	(64)	(69)
Production =	179	552	461	256

Statement Showing Consumption/ Purchase Budget

Cabinet	A	B	C	D
Standard	179	–	–	–
Deluxe	–	552	–	–
Aristocrat	–	–	461	–
Royal	–	–	–	256
Consumption	179	552	461	256
Closing Stock	15	15	15	15
Opening Stock	(30)	(40)	(20)	(25)
Purchase Quantity	164	527	456	246
x Rate	x 200	x 300	x 500	700
Purchase Value	= 32,800	= 1,58,100	= 2,28,000	= 1,72,200
Total	**= 5,91,100**			

Transformer	X	Y	
Standard	179	–	
Deluxe	552	–	
Aristocrat	–	461	
Royal	–	256	
	731	717	
Closing Stock	20	20	
Opening Stock	(31)	(17)	
Purchase	720	720	
Rate	x 200	x 300	
Purchase Value	= 1,44,000	= 2,16,000	
=	**3,60,000**		
	Cone 5"	**Cone 6"**	**Cone 12"**
Standard	179	–	–
Deluxe	552	–	–
Aristocrat	–	461	–
Royal	–	–	256
Closing Stock	30	30	30
Opening Stock	(27)	(47)	(18)
Purchase	734	444	268
x Rate	x 300	x 400	x 600
	= 2,20,200	= 1,77,600	= 1,60,800
	5,58,600		

Picture - Tube	Own	Bel	TeleTube
Standard	179	–	–
Deluxe	–	552	–
Aristocrat	–	461	–
Royal	–	–	256
Consumption	179	1,013	256
Closing Stock	30	40	20
Opening Stock	(20)	(17)	(34)
	189 x Own	1,036 x 1,200 = 12,43,200	242 x 1,600 = 3,87,200
Total =	16,30,400		

Case Study– 13

KFA Ltd. manufactures three products K, F and A in two production departments X and D, in each of which are employed two grades of labour. The cost accountant is preparing the annual budgets for the next year and he has asked you to prepare, using the data given below:

a) The production budget in units for products K, F and A.
b) The direct wages budget for departments X and D with the labour costs of product K. F and A and total shown separately:

Product : (₹' 000)	Product K	Product F	Product A
Finished Stocks:	(₹' 000)	(₹' 000)	(₹' 000)
Budgeted Stocks are			
1st Jan. Next year	720	540	1,800
31st Dec. Next year	600	570	1,000
All Stocks are Valued at Standard Cost per unit	₹ 24	₹ 15	₹ 20
Standard Profit Calculated as % of Selling Price	20%	25%	16.66..%

	Total	Product K	Product F	Product A
Budgeted Sales:	(₹' 000)	(₹' 000)	(₹' 000)	(₹' 000)
South	6,600	1,200	1,800	3,600
West	5,100	1,500	1,200	2,400
North	6,380	1,500	800	4,080
	18,080	4,200	3,800	10,080
Normal Loss in Production		10%	20%	5%

Standard Labour Times per unit and Standard Rate per hour				
Department X :	**Rate (₹)**	**Product K (Hours)**	**Product F (Hours)**	**Product A (Hours)**
Grade 1	1.8	2.0	3.0	1.0
Grade2	1.6	1.5	2	1.5
Department D :				
Grade 1	2.00	3.0	1.0	1.0
Grade2	1.80	2.0	1.5	2.5

Statement Showing Production Budget

'000

Product	**K**	**F**	**A**
	₹	**₹**	**₹**
Budgeted Sales	4,200	3,800	10,080
÷ Sales Price (p.u)	= 30	= 20	= 24
	$\left(\frac{24 \times 100}{80}\right)$	$\left(\frac{15 \times 100}{75}\right)$	$\left(\frac{20 \times 100}{83.33}\right)$
Sales-Units	= 140	= 190	= 420
Closing Stock	600 ÷ 24	570 ÷ 15	1,000 ÷ 20
Units	= 25	= 38	= 50
Opening Stock	720 ÷ 24	540 ÷ 15	1,800 ÷ 20
Units	= (30)	= (36)	= (90)
Good Units (Production)	135	192	380

Statement Showing Production Budget

Good Units	= 150	= 240	= 400
(Production)	$\left(135 \times \frac{100}{90}\right)$	$\left(192 \times \frac{100}{80}\right)$	$\left(380 \times \frac{100}{95}\right)$
Normal	= (15)	(48)	(20)
Loss	$\left(150 \times \frac{10}{100}\right)$	$\left(240 \times \frac{20}{100}\right)$	$\left(\frac{400 \times 5}{100}\right)$
Good Units	**135**	**192**	**380**

Statement Showing Direct Wages Budget For Department x & D

Department	**Products**	**Units x Hours per unit**	**Total Hours x Rate**	**Wages**
X	K	150 x 2	300 x 1.80	540
(Grade - 1)	F	240 x 3	720 x 1.80	1,296
	A			

'000

Department	Products	Units x Hours per unit =	Total Hours x Rate =	Wages
X	K	150 x 2 =	300 x 1.80 =	540
(Grade - 1)	F	240 x 3 =	720 x 1.80 =	1,296
	A	400 x 1 =	400 x 1.80 =	720
				2,556
Grade - 2	K	150 x 1.5 =	225 x 1.60 =	360
	F	240 x 2 =	480 x 1.60 =	768
	A	400 x 1.50 =	600 x 1.60 =	968
				2,088
Department - D				
Grade -1	K	150 x 3 =	450 x 2 =	900
	F	240 x 1 =	240 x 2 =	480
	A	400 x 1 =	400 x 2 =	800
				2,180
Grade - 2	K	150 x 2 =	300 x 1.80 =	540
	F	240 x 1.5 =	360 x 1.80 =	648
	A	400 x 2.50 =	1,000 x 1.80 =	1,800
				2,988

Case Study– 14

EXE Ltd. manufacturing three types of products P, Q and R and market them at ₹ 450,₹ 550 and ₹ 650 per unit respectively. The current ratio of sales in quantity of P, Q and R is 1:2:4.

Relevant Data of P, Q & R (per unit)

Product	Quantity of Parts required therein (In nos.)				Labour Hours		Variable Overheads
	Frame	S	T	U	Skilled	Unskilled	
P	1	10	2	8	6	8	9
Q	1	2	14	10	4	6	11
R	1	6	10	2	3	6	7

The present purchase price per part is ₹ 45, ₹ 15, ₹ 15 and ₹ 5 for Frame, S, T and U respectively. The wages rate per hours for Skilled and Unskilled workers is ₹ 6 and ₹ 5 respectively.

The opening stocks as on 1.11.2013 stood at 500, 1,000, 3,000,1,500, 20,000 and 10,000 for P, Q, R, Frames, S, T and U respectively. The company maintains closing stock of products and parts at 90% of the opening stocks.

The workers work for 8 hours a day for 25 days in a month.

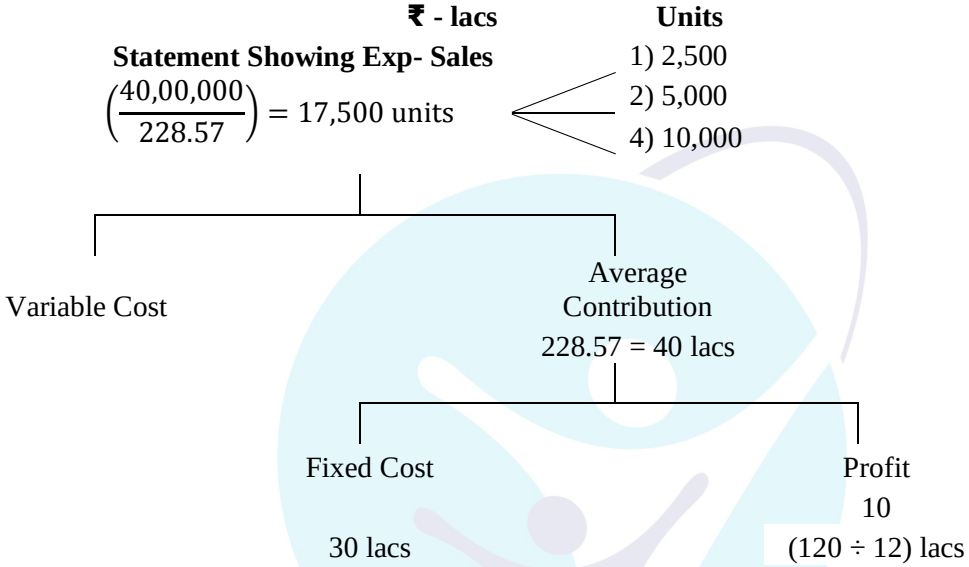
The share of fixed overheads per month comes to ₹ 15,75,000; ₹ 5,80,000; and ₹ 8,45,000 for production, administration and selling & distribution respectively.

The yearly profit as projected up to October, 2014 is ₹ 120 lakhs.

Required:

Present the following for November, 2013;

A. Sales Budget in quantity as well as in value for P,Q and R.
B. Production Budget.
C. Parts Usage Budget.
D. Purchase Budget in quantity as well as in value.
E. Manpower Budget showing labour hours and wages payable for both types of workers.



Average Contribution Per Unit

	P	Q	R
Selling Price (p.u)	450	550	650
Variable Price (p.u)			
Frame	(45)	(45)	(45)
S	(150)	(30)	(90)
T	(30)	(210)	(150)
U	(40)	(50)	(10)
SK - Labour	(36)	(24)	(18)
Unsk - Labour	(40)	(30)	(30)
Variable Overhead	(9)	(11)	(7)
Contribution	100	150	300
Required Ratio	x 1	x 2	x 4
Total- Contribution =	100	300	1,200

$$\text{Average Contribution (p.u)} = \left(\frac{100 + 300 + 1,200}{1 + 2 + 4}\right) = 228.57$$

Ans No. 1 Statement Showing Sales Budget

Products	Units x Sales Price (p.u)	=	Sales
P	2,500 units x 450	=	11,25,000
Q	5,000 units x 550	=	27,50,000
R	10,000 units x 650	=	65,00,000
			10,375,000

Ans No.2 Statement Showing Production budget

	P	Q	R
Sales (Units)	2,500	5,000	10,000
Closing Stock	= 450	= 900	= 2,700
	(500 x 90%)	(1,000 x 90 %)	(3,000 x 90 %)
Open- Stock	(500)	(1,000)	(3, 000)
	2,450	4,900	9,700

Ans No.3 Statement Showing Usage Budget (Parts)

	Frame	S	T	U
P	= 2,450	= 24,500	= 4,900	= 19,600
	(2,450 x 1)	(2,450 x 10)	(2,450 x 2)	(2,450 x 8)
Q	= 4,900	= 9,800	= 68,600	= 49,000
	(4,900 x 1)	(4,900 x 2)	(4,900 x 14)	(4,900 x 10)
R	= 9,700	= 58,200	= 97,000	= 19,400
	(9,700 x 1)	(9,700 x 6)	(9,700 x 10)	(9,700 x 2)
Usage	17,050	92,500	1,70,500	88,000

Statement Showing Purchase Budget

	Frame	S	T	U
Consumption	17,050	92,500	1,70,500	88,000
Closing Stock	1,350	900	18,000	9,000
	(90% x 1,500)	(90 % x 1,000)	(90 % x 20,000)	(90 % x 10,000)
Opening Stock	-1,500	1,000	20,000	10,000
Purchase Quantity	16,900	92,400	1,68,500	87,000
x Rate	x 45	x 15	x 15	5
Purchase Value	7,60,500	13,86,000	25,27,500	4,35,000

SK	Units x hours (p.u)	Hours	₹
P	2,450 x 6 =	14,700 x 6 =	88,200
Q	4,900 x 4 =	19,600 x 6 =	1,17,600
R	9,700 x 3 =	29,100 x 6 =	1,74,600
			3,80,400
Semi			
P	2,450 x 8 =	19,600 x 5 =	98,000
Q	4,900 x 6 =	29,400 x 5 =	1,47,000
R	9,700 x 6 =	58,200 x 5 =	2,91,000
			5,36,000

Case Study– 15

A single product company estimated its sales for the next year quarter wise as under:

Quarter		Sales Units
I	……	60,000
II	……	75,000
III	……	82,500
IV	……	90,000

The opening stock of finished goods is 20,000 units and the company expects to maintain the closing stock of finished goods at 32,500 units and the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.

The opening stock of raw materials in the beginning of the year is 20,000 Kg. and the closing stock at the end of the year is required to be maintained at 10,000 Kg. Each unit of finished output required 2 Kg. of raw materials.

The company proposes to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below:

Quarter	Purchase of raw materials % total annual requirement in quantity	Price per Kg. (₹)
I	30%	2
II	50%	3
III	20%	4

The value of the opening stock of raw materials in the beginning of the year is ₹ 40,000.

Required:

Present the following for the next year, quarter wise-

i. Production budget in units.
ii. Raw material consumption budget in quantity.
iii. Raw material purchase budget in quantity and value.

Ans No. (i)

	Units
Sales (60,000 + 75,000 + 82,500 + 90,000)	= 307,500
Closing Stock	= 32,500
Opening Stock	(20,000)
	3,20,000

Statement Showing Production Budget

Quarter	I	II	III	IV	Total
Production	= 48,000 (80 % x 60,000)	= 60,000 (80 % x 75,000)	= 66,000 (80 % x 82,500)	= 72,000 (80 % x 90,000)	2,46,000
Production	15,000 (20 % x 75,000)	16,500 (20 % x 82,500)	18,000 (20 % x 90,000)	24,500	74,000
	63,000	**76,500**	**84,000**	**96,500**	**3,20,000**

Ans No. (ii)

Statement Showing Raw Material Consumption Budget

Quarter	Production x 2 Kg	=	Consumption
I	63,000 units x 2	=	1,26,000 Kg.
II	76,500 units x 2	=	1,53,000 Kg.
III	84,000 units x 2	=	1,68,000 Kg.
IV	96,500 units x 2	=	1,93,000 Kg.
	3,20,000		**6,40,000 Kg.**

Statement Showing Purchase Budget

Quarter	Purchases (Note No.1)	
I	6,30,000 x 30 %	1,89,000 x 2 = 3,78,000
II	6,30,000 x 50 %	3,15,000 x 3 = 9,45,000
III	6,30,000 x 20 %	1,26,000 x 4 = 504,000
		18,27,000

Note No. (a)

	Kg.
Consumption	6,40,000
Closing Stock	10,000
Opening Stock	(20,000)
Purchases	**6,30,000**

Case Study– 16

SIAM Ltd. manufactures two products using one type of material and one grade of labour. Shown below is an extract from the company's working papers for the next period's budget.

Particulars	Product A	Product B
Budgeted Sales (Units)	1,800	2,400
Budgeted Material Consumption per Product (Kg.) [Budgeted Material Cost ₹ 12 per kg.]	5	3
Standard Hours Allowed per product [Budgeted Wage Rate ₹ 8 per hour]	5	4

Overtime premium is 50% and is payable, if a worker works for more than 40 hours a week. There are 45 direct workers.

The target productivity ratio (or efficiency ratio) for the productive hours worked by the direct workers in actually manufacturing the products is 80%; in addition the non-productive downtime is budgeted at 20% of the productive hours worked.

There are twelve 5-day weeks in the budget period and it is anticipated that sales and production will occur evenly throughout the whole period.

It is anticipated that stock at the beginning of the period will be:

Product A 510 units; Product B 1,200 units; Raw material 2,150 Kg.

The target closing stock, expressed in terms of anticipated activity during budget period are Product A 15 days sales; Product B 20 days sales; Raw material 10 days consumption.

Required:

i. The material purchases budget, and
ii. The wages budget for the direct workers, showing the quantities and values, for the next period.

Statement Showing Production Budget

	'A' Units	'B' Units
Sales	1,800	2,400
Closing FIN Goods	450 $\left(\frac{1,800}{12} \times \frac{15}{5}\right)$	800 $\left(\frac{2,400}{12} \times \frac{20}{5}\right)$
Opening FIN Goods	(510)	(1,200)
	1,740	**2,000**

Statement Showing Purchase Budget

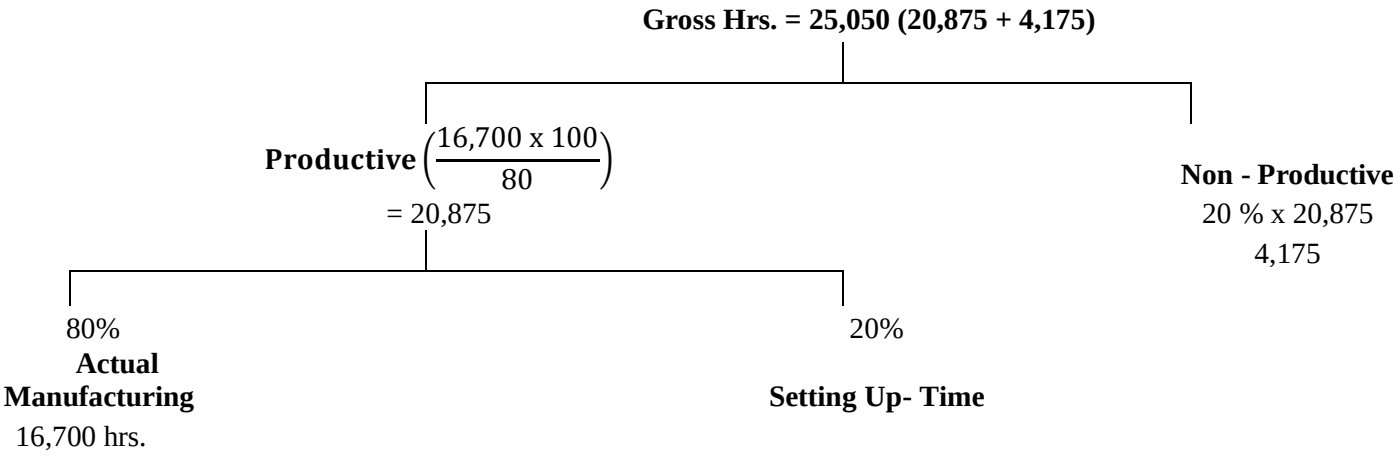
	Kg.
Consumption A (1,740 x 5)	= 8,700
B (2,000 x 3)	= 6,000
	14,700
Closing Stock $\left(14,700 \times \frac{10}{60}\right)$	2,450
OP Stock	(2,150)
Purchases	15,000
x Rate	12
Purchase Value	**= 1,80,000**

Statement Showing Wages Budget

	₹
Normal = 21,600 x 8	= 1,72,800
(45 Workers x 12 Weeks x 5 days x 8 hrs.)	
Overtime = 3,450 x 8 x 150 %	= 41,400
(25,050 - 21,600)	2,14,200

Statement Showing Wages / Hrs.

Product	Units x Hrs. / Per Unit	Total Hrs.
A	1,740 x 5	= 8,700
B	2,000 x 4	= 8,000
		16,700



Case Study– 17

Balrampur Mfg. Ltd. produces and sells a single product. Sales budget for the calendar year 2014 by quarter is as under:

Quarter	No. of units to be sold	Quarter	No. Of units to be sold
I	12,000	III	16,500
II	15,000	IV	18,000

The year 2014 is expected to open with an inventory of 4,000 units of finished product and close with an inventory of 6,500 units.

Production is customarily scheduled to provide for two- thirds of the current quarter's sales demand plus one third of the following quarter's demand.

The standard materials 10 lbs. @ 50 paise per lb.

Direct labour 1 hour 30 minutes @ ₹ 4 per hour.

Variable overheads 1 hour 30 minutes @ ₹ 1 per hour.

Fixed overheads ₹ 1,80,000 p.a.

Required:

i. Prepare a Production Budget for 2014, by quarters, showing the number of units to be produced, and the total costs of direct labour, variable overheads and fixed overheads.
ii. If the budgeted selling price per units is ₹ 17, what would be the budgeted profit for the year as a whole?
iii. In which quarter of the year is the company expected to break even?

Note No. (i)	Units
Sales	61,500
(12,000 + 15,000 + 16,500 + 18,000)	6,500
Closing Stock	(4,000)
	64,000

Statement Showing Production Budget

Quarter	I	II	III	IV	Total
Production	8,000	10,000	11,000	12,000	41,000
	(2/3 x 12,000)	(2/3 x 15,000)	(2/3 x 16,500)	(2/3 x 18,000)	
Production	5,000	5,500	6,000	6,500	23,000
	(1/3 x 15,000)	(1/3 x 16,500)	(1/3 x 18,000)		
	13,000		17,000	18,500	64,000

Statement Showing Total Cost Direct Material Direct Labour Variable Overheads Fixed Overheads

Quarter	I	II	III	IV	Total
Direct Material	= 65,000	= 77,500	= 85,000	= 92,500	3,20,000
(1 unit x 10 Lb x .50) = 5	(13,000 x 5)	(15,500 x 5)	(17,000 x 5)	(18,500 x 5)	
Direct Labour	= 78,000	= 93,000	= 102,000	= 1,11,000	3,84,000
(1.5 hrs. x 4) x 1 unit = 6	(13,000 x 6)	(15,500 x 6)	(17,000 x 6)	(18,500 x 6)	
Variable O.H	= 19,500	= 23,250	= 25,500	= 27,750	96,000
(1 unit x 1.5 hrs. x 1) = 1.50	(13,000 x 1.50)	(15,500 x 1.5)	(17,000 x 1.5)	(18,500 x 1.5)	
Fixed Overheads $\left(\frac{1,80,000}{4}\right)$	45,000	45,000	45,000	45,000	1,80,000
	207,500	**2,38,750**	**2,57,500**	**2,76,250**	**9,80,000**

Statement Showing Analysis of Profit /Loss

	₹
Total Sales (61,500 x 17)	= 10,45,500
Total Variable Cost (61,500 x 12.50) [5 + 6 + 1.50] = 12.5	= (7,68,750)
	2,76,750
Fixed Cost	(1,80,000)
Profit for the year	**96,750**

B.E.P = S.P 17.00 3rd Quarter

Variable Price
12.50

Contribution
1,80,000
(17 - 12.50) x 40,000

Fixed
1,80,000

Profit
0

Case Study– 18

Valley Ltd. produces and markets a very popular product called 'X'. The company is interested in presenting its budget for the second quarter of 2014.

The following information is made available for this purpose:

a. It expects to sell 50,000 bags of 'X' during the second quarter of 2014 at the selling price of ₹ 9 per bag.
b. Each bag of 'X' requires 2.5 kgs. Of a raw – material called 'Y' and 7.5 kgs. of raw – material called 'Z'.
c. Stock levels are planned as follows:

Particulars	Beginning of Quarter	End of Quarter
Finished Bags of 'X' (Nos.)	15,000	11,000
Raw - Material 'Y' (kgs.)	32,000	26,000
Raw - Material 'Z' (kgs.)	57,000	47,000
Empty Bag (Nos.)	37,000	28,000

d. 'Y' cost ₹ 1.20 per Kg., 'Z" costs 20 paise per Kg. and 'Empty Bag' costs 80 paise each.

e. It requires 9 minutes of direct labour to produce and fill one bag of 'X'. labour cost is ₹ 5 per hour.

f. Variable manufacturing costs are ₹ 0.45 bag. Fixed manufacturing costs ₹ 30,000 per quarter.

g. Variable selling and administration expenses are 5% of sales and fixed administration and selling expenses are ₹ 25,000 per quarter.

Required:

1) Prepare a production budget for the said quarter.
2) Prepare a raw – material purchase budget for 'Y', 'Z' and 'Empty Bags' for the said quarter in quantity as well as in rupees.
3) Compute the budgeted variable cost to produce one bag of 'X'.
4) Prepare a statement of budgeted net income for the said quarter and show both per unit and total cost data.

Ans No. 1 Statement Showing Production Budget

	Bags
Sales	50,000
Closing Stock	11,000
Opening Stock	(15,000)
Production	46,000

Ans No. 2 Statement Showing Purchase Budget

	Y (Kg)	Z (Kg)	Empty Bags (Nos.)
Consumption	1,15,000 (46,000 x 2.5)	3,45,000 (46,000 x 7.5)	46,000 (46,000 x 1)
Closing Stock	26,000	47,000	28,000
Opening Stock	(32,000)	(57,000)	(37,000)
Purchase Qty	109,000	3,35,000	37,000
x Rate	1.20	.20	.80
Purchase Value	= 1,30,800	= 67,000	= 29,600

Statement Showing Budgeted Variable Cost of Production Per Bag

		₹
Raw Material		
Y (2.5 x 1.20)	=	3.00
Z (7.5 x .20)	=	15.00
Empty Bag (1 x .80)	=	0.80
Direct Labour (5 x 9 min/ 60 min)	=	0.75
Variable Manufacturing Overhead	=	0.45
Variable Cost of Production	=	**20**

Statement Showing Net Income For The Second Quarter

	Nos. - 50,0000	
	Total	**P.U**
Sales	4,50,000	9.00
Production Cost	(3,25,000)	(6.50)
Admin Selling	(22,500)	(0.45) (5 % x 9)
Budget - Contribution	102,500	2.05
Fixed Cost		
(1) Manufacturing	30,000	(0.60)
(2) Admin Selling	25,000	(0.50)
	47,500	**0.95**

Case Study– 19

Chetak Ltd. produces and markets three products – Chairs, Tables and Benches. The company is interested in presenting its budget for the next quarter ending 31st March, 2014. It expects to sell 4,200 Chairs, 800 Tables and 500 Benches during the said period at the selling price of ₹ 50,₹ 85, and ₹ 158 per unit respectively. The following information is made available for the purpose.

(a) Material and Labour requirements:

Particulars	Chairs	Tables	Benches
Timber per unit (in cu. ft.)	0.50	1.20	2.50
Upholstery per unit (in sq. yds.)	0.25	–	–
Carpenter's time (minutes per unit)	45	60	75
Fixer and Finisher's time (minutes per unit)	15	15	30

Timber costs ₹ 50 per cu. Ft. and Upholstery costs ₹ 20 per sq. yd. Fixing and Finishing materials costs 5% of the cost of Timber and Upholstery. Carpenter gets ₹ 6 per hour while the Fixer and Finisher get₹ 4.80 per hour.

(b) Inventory Levels planned:

Particulars	Timber (Cu. Ft.)	Upholstery (Sq. Yds.)	Chairs (Nos.)	Tables (Nos.)	Benches (Nos.)
Opening	600	400	400	100	50
Closing	650	260	200	300	50

(c)Fixed Overheads would be ₹ 8,000 per month.

Required:

a) Prepare a 'Production Budget' showing quantities to be manufactured.
b) Prepare a 'Raw Materials Purchase Budget' in quantities as well as in rupees.
c) Draw a 'Direct Wages Cost Budget'.

Ans No.1Statement Showing Production Budget

Particulars	Chair	Table	Benches
Sales	4,200	800	500
Closing Stock	200	300	50
Open Stock	(400)	(100)	(50)
Production =	**4,000**	**1,000**	**500**

Ans No. 2 Statement Showing Purchase Budget

	Timber (Cu. Ft)	Upholstery (Sq. Yds.)
Consumption		
(Note No.1)	4,450	1,000
Closing Stock	650	260
Opening Stock	(600)	(400)
Purchase Quantity & Value	(4,500 x 50) = 2,25,000	(860 x 20) = 17,200

Statement Showing Consumption Budget

	Timber	Upholstery
	(4,000 x .50)	(4,000 x 0.25)
Chair	= 2,000	= 1,000
	(1,000 x 1.20)	(1,000 x 0)
Table	= 1,200	= –
	(500 x 2.50)	(500 x 0)
Benches	= 1,250	= –
	4,450	**1,000**

Ans No. 4 Statement Showing Variable Cost

	Chair	Table	Benches
	P.U	**P.U**	**P.U**
Timber	25.00 (0.50 x 50)	60.00 (1.20 x 50)	125 (2.50 x 50)
Up Holstery	5.00 (0.25 x 20)	–	–
Fixing & Finishing (Note No. a)	1.50	3.00	6.25
Wages	= 4.50	= 6.00	= 7.50
Carpenter	$\left(\frac{45 \text{ min}}{60 \text{ min}} \text{ x } 6\right)$	$\left(\frac{60 \text{ min}}{60 \text{ min}} \text{ x } 6\right)$	$\left(\frac{75 \text{ min}}{60 \text{ min}} \text{ x } 6\right)$
Fixing & Finishing	= 1.20 $\left(\frac{15 \text{ min}}{60 \text{ min}} \text{ x } 4.80\right)$	= 1.20 $\left(\frac{15 \text{ min}}{60 \text{ min}} \text{ x } 4.80\right)$	= 2.40 $\left(\frac{30 \text{ min}}{60 \text{ min}} \text{ x } 4.80\right)$
	37.20	**70.20**	**141.15**

Ans No. 3 Statement Showing Direct Wages Cost – Budget

	Carpenter	Fixing & Finishing
Chair	= 3,000 x 6 = 18,000 $\left(4{,}000 \text{ x } \frac{45}{60} \text{ x } \mathbf{6}\right)$	= 1,000 x 4.80 = 4,800 $\left(4{,}000 \text{ x } \frac{15}{60} \text{ x } 4.80\right)$
Table	= 1,000 x 6 = 6,000 $\left(1{,}000 \text{ x } \frac{60}{60} \text{ x } \mathbf{6}\right)$	=(250 x 4.80)= 1,200 $\left(1{,}000 \text{ x } \frac{15}{60} \text{ x } 4.80\right)$
Benches	= 3,750 $\left(500 \text{ x } \frac{75}{60} \text{ x } 6\right)$	= 250 x 4.80 = 1,200 $\left(500 \text{ x } \frac{30}{60} \text{ x } 4.80\right)$
	27,750	**7,200**

Note No. (a) Statement Showing Fixing & Finishing Material Cost

	Chair	Table	Benches
Timber	= 1.25 (0.50 x 50 x 5 %)	= 3.00 (1.20 x 50 x 5 %)	= 6.25 (2.50 x 50 x 5 %)
Upholstery	= 0.25 (0.25 x 20 x 5%)	–	–
P.U	**1.50**	**3.00**	**6.25**

Statement Showing Budgeted Income For the Quarter

	Chair	Table	Benches	₹
Selling Price (P.U)	50.00	85.00	158.00	
Variable Price (P.U)	(37.20)	(70.20)	(141.15)	
Contribution (P.U)	12.8	14.8	16.85	
x Units Sold	x 4,200	x 800	x 500	
Total Contribution	= 53,760	= 11,840	= 8,425	74,025
Fixed Cost	–	–	–	(24,000)
	Budgeted Net Income			**50,025**

Principal Budget Factor

Case Study– 20

JCL Corporation manufactures and sells two products RB and RD. Three types of materials, A, B and C are required for producing these products. Projected information for 2015-16 is given below:

Product	Projected Sales for 2015 - 16	Inventory (in units)		Direct Labour Requirement
	Units	On 1-4-2015	On 31-3-2016	Hours/Unit
RB	75,000	25,000	31,250	4
RD	50,000	10,000	11,250	6

Raw material stock and usage are as follows:

Direct Material	Requirement per unit		Inventory on 1-4-2015	Inventory on 31-3-2016
	RB	RD		
A	5.00 kg	5.00 kg	40,000 kg	45,000 kg
B	2.50 kg	3.00 kg	36,250 kg	40,000 kg
C	0	1.00 kg	7,500 kg	8,750 kg

Required:

Prepare the following for 2015 – 16-

(i). Production budget (in units)

(ii). Direct material purchase budget in quantities for A, B and C.

(iii). After (i) and (ii), you are told that only 6,00,000labour hours will be available for production. If there is no requirement to hold the stated level of finished goods closing inventory, what would be the principal budget factor? Substantiate your view with appropriate figures.

Statement Showing Production Budget

	RB	RD
Sales	75,000	50,000
Closing Stock	31,250	11,250
Opening Stock	(25,000)	(10,000)
	81,250	**51,250**

Statement Showing Purchase Budget

	A	B	C
Consumption	**Kg**	**Kg**	**Kg**
RB	= 406,250	= 203,125	= 0
	(81,250 x 5)	(81,250 x 2.50)	(81,250 x 0)
RD	= 256,250	= 153,750	= 51,250
	(51,250 x 5)	(51,250 x 3)	(51,250 x 1)
Closing Stock	45,000	40,000	8,750
Open- Stock	(40,000)	(36,250)	(7,500)
Purchase	**6,67,500**	**3,60,625**	**52,500**

Ans No. 3 Statement Showing Direct Labour Hours Required V/s Available

	Sales	Units (OP - Stock)	Balance x hrs. P.U = Total
R.B	75,000	(25,000)	(50,000 x 4) = 2,00,000
R.D	50,000	(10,000)	(40,000 x 6) = 2,40,000
			4,40,000
Direct Labour Hours Available			6,00,000
Direct Labour Hours Requirement <Direct Labour Hours (Available)			
Priced A/c Budget Factor is (Sales)			

Budgeted Financials

Case Study– 21

Star Ltd. manufactures two products A and B. the summarized Balance Sheet of the company as at 31st March, 2012 as under :-

Equity and Liabilities	**(₹)**
Shareholder's funds	
Share Capital	12,00,000
Reserve and Surplus	96,000
Current Liabilities	
Trade Payables	48,000
Short- Term Provisions	
Provision for Income Tax	60,000
Total	**14,04,000**
Assets	**(₹)**
Non - Current Assets	
Fixed Assets (Net)	9,00,000
Current Assets	
Inventories	3,54,000
Trade Receivables	90,000
Cash and Cash Equivalents	60,000
Total	**14,04,000**

The following information has been furnished to you for the preparation of the budget for the year ending 31st March, 2013:–

i. Sales forecast:-

Product A 24,000 units ₹ 30 per unit
Product B 24,000 units ₹ 40 per unit

ii. Raw Materials :-

Particulars	**Products**	
	A	**B**
Material X @ ₹ 3 per kg.	2 kgs.	4 kgs.
Material Y @ ₹ 1 per kg.	1 kg.	2 kgs.

iii. Direct Labour:-

Dep. P : 2 Hrs. @ ₹ 1 per hour for A.
1 Hrs. @ ₹ 2 per hour for B.
Dep. Q : 1 Hrs. @ ₹ 3 per hour for A.
1 Hrs. @ ₹ 3 per hour for B.

iv. Overheads :-

Particulars	**Dept. P (₹)**	**Dept. Q (₹)**
Fixed Overheads per annum :-		
Depreciation	48,000	12,000
Others	96,000	30,000
Variable Overheads per hour	0.50	1.50

v. Inventories :-

(a) Raw Materials :

Opening Stock

X	36,000 kgs.	₹ 1,14,000
Y	6,000 kgs.	

Closing Stock

X	48,000 kgs.
Y	12,000 kgs.

(b) Finished Goods :

Opening Stock

A	600 Units	₹ 2,40,000
B	6,000 Units	

Closing Stock

A	6,600 Units
B	3,000 Units

vi. Selling, Distribution and Administration expenses are estimated ₹ 1,80,900 per annum.

vii. The cost of raw material purchases, direct wages, factory overheads, selling, distribution and administration overheads of the year will be met in full in cash during the year. The estimated position of debtors and creditors as on 31st March, 2013 is ₹ 1,50,000 and ₹ 48,000 respectively. Income tax provision standing at the beginning of the year will be paid during the year. Rate of income tax is 30%. An equipment purchased at ₹ 1,20,000 will be paid during the year.

Required:

Prepare for the year ending 31st March, 2013 –

a) Cost of Goods Sold Budget.
b) Cash Budget.
c) Projected Balance Sheet as at 31st March, 2013 in the same format as given in the problem.

The detailed working for each of the above should be shown.

Note No. 1 Statement Showing Production Budget

	A (Units)	B (Units)
Sales	24,000	15,000
Closing Stock	6,600	3,000
Opening Stock	(600)	(6,000)
Production	30,000	12,000

Note No.2 Direct –Material Cost:-

Material	X	Y	Total
A	= 1,80,000 (30,000 x 2 x3)	= 30,000 (30,000 x 1 x 1)	2,10,000
B	= 1,44,000 (12,000 x 4 x 3)	= 24,000 (12,000 x 2 x 1)	1,68,000
Direct Material Cost	**3,24,000**	**54,000**	**3,78,000**

Note No. 3

	Dept - P	Dept - Q	Total
Direct Labour A	60,000 (30,000 x 2 x 1)	90,000 (30,000 x 1 x 3)	1,50,000
B	24,000 (12,000 x 1 x 2)	36,000 (12,000 x 1 x 3)	60,000
	84,000	**1,26,000**	**2,10,000**

Note No. 4

	Dept - P	Dept - Q
A	= 60,000 (30,000 x 2)	= 30,000 (30,000 x 1)
B	= 12,000 (12,000 x 1)	= 12,000 (12,000 x 1)
	72,000	**42,000**

Note No. 5 Statement Showing Recovery Rate

	Dept - P	Dept - Q
Fixed - Overheads		
(1) Department	48,000	12,000
(2) Others	96,000	30,000
	1,44,000	42,000
÷ D- Lab- hrs.	÷ 72,000	÷ 42,000
Fixed - Overhead (Per Hr.)	2.00	1.00
Variable Overhead (P.H)	0.50	1.50
Total	**2.50**	**2.50**

Note No. 6 Statement Showing Overheads Expenses

	Dept - P	Dept - Q	Total
Fixed (Other than Dep)	96,000	30,000	
Variable	= 36,000 (72,000 x 0.50)	= 63,000 (42,000 x 1.50)	
Cash - Overheads	1,32,000	93,000	2,25,000
Department	48,000	12,000	60,000
Total	**1,80,000**	**105,000**	**285,000**

Note No. 7 Statement Showing Cost Sheet

Products	**A 30,000 Units**	**B 12,000 Units**
Direct - Cost	**₹**	**₹**
Direct - Material	2,10,000	1,68,000
Direct - Labour	1,50,000	60,000
Prime Cost	3,60,000	2,28,000
Overheads		
Dept - 'P'	= 1,50,000 (2.50 x 2 x 30,000)	= 30,000 (2.50 x 1 x 12,000)
Dept - 'Q'	= 75,000 (2.50 x 1 x 30,000)	= 30,000 (2.5 x 1 x 12,000)
Total Cost	5,85,000 ÷ 30,000	2,88,000 ÷ 12,000
P.U.	**19.5**	**24**

Note No. 8 Statement Showing Sales

	A	B	Total
Sales	7,20,000	6,00,000	13,20,000
	(24,000 x 30)	(15,000 x 40)	

Note No. 9 Debtors A/c.

To Balance b/d	90,000	By Bank (Receipts)	12,60,000
To Sales	13,20,000	By Closing Balance	1,50,000
	14,10,000		**14,10,000**

Note No. 10 Raw Material – Purchases

	X	Y	Total
Consumption	3,24,000	54,000	3,78,000
Closing Stock	1,44,000 (48,000 x 3)	12,000 (12,000 x 1)	1,56,000
Opening Stock	= (108,000) (36,000 x 3)	= (6,000) (6,000 x 1)	(1,14,000)
	3,60,000	**60,000**	**4,20,000**

Note No. 11 Creditors A/c.

To Balance b/d	48,000	By Purchased	4,20,000
		By Closing Balance	48,000
To Bank	4,20,000		
(Bal Figure)	**4,68,000**		**4,68,000**

Note No. 12 Fixed Assets A/c.

To Balance b/d	9,00,000	By Dep.	60,000
To Bank	1,20,000	By Balance	
		By Balance c/f	9,60,000
	10,20,000		**10,20,000**

Ans No. (a)Statement Showing Cost of Goods Sold

	₹
Direct - Cost	
(Note No. 2) Direct- Material	3,78,000
(Note No. 3) Direct- Labour	2,10,000
Prime Cost	5,88,000
Indirect Cost - Overheads (Note No. 6)	2,85,000
	8,73,000
Opening Balance	2,40,000
Closing Balance	
A (6,600 x 19.5) =	(1,28,700)
B (3,000 x 24) =	(72,000)
Cost of Goods Sold	9,12,300

Ans No. b Statement Showing Cost Budget

	₹
Receipts :-	
Opening Balance	60,000
(Note No. 9) Receipts (Debtors)	12,60,000
	13,20,000
Payments :-	
Creditors (Note No.11)	4,20,000
Wages (Note No.	2,10,000
Overheads (Note No.	2,25,000
Selling & Distribution Overheads (Note No.	180,900
Income Tax	60,000
Capital Expenses	1,20,000
	12,15,900
Closing Balance	104,100

(c) Projected Balance Sheet as at March, 31, 2013

Equity and Liabilities	₹
Shareholder's Funds	
Share Capital	12,00,000
Reserve and Surplus *	2,54,760
Current Liabilities	
Trade Payables	48,000
Short- term Provisions	
Provision for Income Tax	68,040
Total	**15,70,800**
Assets	**₹**
Non- Current Assets	
Fixed Assets (Net)	9,60,000
Current Assets	
Inventories	3,56,700
Trade Receivables	1,50,000
Cash and Cash Equivalents	104,100
Total	**15,70,800**

- **Reserve & Surplus**

Particulars	**(₹)**
Sales (Note 8)	13,20,000
Less : Cost of Goods Sold	9,12,300
Gross Profit	4,07,700
Less: Selling Dist. &Admn. Expenses	1,80,900
Profit before tax	2,26,800
Less: Provisions for Tax (30%)	68,040
Profit after tax	1,58,760
Add: Opening Balance of Reserve & Surplus	96,000
Closing Balance of Reserve Surplus	2,54,760

Key Factor

Case Study– 22

Aakar Ltd. furnishes you the following information relating to four varieties of products manufactured by them during the year 2011.

	A	B	C	D
Output (units)	32,000	20,000	16,000	24,000
₹ Per unit				
Selling Price	300	600	750	500
Direct Materials	60	140	160	60
Direct Wages	50	80	150	60
Variable Overhead	100	160	300	120
Fixed Overhead	100	160	300	120

Anticipation of the company for the Budget for the year 2012 is as follows:

(a) Expected increments are as follows in pursuant of Inflation:

(i) Direct Material	10%
(ii) Direct Wages	20%
(iii) Variable Overheads	20%

(b) Fixed Overhead will increase by₹ 160,000.

(c) The market will take up an increase of 10% in the price, if Volume of Sales in quantities is maintained at the same level as in the year 2011.

In order to fight inflation the Marketing Team puts forth the following proposals:

a) **Product A:** The price of product A will be further increased by 20% (making in all a total increase of 30%) resulting thereby in a reduction in the volume of Sales by 10%.
b) **Product B:** Substitution on direct materials of product B by cheaper materials will bring about a reduction in direct material cost by ₹ 30 per unit. This will reduce the sales volume in units by 20%.
c) **Product C:** An allowance of special sales commission of 4% on the increased price on all quantities sold will increase the sales volume by 20%.
d) **Product D:** A reduction in selling price by 10% on the price of 2011 will yield an increase in sales volume by 30%.

The direct labour hour rate in 2011 is ₹ 4.00 per hour and the number of direct labour hours cannot be increased in the year 2012.

Required:

I. Present a statement showing Profitability for the year 2011.
II. Prepare a budget for the year 2012 after taking into consideration the effects of inflation in costs and prices only.
III. Evaluate the proposals put forth by the Marketing Team and set an optimum product mix after taking into consideration the inflation in costs and prices but subject to the constraint of available labour hours.

Ans No. 1 Statement of Profit of 2011

	A	**B**	**C**	**D**	**Total**
Sales (Units)	32,000	20,000	16,000	24,000	92,000
			₹– Lacs		
Sales	= 96	= 120	= 120	= 120	= 456
	(300 x 32,000)	(600 x 20,000)	(750 x 16,000)	(500 x 24,000)	
Relevant- Cost (Variable)					
Direct - Material	(19.20)	(28)	(25.60)	(14.40)	(87.20)
	(32,000 x 60)	(20,000 x 140)	(16,000 x 160)	(24,000 x 60)	
Direct Wages	(16)	(16)	(24)	(14.40)	(70.40)
Variable Overhead	(32,000 x 100)	(20,000 x 160)	(16,000 x 300)	(24,000 x 120)	
Contribution	28.80	44.00	22.40	62.40	157.60
Fixed Cost	(32)	(32)	(48)	(28.80)	(140.80)
	(32,000 x 100)	(20,000 x 160)	(16,000 x 300)	(24,000 x 120)	
Profit|Loss	(3.20)	12	25.60	33.60	16.80

Statement Showing Direct Labour Hours

Hrs. (P.U)	(50 ÷ 4)	(80 ÷ 4)	(150 ÷ 4)	(60 ÷ 4)	
	= 12.50	= 20	= 37.50	= 15	
Units	x 32,000	x 20,000	x 16,000	x 24,000	
Total Hrs.	= 4,00,000	= 4,00,000	= 6,00,000	= 3,60,000	**17,60,000**

Ans No.2 Statement Showing Budget 2012 (After Impact of Inflation)

	A	**B**	**C**	**D**	**Total**
Sales (Units)	32,000	20,000	16,000	24,000	92,000
₹−Lacs					
Sales	105.6 (32,000 x 300 x110%)	132 (20,000 x 600 x110%)	132 (16,000 x 750 x110%)	132 (24,000 x 500 x110%)	501.6
Direct Material	-21.12 (32,000 x 60 x 110%)	-30.8 (20,000 x 140 x110%)	-28.16 (16,000 x 160 x110%)	-15.84 (24,000 x 60 x 110%)	-95.92
Direct Wages	-19.2 (32,000 x 50 x 120%)	-19.2 (20,000 x 80 x 120%)	-28.8 (16,000 x 150 x120%)	-17.28 (24,000 x 60 x 120%)	-84.48
Variable Overhead	-38.4 (32,000 x 100 x120%)	-38.4 (20,000 x 160 x120%)	-57.6 (16,000 x 300 x120%)	-34.56 (24,000 x 120 x120%)	-168.96
Contribution	26.88	43.6	17.44	64.32	152.24
Fixed Overheads					
	(140.80 + 1.60)				-142.4
				Profit|Loss	**9.84**
÷ Labour Hours	÷ 4,00,000	÷ 4,00,000	÷ 6,00,000	÷ 3,60,000	17,60,000
Contribution per - hour	6.72	10.9	2.91	17.87	8.65

Statement Showing Analysis of Profit/Loss for – 2012 –Proposal of Marketing Team

	A	B	C	D	Total
Sales Units	= 28,800 (32,000 x 90%)	= 18,000 (20,000 x 90%)	= 19,200 (16,000 x 120%)	= 31,200 (24,000 x 130 %)	97,200
Sales	= 112.32 (28,800 x 300 x 130%)	= 118.80 (18,000 x 600 x 110%)	= 158.40 (19,200 x 750 x 110%)	= 140.40 (31,200 x 500 x 90%)	529.92
Commission			(6.34) (4% x 158.40)		
Net Sales	112.32	118.80	152.06	140.40	523.58
Relevant Cost					
Direct Material	(19.01) (28,800 x 60 x 110%)	(22.32) (18,000 x 124) (140 x 110%) - 30 = 124	(33.79) (19,200 x 160 x 110%)	(20.59) (31,200 x 60 x 110%)	(95.91)
Direct Wages	(17.28) (28,800 x 50 x 120%)	(17.28) (18,000 x 80 x 120%)	(34.56) (19,200 x 150 x 120%)	(22.46) (31,200 x 60 x 120%)	(91.58)
Variable Overhead	(34.56) (28,800 x 100 x 120%)	(34.56) (18,000 x 160 x 120%)	(69.12) (19,200 x 300 x 120%)	(44.93) (31,200 x 120 x120%)	(183.17)
Fixed Overhead	**41.47**	**44.64**	**14.59**	**52.42**	**153.12** **142.40)**
Labour Hours	÷ 3,60,000 $\left(4{,}00{,}000 \times \frac{28{,}800}{32{,}000}\right)$	÷ 3,60,000 $\left(4{,}00{,}000 \times \frac{18{,}000}{20{,}000}\right)$	÷ 7,20,000 $\left(\frac{6{,}00{,}000 \times 19{,}200}{16{,}000}\right)$	÷ 4,68,000 $\left(\frac{3{,}60{,}000 \times 31{,}200}{24{,}000}\right)$	**10.72**
Contribution per hour	= 11.52	= 12.40	= 2.03	11.20	

- By following the strategy of Marketing Team, Contribution per Labour Hour has reduced in case of Product C & D. Therefore, strategy of Marketing Team should be followed in Case of Product A & B only.

- Revised Position on the basis of the 'Proposal of Marketing Team' and Product Mix after taking into consideration the 'Inflation in Costs and Prices' but subject to the 'Constraint of Available Labour Hours'.

	A	B	C	D	Total
Sales Units	28,800	18,000	16,000	24,000	86,800
(A) Sales	112.32	118.80	132 (16,000 x 750 x 110%)	132 (24,000 x 500 x110 %)	495.12
Direct Material	(19.01)	(22.32)	(28.16) (16,000 x 160 x110%)	(15.84) (24,000 x 60 x110%)	(85.33)
Direct Wages	(17.28)	(17.28)	(28.80) (16,000 x 150 x 120%)	(17.28) (24,000 x 60 x120%)	(80.64)
Variable Overhead	(34.56)	(34.56)	(57.60) (16,000 x 300 x 120%)	(34.56) (24,000 x 120 x 120%)	(161.28)
Contribution	41.47	44.64	17.44	64.32	167.87
Fixed Overhead					**(142.40)**
					25.47
Labour Hours	3,60,000	3,60,000	6,00,000 (16,000 x 37.5)	3,60,000 (24,000 x 15)	
Contribution per hour	11.52	12.40	2.91	17.87	

Inventory Control

Case Study– 23

Bintan –Indo Manufactures Ltd. (BIML) is specialist in the manufacturing of Industrial Products. They manufacture and market two types of products under the name 'X' and 'Y'. Company produces two products from three basic raw materials 'A', 'B', and 'C'. Company follows a 13 –period reporting cycle for budgeting purpose. Each period is four weeks long and has 20 working days. Data relating to the purchase of raw materials are presented below:

Raw Material	Purchase Price (Per Kg)	Standard Purchase Lot (Kg)	Reorder Point (Kg)	Projected Inventory Status at the end of 5th period (Kg)		Lead Time in Working Days
				On Hand	On Order	
A	₹ 1.00	90,000	72,000	96,000	90,000	10
B	₹ 2.00	30,000	45,000	54,000	–	25
C	₹ 1.00	60,000	60,000	84,000	60,000	20

Past experience has shown that adequate inventory levels for 'X' and 'Y' can be maintained if 40 percent of the next period's projected sales are on hand at the end of a reporting period.

Other relevant information is as follows:

Product	Raw Material Specifications			Projected Inventory levels	Projected Sales		
	A	B	C	At the end of current (5th) period	6thPeriod	7th Period	8th Period
	Kg	Kg	Kg	Units	Units	Units	Units
X	1.25	0.50	–	18,000	45,000	52,500	57,000
Y	2.00	–	1.50	16,800	42,000	27,000	24,000

The Sales of 'X' and 'Y' do not vary significantly from month to month. Consequently, the safety stock incorporated into the reorder point for each of the raw materials in adequate to compensate for variations in the sales of the finished products.

Raw materials orders are placed the day the quantity on hand falls below the reorder point. BIML's suppliers are very trustworthy so that the given lead times are reliable.

The outstanding orders for raw materials 'A' and 'C' are due to arrive on the 10th and 4th working day of the 6th period, respectively. Payments for all raw material orders are remitted by the 10th day of the delivery.

Required:

Determine the following items for raw materials 'A', 'B', and 'C' for inclusion in the 6th period report to management:

i. Projected quantities (in Kg) to be issued to production.
ii. Projected quantities (in Kg) ordered and the date (in terms of working days) the order is to be placed.
iii. The projected inventory balance (in Kg) at the end of the period.
iv. The payments for purchases with due date.

Note No. 1 Statement Showing Production Budget – 6th Period

	X	Y
Sales (Units)	45,000	42,000
Closing Stock	= 21,000	= 10,800
	(40% x 52,500)	(40% x 27,000)
Opening Stock	(18,000)	(16,800)
Production =	**48,000**	**36,000**

Ans No. 1 Statement Showing Projected Raw Material Issue.

	A	B	C
Consumption			
X	= 60,000	= 24,000	= 0
	(48,000 x 1.25)	(48,000 x .50)	(48,000 x 0)
Y	= 72,000	–	= 54,000
	(36,000 x 2)	(36,000 x 0)	(36,000 x 1.50)
Total	**1,32,000**	**24,000**	**54,000**

Ans No. 2/3 Statement Showing Projected Inventory Activity and Ending Balance (Kg)

	A	B	C
Opening Stock	96,000 Kg	54,000 Kg	84,000 Kg
Purchases /Received	90,000 (Order - 5th Period) 90,000 (Order - 6th Period)	–	60,000 (Order - 5th Period)
Issues	(1,32,000)	(24,000)	(54,000)
Closing Stock	**1,44,000**	**30,000**	**90,000**

- ✓ Order of 90,000 Kg of 'A' ordered during fifth period received on tenth working day.
- ✓ Order for 90,000 Kg of 'A' ordered on fourth working day of sixth period received on fourteenth working day.
- ✓ Ordered 30,000 Kg of 'B' on eight working days.
- ✓ Order for 60,000 Kg of 'C' ordered during fifth period received on fourth working day.
- ✓ No orders for 'C' would be placed during the sixth period.

Projected Payments for Raw Material Purchases

Raw Material	Day/Period Ordered	Day/Period Received	Quantity Ordered	Amount Due	Day/Period Due
'A'	20^{th} / 5^{th}	$10^{th}/6^{th}$	90,000 Kg	₹ 90,000	$20^{th}/6^{th}$
'C'	$4^{th}/5^{th}$	$4^{th}/6^{th}$	60,000 Kg	₹ 60,000	$14^{th}/6^{th}$
'A'	$4^{th}/6^{th}$	$14^{th}/6^{th}$	90,000 Kg	₹ 90,000	$4^{th}/7^{th}$
'B'	$8^{th}/6^{th}$	$13^{th}/7^{th}$	30,000 Kg	₹ 60,000	$3^{rd}/8^{th}$

☞**Raw Material "A"**

Re Order Point (Kg)	72,000
Standard Purchase Lot (Kg)	90,000
Lead Time (Days)	10 Days
On Order (Kg)	90,000 (Due to Arrive on 10th Day)
Average Daily Usage (Kg)	6,600
Closing Inventory at the end of 5th Pd	96,000

6th Period				
Day	**Kg - Received**	**Kg- Issued**	**Kg- Balance**	**Remark**
			96,000	Inventory in hand in the beginning
1	–	6,600	89,400	
2	–	6,600	82,800	
3	–	6,600	76,200	
4	–	6,600	69,600	Order to be place 90,000 Kg(Standard Lot Size) as Re-Order Point is 72,000 Kg. Order will receive on 14th as lead time is 10 days
5	–	6,600	63,000	
6	–	6,600	56,400	

7	–	6,600	49,800	
8	–	6,600	43,200	
9	–	6,600	36,600	
10	90,000	6,600	20,000	Order Received, To be paid by 20th of 6th Period(Payment to be remitted the 10th day of the delivery)
11	–	6,600	1,13,400	
12	–	6,600	1,06,800	
13	–	6,600	1,00,200	
14	90,000	6,600	1,83,600	Order Received, To be paid by 4th of 7th Period(Payment to be remitted the 10th day of the delivery)
15	–	6,600	1,77,000	
16	–	6,600	1,70,400	
17	–	6,600	1,63,800	
18	–	6,600	1,57,200	
19	–	6,600	1,50,600	
20	–	6,600	1,44,000	

Budget Variance

Case Study– 24

Sterling Works Ltd. has at the factory three production Departments, Machine Shop, Fabrication and Assembly which are the responsibility of the shop Superintendent. The shop superintendent along with Materials Manager, Planning Superintendent and Maintenance Engineer report to the Works Manager at the factory. The office administration, sales and publicity come under the sales Manager who along with the Works Manager report to the Managing Director of the Company. The following data relating to a month's performance are culled out from the books of the company:

Particulars	Budget (₹)	Variance from Budget (₹)
Sales Comission	800	50 A
Raw Material & Components		
− Machine Shop	900	20 A
Publicity Expenses	1,100	100 A
Printing & Stationery	3,200	200 F
Travelling Expenses	4,000	200 A
Wages − Machine Shop	800	10 F
− Fabrication	600	20 A
− Assembly	720	10 A
Material − Assembly	760	40 A
− Fabrication	460	10 A
Utilities − Machine Shop	320	10 A
− Assembly	470	60 F
− Fabrication	560	30 F
− Maintenance	400	20 A
− Stores	210	40 F
− Planning	180	20 A
Shop Superintendent's Office		
− Salaries & Expenses	1,100	22 F
Depreciation - Factory	3,880	40 A
Work Manager's Office		
− Salaries & Administration	3,810	40 A
General Office Salaries & Administration	4,270	30 A
Managing Director's Salary & Administration	2,800	20 F

Required:

i. Treating the Machine shop, Fabrication and Assembly as Cost Centers, prepare Cost Sheets for each centre with the help of this addition information:

The shop superintendent devotes his time amongst Machine shop, fabrication and Assembly in the ratio 4:3: 4. Other Factory Overheads are absorbed on the basis of Direct Labour in each Cost centre.

Office Administration, Selling and Distribution Overheads are borne equally by the Cost Centres.

ii. Treating Machine shop, Fabrication and Assembly as Responsibility Centres prepare a Responsibility Accounting Report for the shop Superintendent.

Solution

a) Cost Sheet for Machine Shop, Fabrication and Assembly Treating them as Cost Centres

Particulars	Machine Shop		Fabrication		Assembly	
	Budget (₹)	Actual (₹)	Budget (₹)	Actual (₹)	Budget (₹)	Actual (₹)
Raw Material and Components	900	920	460	470	760	800
Wages	800	790	600	620	720	730
Utilities	320	330	560	530	470	410
Prime Cost	2,020	2,040	1,620	1,620	1,950	1,940
Shop Superintendent's Office Salary & Expenses (4 : 3 : 4)	400	392	300	294	400	392
Other Factory Overheads (W.N.1)	3,200	3,160	2,400	2,480	2,880	2,920
Factory Cost	5,620	5,592	4,320	4,394	5,230	5,252
Administration, Selling & Distribution Overheads (W.N.2)	5,390	5,443	5,390	5,443	5,390	5,444
Total Cost	**11,010**	**11,035**	**9,710**	**9,837**	**10,620**	**10,696**

Particulars	Budget (₹)	Actual (₹)
(1) Factory Overheads :		
Maintenance	400	420
Stores	210	170
Planning	180	200
Depreciation	3,880	3,920
Works Establishment	3,810	3,850
Total	8,480	8,5,60
Percentage on Direct Labour	400% $\left(\frac{8,480 \times 100}{2,120}\right)$	400% $\left(\frac{8,560 \times 100}{2,140}\right)$
(2) Administration, Selling and Distribution Overheads:		
Sales Commission	800	850
Publicity	1,100	1,200
Printing & Stationery	3,200	3,000
Travelling	4,000	4,200
General Office Establishment	4,270	4,300
Managing Director's Establishment	2,800	2,780
	16,170	**16,330**

Responsibility Accounting Reports for The Machine Shop, Fabrication & Assembly as Reasonability Centres

Particulars	Budget (₹)	Actual (₹)	Variance (₹)
A. Machine Shop			
Material	900	920	20 A
Labour	800	790	10 F
Utilities	320	330	10 A
Total A	2,020	2,040	20 A
B. Fabrication			
Material	460	470	10 A
Labour	600	620	20 A
Utilities	560	530	30 F
Total B	1,620	1,620	
C. Assembly			
Material	760	800	40 A
Labour	720	730	10 A
Utilities	470	410	60 F
Total C	1,950	1,940	10 F
Total (A + B + C)	**5,590**	**5,600**	**10 A**

Note:

As shop superintendent's office –salaries and expenses included his salary also, it has been assumed that these are not controlled by him, hence not included.

Case Study– 25

A Company manufactures two products X and Y. Product X requires 8 hours to produce while Y requires 12 hours. In April, 2004, of 22 effective working days 8 hours a day, 1,200 units of X and 800 units of Y were produced. The company employs 100 workers in production department to produce X and Y. the budgeted hours are 1,85,000 for the year.

Calculate Capacity, Activity and Efficiency ratio and establish their relationship.

Answer

	Product X	Product Y	Total Standard Hours Produced
Output (units)	1,200	800	
Hours per unit	8	12	
Standard hours	9,600	9,600	19,200
Actual hours worked			
100 workers x 8 hours x 22 days =			17,600
Budgeted hours per month			
1,86,000 / 12 =			15,500

$$\text{Capacity Ratio} = \frac{\text{Actual Hours}}{\text{Budgeted Hours}} \text{ x } 100 = \frac{17{,}600}{15{,}500} = 113.55\ \%$$

$$\text{Efficiency Ratio} = \frac{\text{Standard Hours Produced}}{\text{Actual Hours}} \text{ x } 100 = \frac{19{,}200}{17{,}600} \text{ x } 100 = 109.09\ \%$$

$$\text{Activity Ratio} = \frac{\text{Standard Hours Produced}}{\text{Budget Hours}} \text{ x } 100 = \frac{19{,}200}{15{,}500} = 123.87\ \%$$

Relationship: Activity Ratio = Efficiency Ratio x Capacity Ratio

Or $123.87 = \frac{109.09 \text{ x } 113.55}{100}$

Case Study– 26

If the 'activity ratio' and 'capacity ratio' of a company are 104% and 96% respectively, find out its 'efficiency ratio'.

Solution

The various ratios are calculated as under:

(i) Activity Ratio $= \frac{\text{Standard Hours (for actual production)}}{\text{Budgeted Hours}} \text{ x } 100$

(ii) Capacity Ratio $= \frac{\text{Actual Hours (worked)}}{\text{Budgeted Hours}} \text{ x } 100$

(iii) Efficiency Ratio $= \frac{\text{Standard Hours (for actual production)}}{\text{Actual Hours (worked)}} \text{ x } 100$

From the above, it is clear that the efficiency Ratio can be obtained by dividing Activity Ratio by Capacity Ratio.

Efficiency Ratio (in percentage) $= \frac{\text{Activity Ratio}}{\text{Capacity Ratio}} \text{ x } 100$

$$= \frac{104\ \%}{96\ \%} \text{ x } 100 = 108.33\ \%$$

Case Study– 27

Calculate from the following figures:

1. Efficiency ratio,
2. Activity, ratio and
3. Capacity ratio:

Budgeted Production	880 units
Standard Hours per units	10
Actual Production	750 units
Actual Working Hours	6,000

Solution :

(i) Efficiency Ratio $= \frac{\text{Standard Hours (for actual production)}}{\text{Actual Hours (worked)}} \text{x } 100$

$= \frac{750 \text{ units x } 10 \text{ hrs.}}{6{,}000 \text{ hrs.}} \text{x } 100$

= 125%

(ii) Activity Ratio $= \frac{\text{Standard Hours (for actual production)}}{\text{Budgeted Hours}} \text{x } 100$

$= \frac{750 \text{ units x } 10 \text{ hrs.}}{880 \text{ units x } 10 \text{ hrs.}} \text{x } 100$

= 85.23 %

(iii) Capacity Ratio $= \frac{\text{Actual Hours (worked)}}{\text{Budgeted Hours}} \text{x } 100$

$= \frac{6{,}000 \text{ hrs.}}{880 \text{ units x } 10 \text{ hrs.}} \text{x } 100$

= 68.18 %

Case Study– 28

ABC Ltd. has produced the following figures relating to production for the week ended 27th Jan

		Budgeted	**Actual**
Product A	……	800	800
Product B	……	800	600
Product C	……	200	280

Standard production times were:

		Standard Hours per unit
Product A	……	10
Product B	……	5
Product C	……	2

During the week, 11,200 hours were worked on production.

Required:

You are required to calculate the production volume ratio and efficiency ratio for the week ended 27st Jan.

Production Volume Ratio $= \frac{\text{Standard Hours Produced}}{\text{Budgeted Hours}} \text{x } 100$

$= \frac{(800 \text{ x } 10) + (600 \text{ x } 5) + (280 \text{ x } 2)}{(800 \text{ x } 10) + (800 \text{ x } 5) + (200 \text{ x } 2)} \text{x } 100$

$= 93.23\ \%$

Efficiency Ratio $= \frac{\text{Standard Hours Produced}}{\text{Actual Hours}} \ x\ 100$

$= \frac{(800 \text{ x } 10) + (600 \text{ x } 5) + (280 \text{ x } 2)}{11{,}200} \text{x } 100$

$= 103.21\ \%\ \%$

Case Study– 29

Following information are extracted from monthly budgets of JIT Ltd.

	November	**December**
Beginning WIP Inventory	36,000	???
Beginning Finished Goods Inventory	44,000	???
Variable Cost of Goods Sold	1,23,000	???
Direct Material Usage	50,000	56,000
Direct Labour	53,100	69,000
Variable Overheads	25,000	29,000
Variable Cost of Goods Manufactured	1,09,000	1,14,800
Ending WIP Inventory	???	???
Ending Finished Goods Inventory	???	45,000

Required:

Find out missing figures.

W.I.P A/c.					
	Nov	**Dec**		**Nov**	**Dec**
To Opening WIP	36,000	55,100	By Finished Goods A/c.	109,000	1,14,800
To Direct Material	50,000	56,000	By Balance C/f	55,100	94,300
To direct Labour	53,100	69,000			
To Variable Overhead	25,000	29,000			
	1,64,100	209,100			
Finished Goods A/c.					
To op Bal	44,000	30,000	By Cost of Goods Sold	1,23,000	99,800
To WIP A/c.	109,000	1,14,800			
			By Balance	30,000	45,000

CHAPTER - 12
STANDARD COSTING

Case Study - 1

The standard material cost for a normal mix of one tonne of chemical Xing based on:

Chemical	Usage	Price per kg
A	240 kg	₹ 6
B	400 kg	₹ 12
C	640 kg	₹ 10

During month, 6.25 tonne of X were produced from:

Chemical	Consumption (Tonnes)	Cost (₹)
A	1.6	11,200
B	2.4	30,000
C	4.5	47,250

Required:

Analyze the variance

Case Study – 1 Standard Costing

Note No (1) Standard Inputs for Actual Output

INPUT					
A	240 TONNES / 1000	X	6.25 TONNES	=	1.5 TONNES
B	400 TONNES / 1000	X	6.25 TONNES	=	2.5 TONNES
C	640 TONNES / 1000	X	6.25 TONNES	=	4.00 TONNES

Material Variance – Actual Production – 6.25 TONNES

	STANDARD			ACTUAL		
INPUT	**TONNES**	**x RATE**	**AMOUNT**	**TONES**	**RATE**	**AMOUNT**
A	1.50	x 6,000	= 9,000	1.60	x 7,000	= 11,200
B	2.50	x 12,000	= 30,000	2.40	x 12,500	= 30,000
C	4.00	x 10,000	= 40,000	4.50	x 10,500	= 47,250
	8.00		**= 79,000**	**8.50**		**= 88,450**

Material Cost Variance = (79000 – 88450) = 9450 (A)

Material Usage Variance		Material Rate Variance	
A	(1.50 - 1.60) x 6,000 = 600(A)	(6,000- 7,000) x 1.6 =	1,600(A)
B	(2.50 - 2.40) x 12,000 = 1,200(F)	(12,000-12,500) x 2.4 =	1,200(A)
C	(4.00 - 4.50) x 10,000 = 5,000(A)	(10,000-10,500) x 4.5 =	2,250(A)
	4,400(A)		**5,050(A)**

4400(A)

Material Sub usage variance				**Material Mix Variance**	
Material Sub Usage Variance (8 - 8.50) x 79,000/8 = 4,397.50 (A)					
Material Yield Variance		**Material Mix Variance**			
Input	**Output**	A	(1.50/8 x 8.50)	(1.59375 - 1.60) x 6,000	37.50 (A)
8	6.25	B	(2.50/8 x 8.50)	(2.65625 - 2.40) x 12,000	3075 (F)
8.5	6.640625	C	(4/8 x 8.50)	(4.25 - 4.50) x 10,000	2500 (A)
(6.640625 - 6.25) x79,000/6.25 = 4,937.50(A)					537.50 (F)

Case Study - 2

The standard cost of a certain chemical mixture is as under:

40% of Material A @ ₹30 per kg

60% of Material B @ ₹ 40 per kg

A standard loss of 10% of input is expected in production. The following actual cost data is given for the period.

350 kg Material – A at a cost of ₹ 25

400 kg Material - B at a cost of ₹ 45

Actual weight produced is 630 kg.

Required:

Calculate the following variance raw material wise and indicate whether they are favorable (F) or adverse (A):

i. Cost variance
ii. Price variance
iii. Mix variance
iv. Yield variance

Note No (i)

Standard Input for Actual Output

INPUT	LOSS	OUTPUT
100	10	90
(630 x 100 / 90)		630
= 700 kg		

A	B
40 % x 700	60 % x 700
2,800	420

Material Variance

Actual Production = 630 kg

	Standard			Actual		
	Kg	**Rate**	**Amt**	**Kg**	**Rate**	**Amt**
A	280	x 30 =	8,400	350	x 25 =	8,750
B	420	x 40=	16,800	400	x 45 =	18,000
	700		25,200	750		26,750

Analysis of Variance

Material Cost Variance (25,200 – 26,750) = 1,550 (A)

Material Usage Variance

A = (280-350) x 30
B = (420-400) x 40
= 2,100 (A)
= 800 (F)
1,300 (A)

Material Rate Variance

(30-25) x 350
(40-45) x 400
= 1,750 (F)
= 2,000 (A)
250 (A)

Material Sub Usage Variance
(700 - 750) x 25,200 / 700
1,800 (A)

Material Mix Variance
A' (280 / 700) x 750
(300 - 350) x 30 = 1,500 (A)
B' (420 / 700) x 750
(450 - 400) x 40 = 2,000 (F)
500 (F)

Material Yield Variance

Input	**Output**
700 kg	630 kg
750 kg	675 kg

(675 - 630) x 25,200 / 630
= 1,800 (A)

Computation of Labour Variance

Case Study - 3

The following information relates to the labour element of X Ltd.

Type of Labour	Skilled	Semi-Skilled	Unskilled	Total
No. of workers in the standard gang	4	3	2	9
Standard rate per hour (₹)	6	3	1	
Number of workers in actual gang				9
Actual rate per hour (₹)	7	2	2	

In a 40 hour week, the gang produced 270 standard hours. The actual number of semi-skilled workers is two times the actual number of unskilled workers.

The rate variance of semi-skilled workers is ₹160 (F).

Required:

1. The number of workers in each category
2. Total gang variance
3. Total sun-efficiency variance
4. Total labour rate variance

Indicate if the variances are Favorable (F) or Adverse (A or U).

Standard HRS for Actual Production

SK 4 x 40 hr = (160 x 270/360) = 120
SEMI 3 x 40 hr = (120 x 270/360) = 90
UNSK 2 x 40 hr = (80 x 270/360) = 60
(9 Workers x 40 hr) = 360

Actual HRS for Actual Production

- SK
- SEMI
- UNSK

Labour Variance – Actual Production

Standard

	HRS	Rate	Amt
SK	120 x	6 =	720
SEMI	90 x	3 =	270
UNSK	60 x	1 =	60
	270		1,050

Actual

HRS	Rate	Amt
120	7	840
160	2	320
80	2	160
(160 / 2)		
360		1,320

Labour Cost Variance
(1,050 - 1,320) = 270 (A)

Labour EFF Variance	Lab Rate Variance
SK (120 - 120) x 6 = 0	
SEMI (90 - 160) x 3 = 210 (A)	(6 - 7) x 120 = 120 (A)
UNSK (60 - 80) x 1 = 20 (A)	(3 - 2) x 160 = 160 (F)
230 (A)	(1 - 2) x 80 = 80 (A)
	40 (A)

Case Study - 4

The following information has been extracted from the books of Goru Enterprises which is using standard costing system:

Actual output	=	9,000 units
Direct wages paid	=	1,10,000 hours at ₹ 22 per hour, of which 5,000 hours, being time, were not recorded in production
Standard hours	=	10 hours per unit
Labour efficiency variance	=	₹ 3,75,000 (A)
Standard variance overhead	=	₹ 150 per unit
Actual variable Overhead	=	₹ 16,00,000

Required:

1. Calculate idle time variance
2. Calculate total variable overhead variance
3. Calculate variable expenditure variance
4. Calculate variable overhead efficiency variance

Solution :

Labour Variance - Actual Production = 9,000 units

Standard

Hrs		Rate		Amt
90,000	x	25	=	2,25,000
(9,000 x 10)				

Actual

Hrs		Rate		Amt
11,000	x	22	=	24,20,000

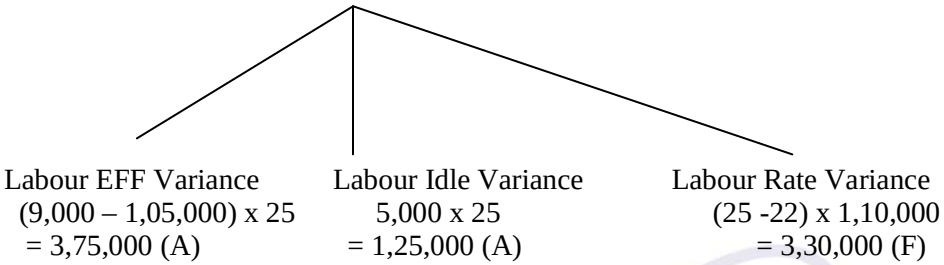
Actually Worked	Abnormal Idle time
1,05,000	5,000

Variance

Hrs		Rate		Amt
90,000	x	15.00	=	13,50,000
(9,000x10)				(9,000 x 150)

Hrs		Rate		Amt
1,05,000	x	15.23	=	16,00,000

Labour - Cost Variance
(22,25,000 – 24,20,000) = 1,70,000 (A)



Labour EFF Variance
(9,000 – 1,05,000) x 25
= 3,75,000 (A)

Labour Idle Variance
5,000 x 25
= 1,25,000 (A)

Labour Rate Variance
(25 -22) x 1,10,000
= 3,30,000 (F)

ANS NO (i)

Variable O.H Cost Variance
(13,50,000 – 16,00,000) = 2,50,000 (A) ANS NO (ii)

V. O EFF Variance
(90,000 – 1,05,000) X 15
= 2,25,000 (A)
ANS NO (iv)

V. O. Exp/ Rate Variance
(15 - 15.23) X 1,05,000
= 25,000 (A)
ANS NO (iii)

Case Study - 5

In a manufacturing co. the standard units of production of the year were fixed at 1,20,000 units and overhead expenditure were estimated to be:

Fixed	₹ 12,000	Variable	₹ 6,000
Semi-Variable	₹ 1,800		

Actual production during April of the year was 8,000 units. Each month has 20 working days. During the month there was one statutory holiday. The actual overheads amounted to:

Fixed	₹ 1,190	Variable	₹ 480
Semi-Variable	₹ 192		

Semi-variable charges are considered to include 60 percent expenses of fixed nature and 40 per cent of variable character.

Required:

a. Calculate Overhead Cost Variance
b. Calculate Fixed Overhead Cost Variance
c. Calculate Variable Overhead Cost Variance
d. Calculate Fixed Overhead Volume Variance
e. Calculate Fixed Overhead Expenditure Variance
f. Calculate Calendar Variance

Solution:

NOTE NO (1)

Budgeted Production Per Month

$\frac{1,20,000 \text{ Units}}{12}$ = 10,000 units

Budgeted Fixed O.H Per Month

	₹
Fixed	12,000
Semi Variable	1,080
(60% x 1,800)	13,080
	÷ 12 Months
= 1,090	

Variable O.H per unit

	₹
Variable	6,000
Semi Variable	720
(40% X 1800)	6,720
÷ Production	÷ 1,20,000
Per Unit =	0.56

Actual Overheads

Fixed	Variable
1,190	480
115.2	76.8
(192 x 60 %)	(192 x 40 %)
1305.20	556.80

Case Study - 6

A company is engaged in manufacturing of several products. The following data have been obtained from the record of a machine shop for an average month:

Budgeted:

No. of working days	24
Working hours per day	8
No. of direct workers	150
Efficiency	One standard hour per clock hour

Down time	10%
Overheads	
Fixed	₹ 75,400
Variable	₹ 90,720

The actual data for the month of August 2013 as follows:

Overheads	
Fixed	₹ 78,800
Variable	₹ 70,870
Net operator hours worked	₹ 20,500
Standard hours produced	₹ 22,550
There was a special holiday in August 2013.	

Required:

i. Calculate efficiency, activity, calendar and standard capacity usages ratio.
ii. Calculate all the relevant fixed overhead variances.
iii. Calculate variable overheads expenditure and efficiency variance.

FIXED OVERHEADS VARIANCE

Budget			**Actual**	
Units	**R.R**	**Expenditure**	**Units**	**Expenditure**
Hours $\frac{28,800}{(24 \times 8)} \times 150$		75,400	20,500	78,800
Days	**R.R**	**Expenditure**	**Days**	**Expenditure**
24		75,400	23 (24-1)	78,800

Full - Capacity	Practical Capacity	Normal Capacity
(Max - Hr)	(budget - Hrs)	(Standard Hrs.)
(24 Days x 8 hrs x 150 workers)	(28,800 x 90 %)	22,550
28,800	25,920	

FIXED O.H

BUDGET			ACTUAL	
Hrs.	**R.R**	**Expenditure**	**Hrs.**	**Expenditure**
25,920	2.908	**75,400**	22,550	**78,800**
Days	**R.R**	**Expenditure**	**Days**	**Expenditure**
24	3141.67	**75,400**	23	**78,800**
	3,142			

Answer

Ratio	Working	Result
Efficiency Ratio	$\frac{\text{Output expressed in Standard Hours}}{\text{Actual Hours Worked}}$	$(\frac{22,550}{20,500}) \times 100 = 110\%$
Activity Ratio	$\frac{\text{Output expressed in Standard Hours}}{\text{Budgeted output in standard hours}}$	$(\frac{22,550}{25,920}) \times 100 = 87\ \%$ or 86.99%
Calendar Ratio	$\frac{\text{Actual Working days in a period}}{\text{No. of working days in related budget}}$	$(\frac{23}{24}) \times 100 = 96\ \%$
Standard Capacity usage ratio	$\frac{\text{Budget Hours}}{\text{Maximum No. of hours in related period}}$	$(\frac{25,920}{28,800}) \times 100 = 90\%$

F.O Account

To Bank	78,800	By Recovery	65,597
		(22,550 x 2.908)	

FIXED O.H-COST VARIANCE
(65,597 - 78,800)

13,203 (A)

F.O. EXP VARIABLE
(75,400 - 78,800)
= 3,400 (A)

F.O VOLUME VARIABLE
(25,920 - 22,550) x 2.908
= 9,803 (A)

V.O VARIANCE

Standard			**Actual**		
Hrs.	**Rate**	**Amt**	**Hrs.**	**Rate**	**Amt**
22,550 ×	3.50	78,925	20,500 ×	3.45	= 70,870
	$\frac{90,270}{25,920}$				

V.O COST VARIANCE

(78,925 - 70,870) = 8,055 (F)

V.O. EFFECTIVE VARIANCE	V.O EXP/ REGULAR
(22,550 - 20,500) x 3.50	(3.50 - 3.45) x 20,500
= 7,175 (F)	= 880 (F)

Case Study - 7

Japan Products Ltd. had drawn up the following Sales budget for August, 2013:-

'B' Product.....5,000 units at ₹ 100 each
'C' Product ..... 4,000 units at ₹ 200 each
'S' Product.....6,000 units at ₹ 180 each

The actual sales for August, 2013 were:

'B' Product.....5,750 units at ₹ 120 each
'C' Product.....4,850 units at ₹ 180 each
'S' Product ..... 5,000 units at ₹ 165 each

The Cost per unit of B, C and S Product were ₹90, ₹ 170 and ₹ 130 respectively.

Required:

Analyse the Sales Variance to show the effects on turnover & the effects on Profit.

Solution **Sales Variance**

Standard						Actual				
Product	**Qty**		**Rate**		**Amt**	**Qty**		**Rate**		**Amt**
B	5,000	x	100		5,00,000	5,750	x	120		6,90,000
C	4,000	x	200		8,00,000	4,850	x	180		8,73,000
S	6,000	x	180		10,80,000	5,000	x	165		8,25,000
	15,000				23,80,000	15600				23,88,000

Sales Variance

(2,38,000 – 23,88,000) = 8,000 (F)

Sales Volume Variance						Sales Price Variance				
Product	**Qty**		**Rate**		**Amt**	**Qty**		**Rate**		**Amt**
B	(5,000 - 5,750)	x	100	=	75,000 (F)	(100-120)	x	5,750	=	1,150
C	(4,000 - 4,850)	x	200	=	1,70,000 (F)	(200-180)	x	4,850	=	9,700
S	(6,000 - 5,000)	x	180	=	1,80,000(A)	(180-165)	x	5,000	=	75,000
					65,000 (F)					**57,000(A)**

Sales Sub Quantity Variance **Sales Mix Variance**

(15,000 – 15,600) x 23,80,000 / 15,000

= 95,200 (F)

(B) (5,000/15,000 x 15,600)

= (5,200 – 5,750) x 100 = 55,000

(C) (4,000/1,500 x 15,600)

= (4,160 – 4,850) x 200 = 1,38,000

(S) (6,000/15,000 x 15600)

= (6,240 – 5,000) x 180 = 2,23,200

30,200

Standard

	Units	Rate		Amount
B	5,000	10	=	50,000
		(100 - 90)		
C	4,000	30	=	1,20,000
		(200 - 170)		
S	6,000	50	=	3,00,000
	15,000	(180 - 130)		4,70,000

Actual

Units	Rate		Amount
5,750	30	=	1,72,500
	(120 - 90)		
4,850	10	=	48,500
	(180 - 170)		
5,000	35	=	1,75,000
15,600	(165 - 130)		3,96,000

Sales Margin Variance (4,70,000 - 3,96,000) = 74,000 (A)

Sales Margin Volume Variance

B (5,000-5,750) x 10 = 7,500 (F)
C (4,000-4,850) x 30 = 25,500 (F)
S (6,000-5,000) x 50 = 50,000 (A)
17,000 (A)

(10-30) x 5,750 = 1,15,000 (F)
(30-10) x4,850 = 97,000 (F)
(50-35) x 5,000 = 75,000 (A)
57,000 (A)

Sales Margin Sub Volume Variance	**Sales Margin Mix Variance**
(15,000 – 15,600) x 4,70,000 / 15,000	(B) (5,000/15,000 x 15,600) = (5,200 – 5,750) x 10 = 5,500 (F)
= 18,800 (F)	(C) (4,000/15,000 x 15,600) = (4,160 – 4,850) x 30 = 20,700 (F)
	(S) (6,000/15,000 x 15,600) = (6,240 – 5,000) x 50 = 62,000 (A) 35,800 (A)

Case Study - 8

The Sales Manager of a company engaged in the manufacture and sale of three products and M gives you the following information for the month of October 2013:-

Budgeted Sales:

Product	Units Sold	Selling Price per unit	Standard Contribution Margin per unit
K	2,000	₹ 12	₹ 6
L	2,000	₹ 8	₹ 4
M	2,000	₹ 5	₹ 1

Actual Sales:

K 1,500 units for ₹ 15,000
L 2,500 units for ₹ 17,500
M 3,500 units for ₹ 21,000

Required:

Calculate Sales Variance

Sales Margin Variance

Standard						Actual				
Product	**Qty**		**Rate**		**Amt**	**Qty**		**Rate**		**Amt**
K	2,000	x	6	=	12,000	1,500	x	4 (10 - 6)	=	6,000
L	2,000	x	4	=	8,000	2,500	x	7 (7 - 4)	=	7,500
M	2,000	x	1	=	2,000	3,500	x	2 (6 - 4)	=	7,000
	6,000				**22,000**	**7,500**				**20,500**

Sales Margin Variance (22,000 – 20,500) = 1,500 (A)

Sales Margin Volume Variance

K (2,000 - 1,500) x 6 = 3,000 (A)
L (2,000 - 2,500) x 4 = 2,000 (F)
M (2,000 - 3,500) x 1 = 1,500 (F)
500 (F)

Sales Margin Price Variance

(6 - 4) x 1,500 = 3,000 (A)
(4 - 3) x 2,500 = 2,500 (A)
(1 - 2) x 3,500 = 3,500 (F)
2,000 (A)

Sales Margin Sub Volume Variance

(6,000 – 7,500) x 22,000 / 6,000

= 5,500 (F)

Sales Margin Mix Variance

(K) (2,000/6,000 x 7,500)

= (2,500 – 1,500) x 6 = 6,000 (A)

(L) (2,000/6,000 x 7,500)

= (2,500 – 2,500) x 4 = 0

(M) (2,000/6,000 x 7,500)

= (2,500 – 3,500) x1 = 1,000 (F)
= 5,000 (A)

Case Study - 9

Zed Company manufactures two types of flooring rolls. Budgeted and actual data for 2015 are-

	Static Budget			Actual Result		
	Industrial	**Domestic**	**Total**	**Industrial**	**Domestic**	**Total**
Unit Sales in Rolls ('000)	200	600	800	252	588	840
Contribution Margin (₹ in Lacs)	100.00	240.00	340.00	119.70	246.96	366.66

In late 2014, a marketing research estimated industrial volume for industrial and domestic flooring at 80 Lacs Rolls. Actual industry for 2015 was 70 Lacs Rolls.

Required:

1. Sales Mix Variance and Sales Quantity Variance by type of flooring rolls and in total.
2. Market Share Variance and Market Size Variance

Solution No (i) **Sales Variance / Margin**

	Budget					Actual				
Product	**Qty '000**		**Rate**		**Amt**	**Qty '000**		**Rate**		**Amt**
IND	2,00,000	x	50	=	1,00,00,000	2,52,000	x	47.50	=	1,19,70,000
DOM	6,00,000	x	40	=	2,40,00,000	5,88,000	x	42	=	2,46,96,000
	8,00,000				3,40,00,000	8,40,000				3,66,66,000

Sales Margin Variance (3,40,00,000 – 3,66,66,000) = 26,66,000 (F)

Sales Margin Volume Variance	**Sales Margin Rate Variance**
IND (2,00,000-2,52,000) x 50 = 26,00,000 (F)	(50-47.50) x 2,52,000 = 6,30,000 (A)
DOM (6,00,000-5,88,000) x 40 = 4,80,000(A)	(40-42) x 5,88,000 = 11,76,000 (F)
21,20,000 (F)	5,46,000(F)

Sales Sub Volume Variance

(8,00,000 - 8,40,000) x 3,40,00,000/8,00,000
= 17,00,000 (F)

MKT Size Variance

(80,00,000 - 70,00000) x 10% x 3,40,00,000/8,00,000
= 42,50,000 (A)

MKT Share Variance

(70,00,000 - 84,00,000) x 3,40,00,000/8,00,000
= 59,50,000 (F)

Sales Mix Variance

IND (2,00,000/8,00,000 x 8,40,000)
= (2,10,000 – 2,52,000) x 50
= 21,00,000 (F)

(6,00,000/8,00,000 x 8,40,000)
= (6,30,000 – 5,88,000) x 40
= 16,80,000 (A)

4,20,000 (F)

Case Study - 10

Computation of All Variance

The standard Cost Sheet per unit for the product produced by Style Manufacturer is worked out on this basis:-

Direct Materials	1.3 tons @ ₹ 4.00 per ton
Direct Labour	2.9 hours @ ₹ 2.30 per hour
Factory Overhead	2.9 hours @ ₹ 2.00 per month.

Normal Capacity is 2,00,000 direct labour hours per month.

The Factory Overhead are is arrived at on the basis of a Fixed Overhead of ₹ 1,00,000 per month and a Variable Overhead of ₹1.50 per direct labour hour.

In the month of May, 50,000 units of the product was started and completed. An investigation of the raw material account reveals that 78,000 tons of raw materials were transferred into and used by the factory during May. These goods cost ₹ 4.20 per ton. 1,50,000 hours of Direct Labour were spent during May at a cost ₹ 2.50 per hour. Factory Overhead for the month amounted to ₹ 3,40,000 out of which ₹ 1,02,000 was fixed.

Required:

a) Compute and identify all variances under Material, Labour and Overhead as favorable or adverse.

b) Identify one or more departments in the company who might be held responsible for each variance.

Solution

Labour Cost Variance (3,33,500– 3,75,000) = 41,500 (A)

Labour EFF Variance
(1,45,000 - 1,50,000) x 2.30
= 11,500 (A)

Labour Rate Variance
(2.30 - 2.50) x 1,50,000
= 30,000 (A)

V. O Cost Variance (2,17,500– 2,38,000) = 20,500 (A)

V. O EFF Variance
(1,45,000 – 1,50,000) x 1.50
= 7,500 (A)

V. O Exp Rate Variance
(1.5 - 1.59) x 1,50,000
= 13,000 (A)

F.O Account			
To Bank	102,000	By Recovery	72,500
		(5,000 x 1.45)	
		By U/R	29,500

F. O Cost Variance (72,500 – 1,02,000) = 29,500 (A)

F. O. Expenses Variance
(1,00,000 – 1,02,000)
= 2,000 (A)

F. O. Volume Variance
(68,965.51 – 50,000) X 1.45
= 27,500 (A)

F.O EFF Variance

	Units	Hrs.
F. O. Cap Active Variance	68,96,5.51	2,00,000
(2,00,000 – 1,50,000) x .5 = 25,000 (A)	50,000	1,45,000

(1,45,000 – 1,50,000) x 0.5= 2,500 (A)

Case Study - 11

Thomson Exports Ltd. manufactures readymade shirts of a specific quantity in lots to each special order from its overseas customers.
The Standard Costs for one dozen of shirts are:

		₹
Direct Material (24 meters @ ₹ 22)	……..	528
Direct Labour (3 hours @ ₹ 98)	……...	294
Overheads (3 hours @₹ 80)	……..	240

During July, 2013 it worked on three orders, for which the month's job cost records show the following:

Lot No.	Units	Materials used	Hours worked
245 (UK)	1,700 Doz.	40,440 Meters	5,130
246 (US)	1,200 Doz.	28,825 Meters	2,890
247 (HK)	1,000 Doz.	24,100 Meters	2,980

Additional information:

a. The company bought 95,000 meters of materials during July at a cost of ₹ 21,28,000. The material price variance is recorded when materials are purchased. All inventories are carried at cost.
b. Direct labour during July, 2013 amounted to ₹ 11,00,000, labour were paid ₹ 100 per hour.
c. Overheads during the month amounted to ₹ 9,12,000.
d. A total of ₹ 1,15,20,000 was budgeted for overheads for the year 2013-14, based on estimated production of the plant's normal capacity of 48,000 dozen shirts annually. An overhead at the level of production is 40% fixed and 60% variable. Overheads are applied on the basis of direct labour hours.
e. There was no work in progress at the beginning of July. During July, lot nos. 245 and 247 were completed. All materials were issued for lot no. 246 which was 80% completed as regards conversion.

Required:

i. Computation of standard cost of production of the shirts per dozen as well as in total for lot Nos. 245, 246 and 247.
ii. Find out the variation in quantity of material used and labour hours worked for each lot as well as in total.
iii. Calculate the material price variance; labour rate variance; variable overheads efficiency variance and fixed overheads volume variance.

(1) Statement Showing Standard Cost For Actual Production

Products	Actual Production		Std Equivalent cost		Std cost for actual production
245 (UK)	1,700 dozen	x	531 per dozen	=	9,02,700
246(US)	1,200 dozen	x	477.6	=	5,73,120
247 (CAN)	1,000 dozen	x	531	=	5,31,000
					20,06,820

* Standard Equivalent cost per dozen

Mat	264	264
Lab	(147 x 80%)	117.6
OH	(120 x 60%)	96
		4,776

Std Cost per Dozen = 531

(2) Statement Showing variation in quantity

(i) Material used (ii) Hours worked

					Material Standard Actual Qty	
Products	**Production**		**Standard Qty Required**	**Actual Qty Used**	**Variation**	
245 UK	1,700 dozen	x	24 m	40,800	40,440	360 (F)
246 US	1,200	x	24 m	28,800	28,825	25 (A)
247 CAN	1,000	x	24 m	24,000	24,100	100 (A)
				93,600	93,365	235 (F)
Labour Hours						
245 UK	1,700	x	3	5,100	5,130	30 (A)
246 US	1,200	x	3 x 60%	2,880	2,890	10 (A)
247 CAN	1,000	x	3	3,000	2,980	20 (F)
				10,980	**11,000**	**20 (A)**

(3) Single Flow

Mat Price (11 - 11.2) x 95,000 = 19,000 (A)

$\frac{10,64,000}{95,000}$ = 11.2

Lab Rate (49 - 50) x 11,000 = 11,000 (A)

$\frac{5,50,000}{50}$ = 11,000

VOH EFF Var (10,980 – 11,000) x 40 x 60% = 480 (A)

FOH volume Var (4,000 – 3,660) x 120 x 40% = 16,320 (A)
(48,000 ÷12 = 4,000)
(1,700 + (1,200 X 80%) + 1,000 = 3,660)

Case Study - 12

The following information relates to a manufacturing concern:

Standard	**₹**
Material A 24,000 kgs @ ₹ 3 per kg	72,000
Material B 12,000 kgs @ ₹4 per kg	48,000
Wages 60,000 hours @₹4 per kg	2,40,000
Variable Overheads 60,000 hours @ ₹ per hour	60,000
Fixed Overheads 60,000 hours @ ₹2 per hour	1,20,000
Total Cost	**5,40,000**
Budgeted Profit	60,000
Budgeted Sales	6,00,000
Budgeted Production (units)	12,000
Actual	**₹**
Sales (9,000 units)	4,57,000
Material A Consumed 22,275 kgs.	62,370
Material B Consumed 10,890 Kgs.	44,649
Wages Paid (48,000 hours)	1,91,250
Fixed Overhead	1,20,900
Variable Overhead	45,000
Labour Hours Worked	47,700
Closing (Work in progress)	900 units
Degree of Completion	
Material A and B	100%
Wages and Overheads	50%

Calculate all Variances.
Calculation of Actual Production

	Material	**Labour**
Finished Goods	9,000 units	9,000 units
Closing WIP	900 units	450 units
	9,900 units	9,450 units

Step No. (1) Material Variance

Actual Production = 9,900 units

Standard						Actual				
	Kg	**x**	**Rate**		**Amt**	**Kg**		**Rate**	**=**	**Amt**
A	19,800 (9,900 x 24,000/12,000)	x	3	=	59,400	22,275	x	2.80	=	62,370
B	9900 (9,900 x 12,000/12,000)	x	4	=	39,600	10,890	x	4.10	=	44,649
	29,700				99,000	33,165				1,07,019

Labour Variance

Actual Production = 9,450 Units

Standard						Actual				
	Hrs		**Rate**		**Amt**	**Hrs**		**Rate**		**Amt**
	47,250 (9,450 x 60,000/12,000)	x	4	=	1,89,000	48,000	x	3.98	=	1,91,250

Actually Worked
47,700 Hrs

Actual Idle Time
300

V. O. Var

Actual Production = 9,450 units

Hrs.		Rate		Amt
47,250 (9,450 x 60,000/12,000)	x	1	=	47,250

Hrs.		Rate		Amt
47,700	x	.94	=	45,000

Budget

Units	R.R	Exp
12,000	10	1,20,000

Actual

Units	Exp
9,450	12,090

Hrs.	R.R	Exp
60,000	2	1,20,000

Hrs.	Exp
47,700	1,20,900

Sales Variance

Units	Rate	Amt
12,000	50	6,00,000

Units	Rate	Amt
9,000	50.83	4,57,500

Sales Margin Variance

Units	Rate	Amt
12,000	5	60,000

Units	Rate	Amt
9,000	5.83	52,500

Actual Profit Per Unit
Actual S. P (P.U) = 50.83
(4,57,500 ÷ 9,000)
Budget Cost (45.00)
(5,00,000 ÷ 12,000)
5.83

Material Cost Variance
(99,000 – 1,07,019) = 8,019 (A)

Material Usage Variance	Material Rate Variance
A (19,800 – 22,275) x 3 = 7,425(A)	(3 - 2.80) x 22,275 = 4,455 (F)
B (9,900 – 10,890) x = 3,960(A)	(4 - 4.10) x 10,890 = 1,089 (A)
11,385 (A)	3,366 (F)

Material Sub Usage Variance	Material Mix Variance
(29,700-33,165) x 99,000/29,700 = 11,550 (A)	(A) (19,800/29,700 x 33,165) = (22,110 – 22,275) x 3 = 495 (A)
	(B) (9,900/29,700 x 33,165) = (11,055 – 10,890) x 4 = 660 (F) 165 (F)

Material Yield Variance

Input	Output
29,700	9,900
33,165	(9,900× 33,165÷ 29,700)

(11,055 – 9,900) 99,000 ÷ 9,900
= 11,550 (A)

Labour Cost Variance

(1,89,000– 1,91,250) = 2,250 (A)

Labour EFF Var	Labour Idle Time Var	Labour Rate Variance
(47,250 – 47,700) x 4 = 1,800 (A)	300 x 4 = 1,200 (A)	(4 - 3.98) x 48,000 = 750 (F)

Variance O.H Cost Variance
(47,250 – 45,000) = 2,250 (F)

V. O EFF Variance	V. O Exp/ Rate Variance
(47,250 – 47,700) x 1 = 450 (A)	(1 - .94) x 47,700 = 2,700 (F)

Fixed O.H A/c.

To Bank	1,20,900	By Recovery (9,450 x 10)	94,500
		By U/R	26,400

Fixed O.H. Cost Variance
(94,500 – 1,20,900) = 26,400 (A)

F. O. Exp Variance
(1,20,000– 1,20,900)
= 900 (A)

F. O. Volume Variance
(12000 - 9450) x 10
= 25,500 (A)

Fixed O.H Capacity Variance
(60,000 – 47,700) x 2
= 24,600 (A)

F.O EFF Variance

Units	**Hrs**
12,000	60,000
9,450	47,250

(47,250 – 47,700) x 2 = 900 (A)

Case Study - 13

An engineering company manufactures a single product whose standard cost structure is as follows:

		₹
Direct Material	(2.4 Kg. at ₹ 30 per Kg.)	72.00
Direct Labour	(6 hours at ₹ 4 per hour)	24.00
Factory Overheads	(6 hours at ₹ 75 per hour)	4.50

The factory overhead is based on the following Flexible Budget:

	80%	**90%**	**100%**	**110%**
Production (units)	6,000	6,750	7,500	8,250
	₹	**₹**	**₹**	**₹**
Variable Overheads	18,000	20,250	22,500	24,750
Fixed Overheads	11,250	11,250	11,250	11,250

Actual data for the month December, 2013
Budgeted Production.....75,000 units
Material used .....19,240 Kg. at ₹ 31 per Kg.
Direct Labour.....46,830 hours at ₹ 4.20 per hour
Actual Factory Overhead .....₹ 36,340
Production completed .....7,620 units
Details of Work-in-progress: 120 units materials fully supplied, 50% converted closing 100 units, materials fully supplied, 50% converted.

Required:

Determine and analyze Material Cost Variance, Labour Cost Variance, and Overhead Cost Variance.

Solution

Note No. (1) Actual Production

	Material	Labour & O.H
F Goods	7,620 Units	7,620 Units
Closing	100 Units	50 Units
WIP	(100 x 100%)	(100 x 50%)
Opening	(120)	(60)
W.I.P	(120 x 100%)	(120 x 50%)
	7,600	7,610

Step No. (i)
Material Variance - Actual Production = 7,600

Standard

kg		Rate		Amt
18,240	x	30	=	5,47,200
(7,600x2.40)				

Actual

kg		Rate		Amt
19,240	x	31	=	5,96,440

Labour Variance – 7,610 Units

Hrs		Rate		Amt
45,660	x	4	=	1,82,640
(7,610x6)				

Hrs		Rate		Amt
46,830	x	4.20	=	1,96,686

V. O. Variance Actual Production = 7,610 units

Hrs		Rate		Amt
45660	x	.50	=	22,830
(7610 x 6)				(18,000/6,000 x 7,610)

Hrs		Rate		Amt
46,830				

Fixed Overhead Variance

Budgets

Units	R.R	Exp
7,500	1.50	11,250

Actual

Units	Exp
7,610	

Hrs	R.R	Exp
45,000 (7,500 x 6)	.25	11,250

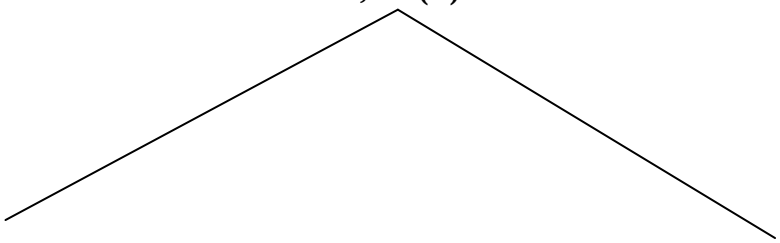
Hrs	Exp
46,830	

Material Cost Variance (5,47,000 – 5,96,440) = 49,440 (A)

Material Usage Variance
(18,240 – 19,240) x 30
= 30,000 (A)

Material Rate Variance
(30 - 31) x 19,240
= 19,240 (A)

Labour Cost Variance (1,82,640 – 1,96,686)
= 14,046 (A)



Labour Efficiency Variance
(45,660 – 46,830) x 4
= 4,680 (A)

Labour Rate Variance
(4 - 4.20) x 46,830
= 9,366 (A)

Overheads Cost Variance

V. O (22830 -

F.O (11415 -
(7610 x 1.50)
(34,245 – 36,340) = 2,095 (A)

Case Study - 14

Alpha Ltd. uses standard costing system for manufacturing its single product 'APS'. Standard cost card per unit is as follows:

	(₹)
Selling Price	120
Direct Material (1 kg per unit)	20
Direct Labour (6 hrs @ ₹ 8 per hour	48
Variable Overheads	24
Contribution	28

Actual and budgeted activity levels in units for the month of September are:

	Budget	**Actual**
Sales	50,000	51,200
Production	50,000	52,000

Actual Sales revenue and variable costs for the month of September are given as under:

Sales	61,33,760
Direct Material	10,65,600
Direct Labour (3,00,000 hrs)	24,42,000
Variable Overheads	12,28,000

Required:

i. Calculate Direct Labour Rate Variance
ii. Calculate Direct Labour Efficiency Variance
iii. Calculate Sales Volume Variance
iv. Calculate Sales Price Variance
v. Comment on your findings in (i) and (ii) above.

Step No.(1) Labour Variance - 52,000 Units

Standard

Hrs		Rate		Amt
3,12,000	x	8	=	24,96,000
(52,000x 6)				

Actual

Hrs		Rate		Amt
3,00,000	x	8.14	=	5,24,42,000

Sales Variance

Units		Rate		Amt
50,000	x	120	=	60,00,000

Units		Rate		Amt
51,200	x	119.80	=	61,33,760

Labour Cost Variance
(24,96,000 – 24,42,000) = 54,000 (F)

Labour Efficiency Variance
(3,12,000 – 3,00,000) x 8
= 96,000 (F)

Labour Rate Variance
(8 - 8.14) x 3,00,000
= 42,000 (A)

Sales Variance
(60,00,000 – 61,33,760) = 1,33,760 (F)

Sales Volume Variance
(50,000 – 5,12,00) x120
= 1,44,000 (F)

Sales Price Variance
(120 - 119.80) x 51,200
= 10,240 (A)

Case Study - 15

Missing/ Required Information from Given Inputs and Variances

KYC Ltd. uses a standard absorption costing system. The following details have been extracted from its budget for year 2013-14.
Fixed Overhead Cost .....₹ 7,20,000
Production..... 36,000 units
In 2013-14, the Fixed Overhead Cost was over-absorbed by ₹ 3,200 and the Fixed Overhead Expenditure Variance was ₹ 20,000 (F).
Required:

What was the actual number of units produced in 2013-14?

Fixed Overheads

Budgets

Units	R.R	Exp
36,000	20	7,20,000

Actual

Units	Exp
35,610	7,00,000

F.O A/c.

To Bank	7,00,000	By Recovery (35,160 x 20)	70,3,200
To O/R	3,200		

F. O. Cost Variance
(7,03,200 – 7,00,000) = 3,200 (F)

F. O. Exp Variance

(7,20,000 – 7,00,000) = 20,000 (F)

(Balance)

F.O Volume Variance

(36,000 – 35,160) x 20

= 16,800 (A)

Case Study – 16

S. Ltd. operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre, the following information is available

Standard Price of material is ₹ 2 per litre. The standard wage rate is ₹ 6 per hour and 5 hours are allowed to produce one unit. Fixed production overhead is absorbed at the rate of 100% of direct wages cost. During the month just ended the following occurred –

	₹
Actual Price (paid for material purchased)	1.95 per litre
Total Direct Wages Cost	1,56,000
Fixed Production Overhead	1,58,000

Variance	Favorable (₹)	Adverse (₹)
Direct Material Price	8,000	-
Direct Material usage	-	5,000
Direct Labour Rate	-	5,760
Direct Labour Efficiency	2,760	-
Fixed Production Overhead Exp	-	8,000

Required:

Calculate the following for the month

i. Budgeted output in units.
ii. Number of litres purchased.
iii. Number of litres used above standard allowed.
iv. Actual units produced.
v. Actual hours worked.
vi. Average Actual wage rate per hours

Step No. (1) Material Variance = 5,100 units

Standard		
Litres	**Rate**	**Amount**
1,57,500	**2.00**	**3,15,000**

Actual		
Litres	**Rate**	**Amount**
1,60,000	**1.95**	**3,12,000**

Labour Variance

Hrs.	Rate	Amount
25,500 (5,100 x 5)	**6.00**	**1,53,000**

Hrs.	Rate	Amount
25,040	**6.23**	**1,56,000**

Fixed Overheads

Budget		
Units	**R.R**	**Exp**
5,000	**30 (6 hr x 5)**	**1,50,000**

Actual	
Units	**Exp**
5,100	**1,58,000**

Material Cost Variance

(3,15,000 – 3,12,000) = 3,000 (F)

D. Material Usage Variance

(1,57,500 – 1,60,000) x 2

= 5,000 (A)

D. Material Rate Variance

(2 - 1.95) x 1,60,000

= 8,000 (F)

Labour Cost Variance

(1,53,000 – 1,56,000) = 3,000 (A)

Labour EFF Variance

(25,500 – 25,040) x 6

= 2,760 (F)

Labour Rate Variance

(6 - 6.23) x 25,040

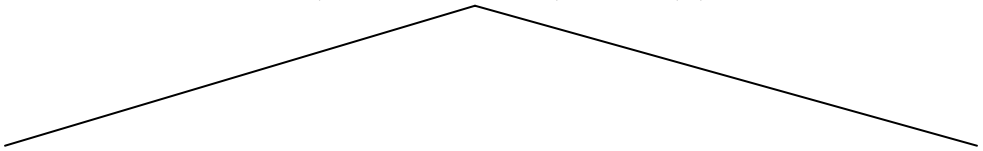
= 5,760 (A)

F.O Account

To Bank	1,58,000	By Recovery (5,100 x 30)	1,53,000
		By U/R	5,000

F. O. Cost Variance

(1,53,000 – 1,58,000) = 5,000 (A)



F. O. Exp Variance	F. O. Volume Variance
(1,50,000 – 1,58,000)	(5,000 – 5,100) x 30
= 8,000 (A)	= 3,000 (F)

Case Study - 17

The details regarding a product manufactured by ZED & Co. for the last one week are as follows:

Standard Cost (for one unit)		**₹**
Direct Material	(10 unit @ ₹ 1.50)	15
Direct Wages	(5 hours @₹ 8.00)	40
Production Overheads	(5 hours @ ₹ 10.00)	50
		105

Actual (for whole activity)	**₹**
Direct Materials	6,435
Direct Wages	16,324
Direct Materials	
Price	585 (A)
Usage	375 (F)
Direct Wages	
Rate	636(F)
Usage	360 (A)
Production Overheads	
Expenditure	400 (F)
Volume	750 (F)

You are required to calculate:

i. Actual output units;
ii. Actual price of material per unit;
iii. Actual wage rate per labour hour;
iv. The amount of production overhead incurred, and
v. The production overhead efficiency variance

Step No. (1) Material Variance

Actual Production = 415 Units (Ans No.(i))

Standard

Units		Rate		Amt
4,150	x	1.50	=	6,225
(415x10)				

Actual

Units		Rate		Amt
3,900	x	1.65	=	6,435

(Ans No. (ii))

Labour Variance

Hrs		Rate		Amt
2,075 (415 x 5)	x	8	=	16,600

Hrs		Rate		Amt
2,120	x	7.70	=	16,324

Ans No. (iii)

Fixed Overhead

Budgets

Units	R.R	Exp
400	50	20,000

Actual

Units	Exp
415	19,600

Ans No. (iv)

Hrs	R.R	Exp
2,000 (400 x5)	10	20,000

Hrs	Exp
2,120	19,600

Material Cost Variance

(6,225 – 6,435) = 210 (A)

Material Usage Variance

(4,150 – 3,900) x 1.50

= 375 (F)

Material Rate Variance

(1.5 - 1.65) x 3,900

= 585 (A)

Labour Cost Variance

(16,600 – 16,324) = 276 (F)

Labour EFF Variance

(2,075 – 2,120) x 8

= 360 (A)

Labour Rate Variance

(8 - 7.7) x 2,120

= 636 (F)

F.O Account

To Bank	19,600	By Recovery (415 x 50)	20,750
To O/R	1,150		
			20,750

F. O. Cost Variance

(19,600 – 20,750) = 1,150 (F)

F. O. Exp Variance

(20,000 – 19,600)

= 400 (F)

F. O. Volume Variance

(20,000 – 20,750)

= 750 (F)

F. O. Capacity Variance

(2,000 – 2,120) x 10

= 1,200 (F)

F.O. EFF Variance

Units	**Hrs.**
400	2,000
415	2,075

$\left(\frac{2,000}{400}\right) \times 415$

(2,075 – 2,120) x 10

= 450 (A)

Ans No. (v)

Case Study - 18

A company operates a standard cost system to control the variable works cost of its only product. The following are the details of actual production, costs and variance of November, 2015.

Production and cost (actual)

Production	……	10,000 units
Direct Material (1,05,000 kg.)	……	₹ 5,20,000
Direct Labour (19,500 hrs.)	……	₹ 3,08,000
Variable Overheads	……	₹ 4,10,000
Cost Variances	……	
Direct Material - Price	……	₹ 5,000 (F)
Direct Material - Usages	……	₹ 25,000 (A)
Direct Labour - Rate	……	₹ 15,500 (A)
Direct Labour - Efficiency	……	₹ 7,500 (F)
Variable overheads	……..	₹ 10,000 (A)

The Cost Accountant finds that the original standard cost data for the product is missing from the cost department files. The variance analysis for December, 2015 is held up for want of this data.

Required:

i. Calculate- Standard price per kg. of direct material
ii. Calculate- Standard quantity for each unit of output
iii. Calculate- Standard rate of direct labour hour
iv. Calculate- Standard time for actual production
v. Calculate- Standard variable overhead rate

Step No.1

Material Variance

Actual Production = 10,000 units

Standard

Kg		Rate		Amt
1,00,000	x	5	=	5,00,000

Actual

Kg		Rate		Amt
1,05,000	x	4.95	=	5,20,000

Labour Variance

Hrs		Rate		Amt
20,000	x	15	=	3,00,000

Hrs		Rate		Amt
19,500	x	15.79	=	3,08,000

Variable Overhead

Hrs		Rate		Amt
20,000	x	20	=	4,00,000

Hrs		Rate		Amt
19,500	x	21.02	=	4,10,000

Material Cost Variance
(5,00,000 – 5,20,000) = 20,000 (A)

Material Usage Variance
(1,00,000 – 1,05,000) x 5
= 25,000 (A)

Material Rate Variance
(5 - 4.95) x 1,05,000
= 5,000 (F)

Labour Cost Variance
(3,00,000 – 3,08,000) = 8,000 (A)

Labour EFF Variance
(20,000 – 19,500) x 15
= 75,000 (F)

Labour Rate Variance
(15 - 15.79) x 19,500
= 15,500 (A)

V. O. Cost Variance
(4,00,000 – 4,10,000) = 10,000 (A)

V. O. EFF Variance
(20,000 – 19,500) x20
= 10,000 (F)

V. O. Exp/ Rate Variance
(20 - 21.02) x 19,500
= 20,000 (A)

Case Study - 19

Prince Edward & Co. used a full standard cost system with raw materials inventory carried at Standard. The following data were taken from the records of the company for the year ended 31.12.2013:

	₹
Opening raw materials inventory	300
Closing raw materials inventory	250
Net purchases	410
Material price variance	10 (A)
Material usage variance	20 (A)
Direct labour cost (Actual)	900
Direct labour cost at standard	840
Actual overhead cost incurred	875
Overheads cost variance	45 (F)
Opening work-in-progress inventory	120
Closing work-in progress inventory	140
Opening finished goods inventory	360
Cost of goods sold reported	2,240

Note: “F” denotes favorable and “A” denotes adverse

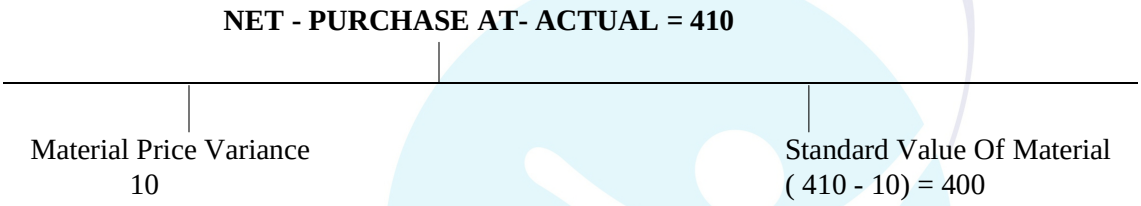
Required:

Compute-

1) Raw material Purchases at standard.
2) Raw materials consumed at standard.
3) Labour cost variance
4) Standard overhead costs.
5) Total manufacturing cost at standard.
6) Cost of goods manufactured.
7) Cost of products sold to customers.
8) Closing finished goods inventory.

ANS NO. (1)

STATEMENT SHOWING COMPUTATION



ANS NO. (2)

STATEMENT SHOWING MATERIAL CONSUMED AT STANDARD

Opening Stock (At - Standard)	300
(+) Purchases At Standard (Ans No.1)	400
	700
Closing Stock At Standard	(250)
Consumed	450

ANS NO. (3)

STATEMENT SHOWING LABOUR COST VARIANCE

Direct - Labour Cost At Standard		840
Actual Labour Cost		**900**
	(A)	**60**

(840 - 900) = 60 (A)

ANS NO. (4)

Standard Overhead Cost = (Standard Cost – Actual Cost) = Variance

(920 – 875) = 45 (F)

ANS NO.(5)

STATEMENT SHOWING TOTAL MANUFACTURING COST AT STANDARD

Standard Raw Material - Cost	450
Standard Direct Lab Cost	840
Standard O.H Cost	920
	2,210

ANS NO. (6)

STATEMENT SHOWING COST OF GOODS MANUFACTURED AT STANDARD

W.I.P A/c.			
To Opening w| p	120		
To Cost of Goods Manufacture (Standard)	2,210	By Goods Material	2,190
		By Closing WIP	140
	2,330		2,330

ANS NO. (7)

STATEMENT SHOWING COST OF PRODUCT SOLD TO CUSTOMER (STANDARD)

Cost of Goods Sold (Reported)	2,240
Cost Variance (Adverse)	
Material Price Variable	(10)
Material Usage Variable	(20)
Direct Labour Cost Variable	(60)
Cost Variance (Fav)	
Overhead Cost Variable	45
	2,195

ANS NO. (8)

STATEMENT SHOWING STOCK OF FINISHED GOODS AT STANDARD

Standard Opening Finished Goods	380
Standard Cost of Goods Manufacture	2,190
Standard Cost of Product Sold	(2,195)
Standard Closing Finished Goods	355

Case Study - 20

The following are the information regarding overheads of a company:

a) Overhead cost variance = ₹ 2,800 (A)
b) Overheads volume variance = ₹ 2,000 (A)
c) Budgeted Overheads = ₹ 12,000
d) Actual overhead recovery rate = ₹ 8 per hour
e) Budgeted hours for the period = 2,400 hours

Required:

Compute the following-

i. Overheads expenditure variance.
ii. Actual incurred variance.
iii. Actual hours for actual production.
iv. Overheads capacity variance.
v. Overheads Efficiency variance.
vi. Standard hours for actual production.

Step No. 1

Fixed Overheads

Budgets

Units	R.R	Exp
		12,000

Actual

Units	Exp
	12,800

(Ans No. (ii))

Hrs	R.R	Exp
2,400	5	12,000

Hrs	Exp
1,600	(12,800 ÷ 8)

(Ans No. (iii))

Days	R.R	Exp
		12,000

Days	Exp
	12,800

F.O Account

To Bank	12,800	By Recovery	10,000
		By U/K	2,800

F. O. Cost Variance

( ) = 2,800 (A)

F. O. Exp Variance

(12,000 – 12,800)

= 800 (A) (Ans No. i)

F. O. Volume Variance

= 2,000 (A)

F. O. Capacity Variance

(2,400 – 1,600) x 5

= 4,000 (A) (Ans No. iv)

F. O. EFF Variance

(2,000 – 1,600) x 5

= 2,000 (F) (Ans No. v)

Case Study - 21

Compute the missing data indicated by the question marks from the following:

	Product R	**Product S**
Standard Sales Quantity (Units)	???	400
Actual Sales Quantity (Units)	500	???
Standard Price/Unit	₹ 12	₹ 15
Actual Price /Unit	₹ 15	₹ 20
Sales Price Variance	???	???
Sales Volume Variance	₹ 1,200 (F)	???
Sales Value Variance	???	???

Step No.1

Sales Mix Variance for both products together was ₹ 450 (F). 'F' denotes favorable.

Standard Sales Variance				**Actual**		
Product	**Qty**	**Rate**	**Amount**	**Qty**	**Rate**	**Amount**
'R'	σ 400	x σ 12	4,800	σ 500	x σ 15	7,500
'S'	σ 400	x σ 15	6,000	T	x σ 20	_____
	800		10,800	500 + T		_____

SALES VARIANCE
(10,800- 23,500) = 12,700 (F)

Sales Volume Variance
R' (400 - 500)12 = 1,200 (F) σ 'R'
S' (400 - 800)x15 = 6,000 (F) 'S'
7,200 (F)

Sales Price Variance
(12 - 15) x 500 = σ 1,500 (F)
(15 - 20) x 800 = 4,000 (F)
5,500 (F)

Sales Sub volume Variance
(800 - 1,300) x 10,800 / 800
= 6,750 (F)

Sales Mix Variance
'R' (400 / 800 x 1,300)
'S' = (650 - 500) x 12
(400 / 800 x 1,300) = 1,800 (A)
= (650 - 800) x 15= 2,250 (F)
450 (F)

SALES MIX-VARIANCE

Assuming – Actual Sales 'S' = T.

$$\left(400 \times \frac{500 + T}{800}\right) - (500) \times 12 +$$

$$\left(400 \times \frac{500 + T}{800}\right) - (T) \times 15 = 450 \text{ (F)}$$

[(250 + 0.5T) – (500)] x 12 +

[(250 + 0.5T) – (T)] x 15 = 450 (F)

3,000 + 6T- 6,000 + 3,750 + 7.5 T – 15 T = 450 (F)

750 - 1.5T = 450 (F)

1.5 T = 1,200

T = 800

	Qty	Rate	Amt	Qty	Rate	Amt
R	400	x 12	4,800	500	x 15	7,500
S	400	x 15	6,000	800	x 20	16,000
	800		10,800	1,300		23,500

Case Study - 22

M Star ltd uses standard costing system in manufacturing of its single product 'MOG'. The standard cost per unit of 'MGO' is as follows.

	₹
Direct Material - 2 meters @ ₹ 6 per metre	12.00
Direct Labour - 1 hour @ ₹ 4.40 per hour	4.40
Variable Overhead - 1 hour @ ₹ 3 per hour	3.00
	19.40

During July, 2013, 6,000 units of M were procured and the related data are as under:

Direct material acquired - 19,000 meters @ 5.70 per metre
Direct labour - ? hours @ ₹ ? per hour ..... ₹ 27,950
Variable Overhead Incurred ..... ₹ 20,475

The variable overhead efficiency variance is ₹ 1,500 adverse. Variable overheads are based on direct labour hours. There was no stock of raw - material in the beginning.

Required:

Compute the missing figures and work out all the relevant variances.

Material variance Actual Production= 6,000

Standard				
Meters		**Rate**		**Amt**
12,000 (6,000 x 2)	x	6	=	72,000

Actual				
Meters		**Rate**		**Amt**
12,670	x	5.70	=	72,219

Labour Variance

Hrs		**Rate**		**Amt**
6,000 (6,000 x 1)	x	4.40	=	26,400

Hrs		**Rate**		**Amt**
6,500	x	4.30	=	27,950

V. O. Variance

Hrs		**Rate**		**Amt**
6,000 (6,000 x 1)	x	3	=	18,000

Hrs		**Rate**		**Amt**
6,500	x	3.15	=	20,475

Material Cost Variance
(72,000 – 72,219) = 219 (A)

Material Usage Variance
(12,000 – 12,670) x 6
= 4,020 (A)

Material Rate Variance
(6 - 5.70) x 12,670
= 3,801 (F)

Labour Cost Variance
(26,400 – 27,950) = 1,550 (A)

Labour EFF Variance
(6,000 – 6,500) x 4.40
= 2,200 (A)

Labour Rate Variance
(4.4 - 4.30) x 6,500
= 650 (F)

V.O. Cost Variance
(18,000 – 20,475) = 24.75 (A)

V.O. EFF Variance
(6,000 – 6,500) x 3
= 1,500 (A)

V. O. Exp /Rate Variance
(3 - 3.15) x 6,500
= 975 (A)

Case Study – 23

A company produces a product X, using raw materials A and B. the standard mix of A and B is 1:1 and the standard loss is 10% of input.

	A	**B**	**Total**
Standard price of raw material (₹ / kg.)	24	30	
Actual input (kg.)	?	70	
Actual output (kg.)			?
Actual price ₹ /kg.	30	?	
Standard input quantity (kg.)	?	?	
Yield variance (sub usage)			270 (A)
Mix variance			?
Usage variance	?	?	?
Price variance	?	?	?
Cost variance	0	?	1,300 (A)

Required:

Compute the missing information indicated by "?"Based on the data given above.

STANDARD INPUT FOR ACTUAL OUTPUT

INPUT	**N.LOSS**	**OUTPUT**
100	10	90

A : B
1 : 1

MATERIAL VARIANCE ACTUAL OUTPUT= 90Kg.

STANDARD				ACTUAL		
Input	**Qty**	**Rate**	**Amt**	**Qty**	**Rate**	**Amt**
A	50	x 24	1,200	40	30	1,200
B	50	x 30	1,500	70	40	2,800
	100		2,700		110	4,000

Material Cost Variance (2,700 - 4,000) = 1,300 (A)

Material Usage Variance
A (50 - 40) x 24 = 240 (F)
B (50 -70) x 30 = 600 (A)
360 (A)

Material Rate Variance
(24 - 30) x 40 = 240 (A)
(30 - 40) x 70 = 700 (A)
940 (A)

Material Sub Usage Variable
(100 - 110) x 2700 / 100 = 270 (A)

Material Yield Variance
110 - 90
110- 99
(99 - 90) x 2,700/90 = 270 (A)

A (50/100 x 110)
= (55 - 40) x 24
= B (50/100 x 110)
= (55 -70) x 30 = 450 (A)

Material Cost Variance –A = O
(SQA x 24) = (AQA x 30)
24 SQA = AQA 30
SQA = $\frac{30}{24}$ AQA
SQA = 1.25 AQA

MATERIAL YIELD/ SUB-USAGE VARIANCE

$$(SQA + SQB) – (AQA + 70) \times \frac{24\ SQA+30\ SQB}{SQA+SQB}$$

$$(SQA + SQA) – (AQA + 70) \times \frac{24\ SQA+30\ SQA}{SQA+SQA} = 270\ (A)$$

(SQA + SQA) – (AQA + 70) x 27 = 270 (A)

(2 x 1.25 AQA) – (AQA + 70) x 27 = 270 (A)
(2.50 AQA) – (AQA + 70) = 10 (A)
AQA = 60
AQA = 40

<u>MATERIAL SUB USAGE VARIANCE</u> (100 – 110) x 27 (270 (A))

Case Study – 24

Worldwide LTD. is engaged in marketing of wide range of consumer goods. M, N, O and P are the zonal sales officers for your zones. The company fixes annual sales target for them individually.

You are furnished with the following:

(1) The Standard Costs of sales target in respect of M, N, O and P are ₹ 3,75,000, ₹ 4,00,000 and ₹ 4,25,000 respectively.

(2) M, N, O and P respectively earned ₹ 29,900, ₹ 23,500, ₹ 24,500 and ₹ 25,800 as commission at 5% on actual sales affected by them during the previous year.

(3) The relevant variance as computed by a qualified cost accountant are as follows:

Particular	M (₹)	N (₹)	O (₹)	P (₹)
Sales Price Variance	4,000 (F)	6,000 (A)	5,000 (A)	2,000 (A)
Sales Volume Variance	6,000 (A)	26,000 (F)	15,000 (F)	8,000 (F)
Sales Margin Mix Variance	14,000 (A)	8,000 (F)	17,000 (F)	3000 (A)

Note: (A) Adverse Variance and (F) = Favourable variance

Required:

i. Compute the amount of sales target fixed and the actual amount of margin earned in case of each of the zonal sales officer.

ii. Evaluate the overall performance of these zonal sales officers taking three relevant base factors and then recommend whose performance is the best.

Statement showing sales Target fixed (Budgeted sales)

(Budgeted sales – Actual Sales) = Variance

M (6,00,000 - 5,98,000) = 2,000 (A)

N (4,50,000 - 4,70,000) = 20,000 (F)

O (4,80,000 - 4,90,000) = 10,000 (F)

P (5,10,000 - 5,16,000) = 6,000 (A)

Sales Volume Variance	Sales Price Variance
M 6,000 (A)	M 4,000 (F)
N 26,000 (F)	N 6,000 (A)
O 15,000 (F)	O 5,000 (A)
P 8,000 (F)	P 2,000 (A)

Actual Sales = $\left(\frac{\text{Comission}}{5\ \%} \right)$

M = $\left(\frac{29,900}{5\ \%} \right)$ = 5,98,000

N = $\left(\frac{23,500}{5\ \%} \right)$ = 4,70,000

O = $\left(\frac{24,500}{5\ \%} \right)$ = 4,90,000

P = $\left(\frac{25,600}{5\ \%} \right)$ = 5,16,000

Statement Showing Actual Contribution
(Budget Contribution - Actual Contribution) = Variance

M 1,00,000 - 1,03,000 = 3,000 (F)
N 75,000 - 73,333 = 1,667 (A)
O 80,000 - 77,500 = 2,500 (A
P 85,000 - 84,333 = 667 (A)

Margin/Contribution Volume Variance		Count Rate Variance	
1,000 (A)		M	4,000 (F)
4,333 (F)		N	6,000 (A)
2,500 (F)		O	5,000 (A)
1,333 (F)		P	2,000 (A)
7,166 (F)			9,000 (A)

Contribution /Margin Sub Volume		Count Mix Variance	
13,000 (F)		A	14,000 (A)
3,667 (A)		B	8,000 (F)
14,500 (A)		C	17,000 (F)
4,333 (F)		D	3,000 (A)
834 (A)			8,000 (F)

Note (a)	**Budget Sales**		**Budget Cost**		**Budget Contribution**
M	6,00,000	-	5,00,000	=	1,00,000
N	4,50,000	-	3,75,000	=	75,000
O	4,80,000	-	4,00,000	=	80,000
P	5,10,000	-	4,25,000	=	85,000

Note (b)	**Actual Sales**		**Budget Cost**		**Actual Contribution**
M	5,98,000	-	4,95,000	=	1,03,000
N	4,70,000	-	3,96,667	=	73,333
O	4,90,000	-	4,12,500	=	77,500
P	5,16,000	-	4,31,667	=	84,333

Note (c) Budgeted Cost for actual Sales

	SP	Cost	Profit
	100	80	20
2 x 120	= 240	160 (80 x 2)	80

Price Variance (F)
40
Cost x

Normal Sales
(200 x 80/100)
Cost = 160

M Sales = 5,98,000

Price Variance
4,000 (F)

Standard Sales value
5,94,000
(5,00,000 /6,00,000 x 594000)
= 4,95,000

N Sales = 4,70,000

Price Variance
6,000 (A)

Standard Value
4,76,000
3,75,000 /4,50,000 x 4,76,000
= 3,96,666

O Sales = 4,90,000

Price Variance
5,000 (A)

Standard Sales Value
4,95,000

4,00,000/4,80,000 x 4,95,000
= 4,12,500

P Sales = 5,76,000

Price Variance
2,000 (A)

Standard Sales Value
5,18,000
4,25,000/ 510,000 x 5,18,000 = 4,31,666

Factors Contributing to Change in Profit

Case Study - 25

The working result of a Jems Ltd. for two corresponding years are shown below:

Particulars	Amount (₹ in lakhs)	
	Year 2012	Year 2013
Sales	600	770
Cost of Sales:		
Direct Material	300	324
Direct wages and variable overheads	180	206
Fixed overheads	80	150
Profit	40	90

In year 2013, there has been an increase in the selling price by 10 per cent. Following are the details of material consumption and utilization off direct labour hours during the two years:

Particulars	Year 2012	Year 2013
Direct material consumption (M. tons)	5,00,000	5,40,000
Direct labour hours	75,00,000	80,00,000

Required:

(i) Taking year 2012 as base year, analyze the variance of year 2013 and also workout the amount which each variance has contributed to change in profit.

(ii) Find out the breakeven sales for both years.

(iii) Calculate the percentage increase in selling price in the year 2013 that would be needed year the sale value of year 2013 to earn margin of safety of 45 per cent

Ans No (i)

Statement Showing Analysis of Variance

	2012	2013	Total Inc/Dec	Due to Price	Due to Volume	Due to Others
Sales	600	770	170	70	100	-
D Mat	(300)	(324)	(24)	13.5	12.5	(50)
D Wag	(120)	(137)	(17)	(7)	10	(20)
V. O.	(60)	(69)	(9)	(4)	5	(10)
F. O.	(80)	(150)	(70)	-	-	(70)
Pt	40	90	50	72.50	127.50	(150)

Due to Inc In Sales

Due to Price (770 - 700) = 70

(770 x100/110) = 700

Due to Volume (700 - 600) = 100

170

Material Variance Actual Sales = 700

Standard				
Kg		**Rate**		**Amt**
1.40 (1.20/600 x 700)	x	250	=	350 (300/600 x700)

Actual				
Kg		**Rate**		**Amt**
1.35	x	240	=	324

Material Cost Variance
(350 - 324) = 26 (F)

Material Usage Variance

(1.40 - 1.35) x 250

= 12.5 (F)

Material Rate Variance

(250 - 240) x 1.35

= 13.5 (F)

Labour Variance

Standard				
Hrs		**Rate**		**Amt**
28 (24/600 x 700)	x	5	=	140 (120/600 x 700)

Actual				
Hrs		**Rate**		**Amt**
26	x	5.26	=	137

Labour Cost Variance
(140 - 137) = 3 (F)

Labour EFF Variance
(28 - 26) x 5
= 10 (F)

Labour Rate Variance
(5 - 5.26) x 26
= 7 (A)

Variable Overheads

Standard		
Hrs	**Rate**	**Amt**
28	2.50	70 (60/600 x 700)

Actual		
Hrs	**Rate**	**Amt**
26	2.65	69

Labour Cost Variance
(70 - 69) = 1 (F)

Labour Efficiency Variance
(28 - 26) x 2.50
= 5 (F)

Labour Rate Variance
(2.50 - 2.65) x 26
= 4 (A)

Ans No (ii)

	2012	2013
Sales V. Cost	600 (480) (300 + 180)	770 (530) (324 + 206)
Contribution P. V. Ratio	120 (120/600 x 100) 20%	240 (240/770 x 100) 31.16%

Ans No (iii)

Sales (80 / 20 x 100) = 400

Variable Cost (20 %) — Contribution 80

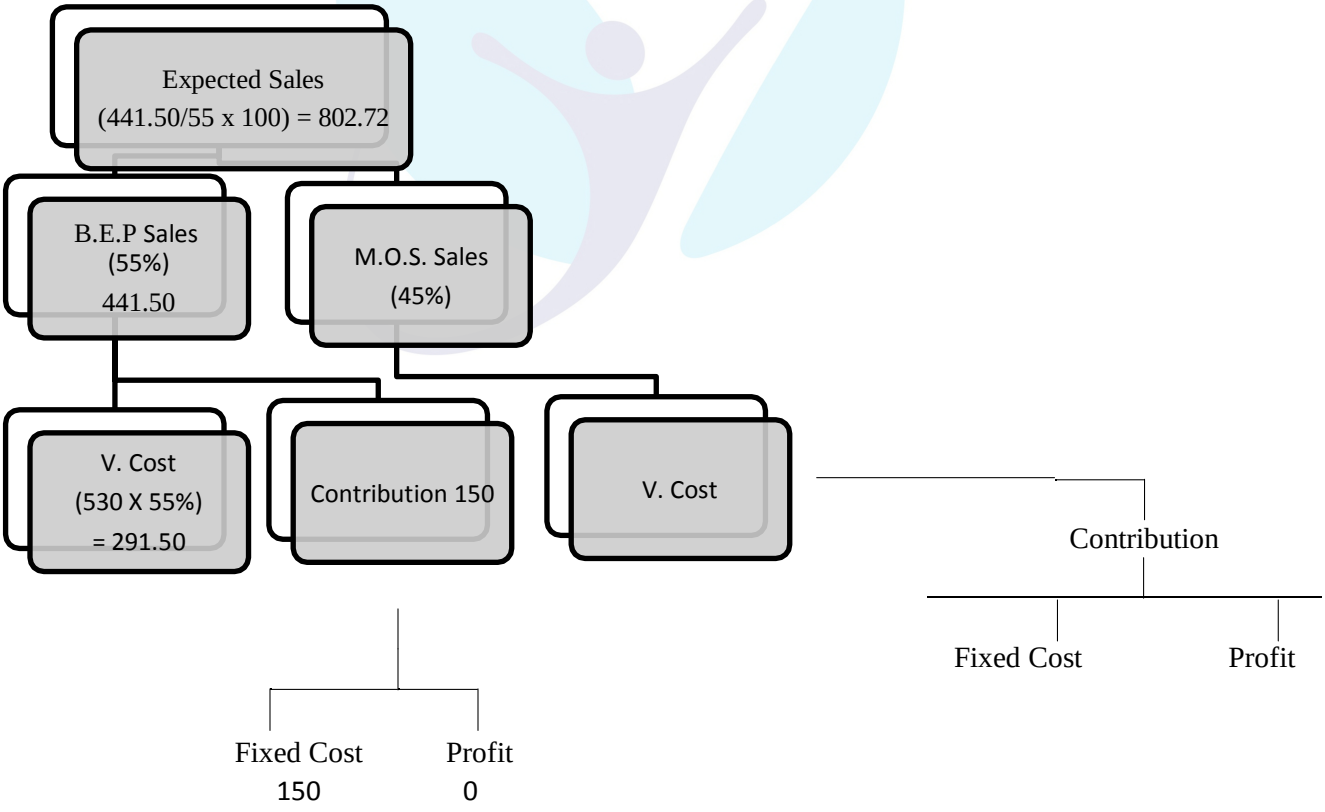
Fixed Cost 80 — Profit 0

Sales (150 / 31.16 x 10)

Variable Cost (31.16) — Contribution 150

Fixed Cost 150 — Profit 0

Expected Sales 802.72
Present Sales (770)
Inc-in-Sales ~~32.72~~
(%) (32.72/770) x 100 = 4.25%



Case Study – 26

RST Ltd. has provided the following summarized results for two years:

	Year ended (₹ in lakhs)	
	31-03-2013	**31-3-2014**
Sales	3,000	3,277.50
Material	2,000	2,357.50
Variable Overheads	500	525.00
Fixed Overheads	300	367.50
Profit	200	27.50

During the year ended 31-3-2014 sale price has increased by 15% whereas material and overhead prices have increased by 15% and 5% respectively.

Required:

(i) Analyze the variance of revenue of each element of cost over the year in order to bring out the reasons for change in the profit.

(ii) Present a profit reconciliation statement starting from profits in 2012-13 showing the factors responsible for the change in profits in 2013-14.

Statement Showing Analysis of Variance **₹ - lakhs**

	31-3-13	**31-3-13**	**Total Inc/Dec**	**Due to Price**	**Due to Volume**	**Due to Other**
Sales	3,000	3,277.50	277.50	427.50	(150)	-
D Mat	(2,000)	(2,357.50)	(357.50)	(307.50)	100	(150)
V. O.	(500)	(525)	(25)	(25)	25	(25)
F. O.	(300)	(367.50)	(67.50)	(17.50)	-	(50)
Profit	200	27.50	(172.50)	77.5	(25)	(225)
Note No -	1					

Due to Sales

Due to Price (3,277.50 – 2,850) = 427.50

100 15 115

(3277.50/115 x 100) 3,277.50

= 2,850

Due to Volume (2,850 – 3,000) = (150.00)

277.50

Note No - 2

Materials

Due to Price (2,050 – 2,357.50) = (307.50)

100 15 115

2,357.50

(2,357.50/115 x 100) = 2,050 (2,000/3,000 x 150) 100

Due to Volume (150)

Due to Others (357.50)

Note No - 3

Due to Price (500 - 525) = (25)

100 5 105

525

(525 x 100 / 105)

= 50

Due to Volume

(500/3000 x 150) 25

Due to Others (25)

(25)

Due to Fixed Overheads

F.O

Due to Price (350 - 367.50) = (17.50)

100 5 105

367.50

(367.50 x 100 / 105) Due to Volume -

= 350 Due to others (50)

67.5

Case Study – 27

The summarized results of a company for the two years ended 31st December 2013 and 2012 are given below:

Particulars	2013 ₹' lakhs	2012 ₹' lakhs
Sales	770	600
Direct Material	324	300
Direct Wages	137	120
Variable Overheads	69	60
Fixed Overheads	150	80
Profit	90	40

As a result of re-organization of production methods and extensive advertisement campaign used, the company was able to secure an increase in the selling price by 10% during the year 2013 as compared to previous year.

In the year 2012, the company consumed 1,20,000 Kgs. of raw materials and used 24,00,000 hours of direct labour. In the year 2013, the corresponding figures were 1,35,000 Kgs. of raw material and 26,00,000 hours of direct labour.

You are required use the information given for the year 2012 as the base year information to analyze the results of the year 2013 and to show in a form suitable to the management the amount each factor has contributed by way of price, usage and volume to the change in profit in 2013.

Statement Showing Analysis of Variance

	2012	2013	Total Inc/Dec	Due to Price	Due to Volume	Due to Other
Sales	600	770	170	70	100	-
D Mat	(300)	(324)	(24)	13.5	12.5	(50)
D Wag	(120)	(137)	(17)	(7)	10	(20)
V. O.	(60)	(69)	(9)	(4)	5	(10)
F. O.	(80)	(150)	(70)	-	-	(70)
Pt	40	90	50	72.50	127.50	(150)

Due to IncIn Sales

Due to Price (770 - 700) = 70

(770x100 /110) = 700

Due to Volume (700 - 600) = 100

170

Material Variance

Actual Sales = 700

Standard				
Kg		**Rate**		**Amt**
1.40 (1.20/600 x 700)	x	250	=	350 (300/600 x700)

Actual				
Kg		**Rate**		**Amt**
1.35	x	240	=	324

Material Cost Variance

(350 - 324) = 26 (F)

Material Usage Variance

(1.40 - 1.35) X 250

= 12.5 (F)

Material Rate Variance

(250 - 240) X 1.35

= 13.5 (F)

Labour Variance

Standard				
Hrs		**Rate**		**Amt**
28 (24/600 x 700)	x	5	=	140 (120/600 x700)

Actual				
Hrs		**Rate**		**Amt**
26	x	5.26	=	137

Labour Cost Variance

(140 - 137) = 3 (F)

Labour EFF Variance

(28 - 26) x 5

= 10 (F)

Labour Rate Variance

(5 - 5.26) x 26

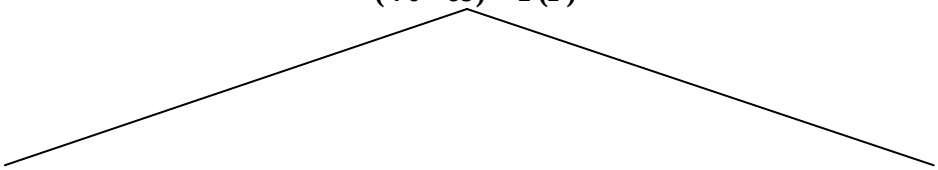
= 7 (A)

Variable Overheads

Standard				
Hrs		**Rate**		**Amt**
28	x	2.50	=	70 (60/600 x 700)

Actual				
Hrs		**Rate**		**Amt**
26	x	2.65	=	69

Labour Cost Variance
(70 - 69) = 1 (F)



Labour EFF Variance	Labour Rate Variance
(28 - 26) x 2.50	(2.50 - 2.65) x 26
= 5 (F)	= 4 (A)

Computation of Variance and Reconciliation of Budgeted Standard Profit with Actual Profit

Case Study - 28

ZCL Ltd produces one standard product X and operates standard costing and budgetary control system. During the month of February the following information were available:

(i) Direct Materials:

100 tonnes of material A at □155 per tonne were issued for production. The standard price of A is ₹ 150 Per tonne and standard production from each tonne of material A consumed is 50 units.

(ii) Direct Labour:

Skilled and semi-skilled workers are employed in the factory. The budgeted labour-mix is as follows:

Skilled.....6,000 hours at ₹1.50 per hour ..... ₹ 9,000
Semi-skilled.....10,000 hours at ₹1.00 per hour..... ₹10,000

At the end of February an analysis of wages showed the following:

Skilled.....6,600 hours at ₹ 1.60 per hour..... ₹ 10,560
Semi-skilled.....11,000 hours at ₹0.80 per hour..... ₹ 8,800

Failure of power, machine breakdown, etc. resulted in 120 idle hours in respect of skilled workers.

(iii)Variable Overhead:

The standard variable overhead rate per unit has been set at ₹ 2. Actual variable overhead for the month Was ₹ 11,500.

(iv) Fixed Overhead

Budgeted Overhead.....₹ 2,18,750 p.a.
Budgeted Production for the year..... 62,500 units
Budgeted number of weeks in the year.....50 weeks
Actual Production (February)..... 6,000 units
Actual Overhead (February) ..... ₹ 22,000

(v) Sales:

Product	Budget			Actual		
	Quantity	Price (₹)	Value (₹)	Quantity	Price (₹)	Value (₹)
X	5,000	20	1,00,000	4,600	21	96,600

Required:

Calculate the necessary variance & prepare a summary there of with reconciliation statement.

Step No (1)

Statement Showing Cost Sheet

	Budget units = 5,000	
	Total	**P. U**
Material	15,000	3.00
(5000/50 x1 x 150)		
SK Labour	9,000	1.80
(6,000 x 1.5)		
Semi-SK	10,000	2.00
(10000 x 1)		
V.O.	10,000	2.00
F. O.	**17,500**	**3.50**
Budget Cost	61,500	12.30
Budget Profit	**38,500**	**7.70**
Budget Sales	1,00,000	20.00

Step No (2)Profit and Loss A/c

Particulars	**₹**	**Particulars**	**₹**
To Mat A/c	15,500	By Sales	96,600
(100 x 155)		(4,600 x 21)	
To Labour			
SK	10,560	By Closing Stock	17,220
SEMI	8,800	(6,000 – 4,600) x 12.30	
To V.O.	11,500		
To F.O.	22,000		

Step No (3)

Statement Showing Reconciliation

	₹
Profit as Per Cost Sheet	38,500
Due to Material Usage Variance	3,000
Due to Material Rate Variance	(500)
Due to Labour Idle Time	(180)
Due to Labour Rate Variance	1,540
Due to Labour Sub EFF Variance	2,042.50
Due to Labour Mix Variance	37.50
Due to V. O. EFF Variance	-
Due to V. O. Exp Variance	500
Due to F.O. Exp Variance	(4,500)
Due to F.O. Capacity Variance	1,618.75
Due to F. O. EFF Variance	1,881.25
Due to Sales Margin Volume	(3,080)
Due to Sales Margin Price	4,600
Total	45,460

Step No (4)
Analysis of Variance

Material Variance
Actual Production = 6,000 units

Tonnes		Rate		Amt
120	x	150	=	18,000

Tonnes		Rate		Amt
100	x	155	=	15,500

$\left(\frac{6,000}{50}\right)$ x

Labour Variance

Hrs		Rate		Amt
7,200	x	1.5	=	10,800
SK $\left(\frac{6,000}{5,000}\right)$ x 6,000				
12,000				
SEMI $\left(\frac{10,000}{5,000}\right)$ x 6,000	x	1.00	=	12,000
19,200				**22,800**

Hrs		Rate		Amt
6,600	x	1.60	=	10,500
11,000	x	.80	=	8,800
17,600				**19,360**

V. O. Variance

Units		Rate		Amt
6,000	x	2	=	12,000

Units		Rate		Amt
6,000	x	1.91	=	11,500

Fixed O.H.

Units		Rate		Amt
5,000	x	3.5	=	17,500

Units	Exp
6,000	22,000

Hrs.		R.R		Exp
16,000	x	1.093	=	17,500

Hrs.	Exp
17,480	22,000

Sales Margin Variance

Units		Rate		Amt
5,000	x	7.70	=	38,500

Units		Rate		Amt
4,600	x	8.70	=	4,002

Actual S.P (P.U) = 21.00

Budgeted Cost (P. U) = (12.30)

8.70

Material Cost Variance
(18,000 – 15,500) = 2,500 (F)

Material Usage Variance	Material Rate Variance
(120 - 100) x 150	(150 - 155) x 100
= 3,000 (F)	= 500 (A)

Labour Cost Variance
(22,800 – 19,360) = 3,440 (F)

Labour Efficiency Variance	Labour Idle Time Variance	Labour Rate Variance
SK (7,200 – 6,480) x 1.5	120 x 1.50	(1.5 - 1.60) x 6,600
= 1,080 (F)	= 180 (A)	= 660 (A)
SEMI (12,000 – 11,000) x 1		(1 - .80) x 11,000
= 1,000 (F)		= 2,200 (F)
2,080 (F)		1,540 (F)

Labour Sub efficiency variance	Labour Mix variance
(19,200-17,480) x 22,800/19,200	SK (7,200/19,200 x 17,480)
= 2,042.50 (F)	= (6,555 - 6,480) x 1.5= 112.5 (A)
Labour Yield Variance	SEMISK (12,000/19,200 x 17,480)
Hrs **Output**	(10,925 – 11,000) x 1.00= 75 (A)/37.5 (F)
19,200 6,000	
17,480 5462.49	
(5,462.50 - 6,000) x 22,800/19,200 =2,042.50(F)	

V. O. Cost Variance
(12,000 – 11,500) = 500 (F)

V. O. Efficiency Variance

(6,000 – 6,000) x 2

= 0

V. O. Expense/Rate Variance

(2 – 1.91) x 6,000

= 500 (F)

Account

To Bank	22,000	By Recovery (6,000 x 3.5) By U/R	21,000 1,000

F. O. Cost Variance

(21,000 – 22,000) = 1,000 (A)

F. O. Capacity Variance

(17,500 – 22,000)

= 4,500 (A)

F.O. Volume Variance

(5,000 – 6,000) x 3.5

= 3,500 (F)

F. O. Capacity Variance

(16,000 – 17,480) x 1.09375

= 1,618.75 (F)

F. O. Efficiency Variance

Units	**Hrs**
5,000	16,000
6,000	19,200

(19,200 – 17,480) x 1.09375

= 1,881.25 (F)

Sales Margin Variance
(38,500 – 40,020) = 1,520 (F)

Sales Margin Volume	Sales Margin Rate Variance
(5,000 – 4,600) x 7.70	(7.70 - 8.70) x 4,600
= 3,080 (A)	= 4,600 (F)

Case Study - 29

Safron products Ltd. produces and sells a single product. Standard cost card per unit of the product is as follow:

	₹
Direct Material, A 10 Kg @ ₹ 5 per kg	50.00
B 5 kg @ ₹ 6 per kg	30.00
Direct Wages, 5 hours @ ₹ 5 per hour	25.00
Variable Production Overheads, 5 hours @ 12 per hour	60.00
Fixed Production Overheads	25.00
Total Standard Cost	190.00
Standard Gross Profit	35.00
Standard Selling Price	225.00

A fixed production overheads has been absorbed on the expected annual output of 25,200 units produced evenly throughout the year. During the month of December, 2013, the following were the actual production of 2,000 units:

	₹
Sales, 2,000 units @ ₹ 225	4,50,000
Direct Materials, A 18,900 Kg	99,225
B 10,750 Kg	61,275
Direct Wages, 10,500 hours (actually worked 10,300 hours)	50,400
Variable Production Overheads	1,15,000
Fixed Production Overheads	56,600
Gross Profit	67,500

The material price variance is extracted at the time of receipt of materials. Material purchases were a 20,000 kg. @ ₹ 5.25 per kg; B 11,500 kg @ ₹ 5.70 per kg.

Required:

i. Calculate all Variance.
ii. Prepare a reconciliation statement showing Standard Gross Profit, Variance and Actual Gross Profit.
iii. Explain the reason for the difference in Actual Gross Profit given in the Problem and calculated in (ii) above.

Step 1: Statement Showing Cost Sheet for Dec 2009

	Budgeted Production = 25,200 /12 = 2,100 Units	
	Total	**Per Unit**
DM:		
A	1,05,000	50
B	63,000	30
DW:	52,500	25
VOH	1,26,000	60
FOH	52,500	25
Std Cost	3,99,000	190
Budget Profit	**73,500**	35
Budget S.P	4,72, 500	225

Step 2: Profit & Loss Account: Given

Profit = 67,500

Step 3: Statement Showing Reconciliation

Profit as per Cost Sheet	73,500
Due to: Material Rate Variance: A	(5,000)
B	3,450
Material Usage Variance: A	5,500
B	(4,500)
Labour Rate Variance	2,100
Labour Idle Time Variance	(1,000)
Labour Efficiency Variance	(1,500)
Due to : VOH Efficiency Variance	(3,600)
VOH Rate Variance	8,600
FOH Expenses Variance	(4,100)
FOH Volume Variance	(2,500)
Sales Margin	(3,500)
Profit as Per P&L	**67,450**

Revised Reconciliation

Profit as per Reconciliation (Step 3)	67,450
Add: Due to Material Price Variance	
A : (20000 - 18900) X 0.25 (5 - 5.25)	275
B : (11500 - 10750) X 0.30 (6 - 5.7)	(225)
Profit as per P&L	67,500

Step 4: Analysis of Variance

Material Variance: Actual Production = 2,000 Units

Standard						**Actual**				
Input	**Qty**		**Rate**		**Amt**	**Qty**		**Rate**		**Amt**
A	20,000 (10Kg x 2,000)	x	5	=	1,00,000	18x900	x	5.25	=	99,225
B	10,000 (5Kg x 2,000)	x	6	=	60,000	10x750	x	5.7	=	61,275
	30,000				1,60,000	29,650				1,60,500

Labour Variance

Standard				
Hrs.		**Rate**		**Amt**
10,000	x	5	=	50,000
(5 x 2,000)				

Actual				
Hrs.		**Rate**		**Amt**
10,500	x	408	=	50,400

Actual Idle Time 200 | Hrs. Actually Worked 10,300

Variable OH Variance

Hrs		Rate		Amt
10,000	x	12	=	1,20,000

(5 x 2,000)

Hrs		Rate		Amt
10,300	x	11.17	=	1,15,000

FOH

Units		Rate		Amt
2,100	x	25	=	52,500

Units	Exp
2,000	56,600

Sales Margin

Units		Rate		Amt
2,100	x	35	=	73,500

Units		Rate		Amt
2,000	x	35 (225 – 190)	=	70,000

Normally All Questions we solved were partial plan,

This Question is single plan. In S.P. we X by Qty purchased (not consumed) where as in Partial plan we take Qty consumed.

Material Rate Variance = Quantity Purchased

A: (5 - 5.25) x 20,000 = 5,000 (A)

B: (6 - 5.7) x 11,500 = 3,450 (F)

Purchase Price

Material Usage Variance = Units Purchased

A: (20,000 - 18,900) x 5 = 5,500 (F)

B: (10,000 - 10,750) x 6 = 4,500 (A)

Labour Rate Variance

(5 - 4.8) x 10,500 = 2,100 (F)

Labour Idle Time Variance

200 x 5 = 1,000 (A)

Labour Efficiency Variance

(10,000 - 10,300) x 5 = 1,500 (A)

VOH Rate Variance:

(12 - 11.17) x 10,300 = 8,600 (F)

VOH Efficiency Variance

(10,000 - 10,300) x 12 = 3,600 (A)

FOH Expenses Variance

52,500 - 56,600 = 4100 (A)

FOH Volume Variance

(2,100 – 2,000) x 25 = 2,500 (A)

Sales Margin Volume

(2,100 – 2,000) x 35 = 35 (A)

In this plan only material usage variance will change because we consider Qty purchased. Remaining things are the same.

Case Study - 30

You are appointed Accountant of Exe Ltd. Given below is the Company's Operating Report for March, 2013.

Particulars	Standard and Variances (₹)	Actual (₹)
Sales Budgeted	18,000	
Variance due to		
Volume of Orders	1,000	
Selling Price	400	19,400
Profit - Budgeted		3,800
Sales Variances -		
Volume	240	
Price	400	640
Labour Variances -		
Rate	(250)	
Efficiency	(100)	(350)
Material Variances -		
Price	150	
Usage	(60)	90
Overhead Variances-		
Expenditure - Fixed	100	
Variable	(250)	
Efficiency	200	
Capacity	100	150
	Operating Profit	**4,330**

Your assistant provides the following information about sales and costs for April, 2013:

Sales	Budgeted Units	Sales Value (₹)	Actual Units	Sales Value (₹)
Product A	250	10,000	280	10,800
Product B	200	6,000	190	5,500
Product C	150	3,000	180	3,500

Product	Standard Selling Price per unit	Standard Product Cost per unit
A	40	31
B	30	25
C	20	15

Labour:	
Standard Labour Cost (per hour)	₹ 0.90
Budgeted Hours	4,000
Standard Hours (produced)	4,500
Actual Clocked hours	4,400
Actual Labour Cost	₹ 4,260

Materials:	
Standard Cost of Material (actually used)	₹ 5,230
Standard Cost of Material (allowed)	₹ 5,330
Actual Cost of Material (used)	₹ 5,430

Overheads:	
Budget Rate of Overhead Recovery (per labour hour)	
Fixed	₹ 0.50
Variable	₹ 1.00
Actual Overhead Costs	
Fixed	₹ 2,000
Variable	₹ 4,300

Required:

Prepare the Operating Statement for April,2013 in the same form as for March,2013.

	₹
Profit As Per Cost	4,000
(Sales- Margin Variance)	
Due to Material Usage Variance	100
Due to Material Rate Variance	(200)
Lab FFF Variance	90
lab Rate Variance	(300)
V.U FFF Variance	100
V.U Exp Variance	100
F.O Exp Variance	–
F.O Capacity Variance	200
F.O EFF Variance	50
Sales Margin Volume Variance	370
Sales Margin Rate Variance	(700)
	3,810

NOG NO.(1)

BUDGET SALES:-

Products	Units	x S.P P.U	Total
A	250	x 40	= 10,000
B	200	x 30	= 6,000
C	150	x 20	= 3,000
			= 19,000

ACTUAL:-

Products	Units		
A	280	x 38.57	= 10,800
B	190	x 28.94	= 5,500
C	180	x19.44	= 3,500
	650	x 30.46	= 19,800

SALES VARIANCE

(19,000 - 19,800) = 800 (F)

Sales Volume Variable

A (250 - 280) x 40 = 1,200 (F)
B (200 -190) x 30 = 300 (A)
C (150 -180) x 20 = 600 (F)
1,500 (F)

Sales Price Variable

A (40 - 38.57) x 280 = 400 (A)
B (30 - 28.94) x 190 = 200 (A)
C (20 - 19.44) x 180 = 100 (A)
700 (A)

SALES – MARGIN VARIANCE

STANDARD				ACTUAL		
PRODUCT	**QUANTITY**	**RATE**	**AMOUNT**	**QUANTITY**	**RATE**	**AMOUNT**
A	250 (40 -31)	x 9	= 2,250	280	x 7.57 (38.57 - 31)	= 2,120
B	200 (30 - 25)	x 5	= 1,000	190	x 3.94 (29.94 - 25)	= 750
C	150 (20-15)	x 5	= 750	180	x 4.44 (19.44 - 15)	= 800
	600		**4,000**	**650**		**3,670**

SALES MARGIN VARIANCE (4,000 - 3,670) = 330 (A)

SALES MARGIN VARIABLE

A (250 - 280) x 9 = 270 (F)
B (200 - 190) x 5 = 50 (F)
C (150 - 180) x 5 = 150 (F)
370 (F)

(9 - 7.57) x 280 = 400 (A)
(5 - 3.94) x 190 = 200 (A)
(5 - 4.44) x 180 = 100 (A)
700 (A)

MATERIAL COST VARIANCE
(5,330 - 5,430) = 100 (A)

Material Usage Variable	Material Rate Variable
(5,330 - 5,230)	(5,230 - 5,430)
= 100 (F)	= 200 (A)

Labour Cost Variance

STANDARD			ACTUAL		
Hrs	**Rate**	**Amt**	**Hrs**	**Rate**	**Amt**
4,500	x .90	4,050	4,400	0.968	4,260

LABOUR COST VARIANCE (4,050 - 4,260) = 210 (A)

Labour EFF Var	Labour Rate Variable
(4,500 - 4,400) x .90	(.90 - .968) x 4,400
= 90 (F)	= 300 (A)

V.O. Variance

STANDARD			ACTUAL		
Hrs	**Rate**	**Amt**	**Hrs**	**Rate**	**Amt**
4,500	1.00	= 4,500	4,400	0.97	= 4,300

V.O COST VARIANCE (4,500 - 4,300) = 200 (F)

V.O EFF Var	V.O Exp/ Rate Variable
(4,500 - 4,400) x 1	(1 - .97) x 4,400
= 100 (F)	= 100 (F)

F.O

BUDGET			ACTUAL	
Hrs	**R.R**	**Exp**	**Hrs**	**Exp**
4,000	x .5	= 2,000	4,400	2,000

F.O COST VARIANCE (2,200 - 2,000) = 200 (F)
(4,400 x .50)

F.O Exp Var
(2,000 - 2,000) = 0

F.O Volume Variable
(4,000 - 4,400) x .5=200 (F)

F.O Cap Var
(4,000 - 4,400) x.5
= 200 (F)

F.O. Ff Var
(2,250 - (4,400 x .5))
4,500 x .5 = (2,200 -) = 50 (F)

Case Study – 31

Standard Cost Card of a product is under:

	₹
Direct Material	
A 2 Kg. @ ₹ 3 per Kg.	6.00
B 1 Kg. @ ₹4 per Kg.	4.00
Direct Wages 5 hours @ ₹ 4 per hour	20.00
Variable Overheads 5 hours @ ₹1 per hour	5.00
Fixed Overheads 5 hours @ ₹ 2 per hour	10.00
Standard Cost	45.00
Standard Profit	5.00
Standard Selling Price	50.00

Budgeted Output is 8,000 units per month.

In October 2013, the company produced and sold 6,000 units. The actual sales value was ₹ 3,05,000. Direct materials consumed were: Material A: 14,850kg. valued at ₹ 43,065 and Material B 7,260 kg. valued at ₹ 29,750. The total direct labour hours worked was 32,000 and the wages paid therefore amounted to ₹ 1,27,500. The direct labour hours actually booked on production was 31,800. Overheads recorded were: Fixed ₹ 80,600 and variable ₹ 30,000. Closing work-in-progress was 600 units in respect of which materials A and B were fully issued and labour and overheads were 50% complete.

OPERATING STATEMENT

Budgeted Profit

- Sales variance
- Price
- Volume

Direct Material Variance

- Price (Material A)
- Price (Material B)
- Yield
- Mix
- Direct Wages Variance
- Rate

- Efficiency
- Idle Time
- Variable Overheads Variance
- Expenditure
- Efficiency
- Fixed Overheads Variance
- Expenditure
- Efficiency
- Capacity

Annual Profit

Required:

Analyze the variance and present an operating statement showing the reconciliation between budgeted and actual profits for the month in the above format

Statement Showing Reconciliation

	₹
Profit as Per Cost Sheet	40,000
Due to Material Usage Variance	(7,700)
Due to Material Rate Variance	110
Due to Labour Idle Time	775
Due to Labour Rate Variance	(1,200)
Due to Labour Sub EFF Variance	(800)
Due to Labour Mix Variance	500
Due to V. O. EFF Variance	(300)
Due to V. O. Exp Variance	1,800
Due to F.O. Exp Variance	(600)
Due to F.O. Capacity Variance	(16,400)
Due to F. O. EFF Variance	(600)
Due to Sales Margin Volume	(10,000)
Due to Sales Margin Price	5,000
Total	**10,585**

Valuation of W.I.P

Material A (6 x 100% x 600) = 3,600

B (4 x 100% x 600) = 2,400

Direct Wages (20 x 50% x 600) = 6,000

V.O. (5 x 50% x 600) = 1,500

F. O. (10 x 50% x 600) = 3,000

16,500

Material Cost Variance
(66,000 – 72,815) = 6,815 (A)

Material Usage Variance	**Material Rate Variance**
A (13,200 – 14,850) x 3 = 4,950(A)	(3 - 2.90) x 14,850 = 1,485 (F)
B (6,600 – 7,260) x 4 = 2,640(A)	(4 - 4.09) x 7,260 = 710 (A)
7,590(A)	775 (F)

Material Sub Usage Variance	**Material Mix Variance**
(19,800 – 22,110) x 66,000/19,800 = 7,700 (A)	(A) (13,200/19,800 x 22110) = (14,740 – 14,850) x 3 = 330 (A)
	(B) (6,600/19,800 x 22,110) = (7,370 – 7,260) x 4 = 440 (F)

Material Yield Variance

Input	**Output**
19,800	6,600
22,110	7,370

(7,370 – 6,600) x 66,000/19,800
= 7,700 (A)

Labour Cost Variance (1,26,000 – 1,27,500) = 1,500 (A)

Labour EFF Variance
(31,500 – 31,800) x 4
= 1,200 (A)

Labour Idle Time Variance
200 x 4
= 800 (A)

Labour Rate Variance
(4 - 3.98) x 32,000
= 500 (F)

Variance O Cost Variance (31,500 – 30,000) = 1,500 (F)

V. O EFF Variance
(31,500 – 31,800) x 1
= 300 (A)

V. O Exp/ Rate Variance
(1 - .95) x 31,800
= 1,800 (F)

Fixed O.H. Cost Variance (63,000 – 80,600) = 17,600 (A)

F. O. Exp Variance
(8,000 – 6,300) x 10
= 17,000 (A)

F. O. Volume Variance
(80,000 – 8,060)
= 600 (A)

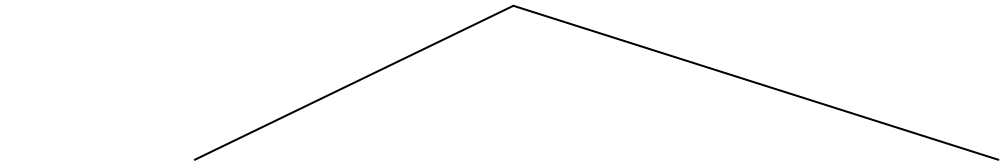
F. O Capacity Variance
(40,000 – 31,800) x 2
= 16,400 (A)

F.O. Efficiency Variance

Units	**Hrs**
8,000	40,000
6,300	31,500

(40,000 – 31,500) x 2 = 23,000 (A)

Sales Margin Variance
(40,000 - 35,000) = 5,000 (A)



Sales Margin Volume variance	Sales Margin Price Variance
(8,000 – 6,000) x 5	(5 -5.83) x 6,000
= 10,000 (A)	= 5,000 (F

Case Study – 32

Fo-Tan Ltd. operating on a standard costing system. For a given four week period budgeted for sales of 10,000 units at ₹ 50 per unit, actual sales were 9,000 units at ₹ 51.25 per unit. Costs relating to that period were as follows:

	Standard (₹)	Actual (₹)
Materials	2,50,000	2,57,400
Wages	75,000	70,875
Fixed Overhead	20,000	18,810
Variable Overhead	10,000	9,250
Semi-Variable Overhead	2,700	2,430
Hours	50,000	40,500

i. The Standard material content of each unit is estimated at 25 Kg. at ₹ 1 per Kg. actual figures was 26 Kg. at ₹ 1.10 per Kg.
ii. The standard wages per unit are 5 hours at ₹ 1.50 per unit; actual wages was 4.5 hours at ₹ 1.75.
iii. Semi-variable overhead consists of five-ninths fixed expenses and four-ninths variable.
iv. There was no opening stock and the whole production for the period was sold.
v. The four week period was a normal period.

Required:

a) Compute the variance in sales, materials, labour and overhead due to all possible causes, and
b) With the help of such a computation draw-
- a statement reconciling the actual profit for the period with the standard profit.
- a statement reconciling the actual profit for the period with the budgeted profit

Step No (1) Statement Showing Cost Sheet

	Budget Units = 10,000	
	Total	**Per Unit**
	₹	**₹**
Material	2,50,000	25.00
Wages	75,000	7.50
Fixed O.H.	20,000	2.00
V. O.	10,000	1.00
S.V.O.	2,700	.27
Budget Cost	3,57,700	35.77
Budget Profit	1,42,300	14.23
Budget Sales	5,00,000	50.00

Step No (2) Ans No. b Part (1) Profit and Loss A/c

Particulars	₹	Particulars	₹
To Mat A/c	2,57,400	By Sales	4,61,250
To Wages	70,875	(9,000 x 51.25)	
To F.O.	18,810		
To V.O.	9,250		
To S.V.O.	2,430		
To Net profit	1,02,485		
	4,61,250		**4,61,250**

Ans No. b Part (2)

	₹
Profit as Per Cost Sheet	1,42,300
Due to Material Usage Variance	(9,000)
Due to Material Rate Variance	(23,400)
Due to Labour efficiency Variance	6,750
Due to Labour Rate Variance	(10,125)
Due to V. O. Eff Variance	1,008
Due to V. O. Exp/Rate Variance	(1,258)
Due to F.O. Expenses Variance	1,340
Due to F.O. Volume Variance	(2,150)
Due to Sales Margin Volume variance	(14,230)
Due to Sales Margin Rate	11,250
Profit As Per P&L A/c	**1,02,485**

Analysis of Variance Material Variance – Actual Production = 9,000

Standard				
Kg		**Rate**		**Amt**
22,5000 (9,000 x 25)	x	1	=	2,25,000
			=	2,25,000

Actual				
Kg		**Rate**		**Amt**
2,34,000 (9,000x26)	x	1.10	=	2,57,400
			=	2,57,400

Labour Variance

Hrs		Rate		Amt
45,000 (9,000x5)	x	1.50	=	67,500

Hrs		Rate		Amt
40,500 (9,000x4.50)	x	1.75	=	70,875

V. O. Variance

Hrs		Rate		Amt
45,000 (9,000 x5)	x	.224	=	10,080

(Note No.1)

Hrs		Rate		Amt
40,500 (9,000x 4.50)	x	.255	=	10,330

(Note No.1)

Budget

Units		R.R		Amt
10,000	x	2.15	=	21,500 (20,000+1,500)

Actual

Units	Exp
9,000	20,160 (18,810+1,350)

Sales Margin Variance

Units		Rate		Amt
10,000	x	14.23	=	1,42,300

Budget

Units		Rate		Amt
9,000	x	15.48	=	1,39,320

Actual

Semi-Variable

= 2,700

4 5

V F

=1200 1500

(10,000 + 1,200) = .224

Semi-Variable

= 2,430

4 5

V F

1080 1350

(9,250 + 1,080) = 10,330

Analysis of Variance

Material Cost Variance

(2,25,000 – 2,57,400) = 32,400 (A)

Material Usage Variance	Material Rate Variance
(2,25,000 – 2,34,000) x 1	(1 - 1.10) x 2,34,000
= 9,000 (A)	= 23,400 (A)

Labour Cost Variance

(67,500 – 70,875) = 3,375 (A)

Labour EFF Variance	Labour Rate Variance
(45,000 – 40,500) x1.50	(1.50 - 1.75) x 40,500
= 6,750 (F)	= 10,125 (A)

V. O. Cost Variance

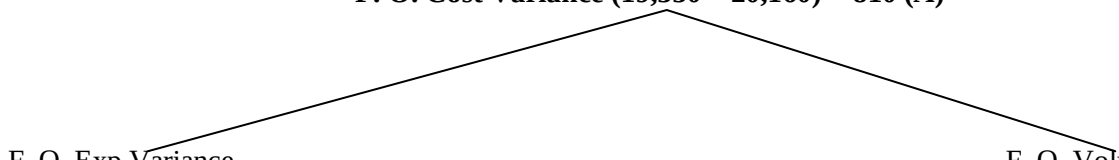
(10,080 – 10,330) = 250 (A)

V. O. EFF Variance	V. O. Exp/ Rate Variance
(45,000 – 40,500) x .244	(.244 - .255) x 40,500
= 1,008 (F)	= 1,258 (A)

F.O A/C.

To Bank	**2,0160**	By Recovery (9,000 x 2.15)	19,350 810
	20,160	By U/R	20,160

F. O. Cost Variance (19,350 – 20,160) = 810 (A)



F. O. Exp Variance
(21,500 – 20,160)
= 1,340 (F)

F. O. Volume Variance
(10,000 – 9,000) x 2.15
= 2,150 (A)

Actual S.P = 51.25

Bud Cost = (35.77)

15.48

Sales Margin Variance (1,42,300 – 1,39,320) = 2,980 (A)

Sales Volume Variance

(10,000 – 9,000) x14.23

= 14,230 (A)

Sales Rate Variance

(14.23 - 15.48) x 9,000

= 11,250 (F)

Case Study – 33

Bom & Co. operate a system of standard costs. For the four weeks ended 31st March, 2013 the following was their Profit and Loss Account:

Particulars	₹	Particulars	₹
Material Consumed	1,89,000	Transfer to Sales Dept. 3,500 units of finished articles at. ₹ 140 each	4,90,000
Direct Wages	22,100		
Fixed Expenses	1,88,000		
Variable Expenses	62,000		
Profit	28,900		
	4,90,000		**4,90,000**

The following further information is given:

a) There was no opening or closing work-in-progress. The articles manufactured are identical and get transferred to sales department after manufacture.

b) Materials were drawn for 3,600 units at ₹ 52.50 per unit.

c) For the four week period, the standard production capacity is 4,800 units, and the break-up of the standard selling price is given below:

	₹
Materials	50
Direct Wages	6
Fixed Expenses	40
Variable Expenses	20
Standard Cost of Sale	116
Standard Profit	24
Standard Selling Price	140

d) The standard wages per article is based on 9,600 hours worked for the four-week period at a rate of ₹ 3.00 per hour. 6,400 hours were actually worked during the four-week period and, in addition, wages for 400 hours were paid to compensate for idle time due to breakdown of a machine, and the overall wage rate was ₹ 3.25.

Required:

Present a Trading Profit and Loss account indicating the comparison between standards and actual and analyze the variance.

COMPARISON BETWEEN STANDARD AND ACTUAL
Trading and Profit and Loss Account
For 4 weeks ended 31st March, 2013

Particulars	Std. 3,500 units	Actual 3,500 units	Variance	Particulars	Std. 3,500 units	Actual 3,500 units	Variance
	₹	₹	₹		₹	₹	₹
Material	1,75,000	1,89,000	14,000 (A)	Transfer to Sales Dept. at ₹ 140 each.	4,90,000	4,90,000	
Direct Wages	21,000	22,100	1,100 (A)				
Variable Exp.	70,000	62,000	8,000(F)				
Fixed Exp.	1,40,000	1,88,000	48,000 (A)				
Profit	84,000	28,900	55,100 (A)				
	4,90,000	4,90,000			4,90,000	4,90,000	

Step No. 1
Material Variance
Actual Production = 3,500 units

Units		Rate		Amt
3,500	x	50	=	1,75,000

Units		Rate		Amt
3,600	x	52.50	=	1,89,000

Labour Variance

Hrs		Rate		Amt
7,000 (3,500x2)	x	3	=	21,000

Hrs		Rate		Amt
6,800	x	3.25	=	22,100

ABN-IDLE

400

V. O. Variance

Units		Rate		Amt
3,500	x	20	=	70,000 (3,500x20)

Hrs		Rate		Amt
3,500	x	17.71	=	2,000

Fixed O.H.

Budget

Units		R.R		Amt
4,800	x	40	=	1,92,000

Hrs.		R.R		Amt
9,600	x	20	=	1,92,000

Actual

Units	Exp
3,500	1,88,000

Units	Exp
6,400	1,88,000

Sales Margin Variance

Units		Rate		Amt
4,800	x	24	=	1,15,200

Units		Rate		Amt
3,500	x	24	=	84,000

Actual Profit Per Unit

Actual S.P. (P.U) = 140

Budget Cost = (116)

24

Material Cost Variance
(1,75,000 – 1,89,000) = 14,000 (A)

Material Usage Variance
(3,500 – 3,600) x 50
= 5,000 (A)

Material Rate Variance
(50 - 52.5) x 3,600
= 9,000 (A)

Labour Cost Variance (21,000 – 22,100) = 1,100 (A)

Labour EFF Variance
(7,000 – 6,400) x 3
= 1,800 (F)

Labour Idle Time Variance
400 x 3
= 1,200 (A)

Labour Rate Variance
(3 - 3.25) x 6,800
= 1,700 (A)

Variance O.H Cost Variance (70,000 – 62,000) = 8,000 (F)

V. OH EFF Variance
(3,500 – 3,500) x 20
= 0

V. O Exp/ rate Variance
(20 - 17.71) x 3,500
= 8,000 (F)

Fixed O.H

To Bank	1,88,000	By Recovery	1,40,000
		(3,500 x 40) By U/R	48,000
	1,88,000		**1,88,000**

Fixed O.H. Cost Variance(1,40,000 – 1,88,000) = 48,000 (A)

F. O. Exp Variance
(1,92,000 – 1,88,000)
= 4,000 (F)

F. O. Volume Variance
(4,800 – 3,500) x 40
= 52,000 (A)

F. O Capacity Variance
(9,600 – 6,400) x 20
= 64,000 (A)

F.O. Efficiency Variance

Units	**Hrs**
4,800	9,600
3,500	7,000

(7000 - 6400) x 20 = 12,000 (F)

Sales Margin Variance(1,15,200 – 84,000) = 31,200 (A) =12,000 (A)

Sales Margin Volume variance
(4,800 – 3,500) x24
= 31,200 (A)

Sales Margin Price Variance
(24 - 24) x 3,500
= 0

Reconciliation of Budgeted/Standard Profit with Actual Profit with Given Variance

Case Study – 34

Tsim Sha Tsui Ltd. adopts a standard costing system. The standard output for a period is 20,000 units and the standard cost and profit per unit is as under:

	(₹)
Direct Material (3 units @ ₹ 1.50)	4.50
Direct Labour (3 hr. @ ₹ 1.00)	3.00
Direct Expenses	0.50
Factory Overheads	
Variable	0.25
Fixed	0.30
Administration Overheads	0.30
Total Cost	8.85
Profit	1.15
Selling Price (Fixed by Govt.)	10.00

The actual production and sales for a period was 14,400 units. There has been no price revision by the Govt. during the period.

The Following are the variance worked out at the end of the period:

		Favorable (₹)	Adverse (₹)
Direct Material			
	Price	----	4,250
	Usage	1,050	----
Direct Labour			
	Rate	----	4,000
	Efficiency	3,200	----
Factory Overheads			
	Variable-Expenditure	400	----
	Fixed-Expenditure	400	----
	Fixed-Volume	----	1,680
Administration Overheads			
	Expenditure	----	400
	Volume	----	1,680

Required:

(a) Ascertain the details of actual costs and prepare a Profit and Loss Statement for the period showing the actual profit/loss. Show working clearly.

(b) Reconcile the Actual Profit with Standard Profit.

Step No (1) Statement Showing Cost Sheet

	Budget Units = 20,000	
	Total	**Per Unit**
Direct Material	90,000	4.50
Direct Wages	60,000	3.00
Direct Expenses	10,000	.50
F. O.		
Variable	5,000	.25
Fixed	6,000	.30
Administration OH	6,000	.30
Total Cost	1,77,000	8.85
Profit	23,000	1.15
Sales	2,00,000	10.00

Step No (2) **Profit and Loss A/c**

Particulars	₹	Particulars	₹
To Mat A/c	68,000	By Sales	1,44,000
To Wages	44,000	(14,400 x 10)	
To Direct Exp	7,200		
To F.O. (V)	3,200		
To F.O. (F)	5,600		
To Admin OH	6,400		
To Net profit	9,600		
	1,44,000		**1,44,000**

Statement Showing Reconciliation

	₹
Profit as Per Cost Sheet	23,000
Due to Material Usage Variance	1,050
Due to Material Rate Variance	(4,250)
Due to Labour Efficiency Variance	3,200
Due to Labour Rate Variance	(4,000)
Due to V. O. EFF Variance	0
Due to V. O. Exp/Rate Variance	400
Due to F.O. Expenses Variance	400
Due to F.O. Volume Variance	(1,680)
Due to Admin OH Expenses Variance	(400)
Due to Admin OH Volume Variance	(1,680)
Due to Sales Margin Volume variance	(6,440)
Due to Sales Margin Price Variance	-
Profit transfer to P&L A/c	**9,600**

Step No.(3)
Analysis of Variance
Material = 14,400 units

Standard				
Units		**Rate**		**Amt**
43,200 (14,400 x 3)	x	1.50	=	64,800

Actual				
Units		**Rate**		**Amt**
42,500	x	1.60	=	68,000

Labour Variance

Standard

Hrs		Rate		Amt
43,200 (14,400 x 3)	x	1.00	=	43,200

Actual

Hrs		Rate		Amt
40,000	x	1.10	=	44,000

Direct Expenses

Units		Rate		Amt
14,400	x	.50	=	7,200

Units		Rate		Amt
14,400	x	.5	=	7,200

Variable Overheads

Standard

Units		Rate		Amt
14,400	x	.25	=	3,600 (14,400x.25)

Actual

Units		Rate		Amt
14,400	x	.222	=	3,200

Fixed O.H.

Budget

Units		R.R		Exp
20,000	x	.30	=	6,000

Actual

Units	Exp
14,400	5,600

Admin O.H

Units		R.R		Exp
20,000	x	.30	=	6,000

Units	Exp
14,400	6,400

Sales Margin Variance

Units		Rate		Amt
20,000	x	1.15	=	23,000

Units		Rate		Amt
14,400	X	1.15	=	16,560

Material Cost Variance (64,800 – 68,000) = 3,200 (A)

Material Usage Variance

(43,200 – 42,500) x 1.50

= 1,050 (F)

Material Rate Variance

(1.50 - 1.60) x 42,500

= 4,250 (A)

Labour Cost Variance (43,200 – 44,000) = 800 (A)

Labour EFF Variance

(43,200 – 40,000) x1

= 3,200 (F)

Labour Rate Variance

(1 - 1.10) x 40,000

= 4,000 (A)

V. O. Cost Variance (3,600 – 3,200) = 400 (F)

V. O. EFF Variance

(14,400 – 14,400) x .25

= 0

V. O. Exp/ Rate Variance

(0.25 - 0.222) x 14,400

= 400 (F)

Fixed O.H

To Bank	5,600	By Recovery	4,320
		(14,400 x .30) By U/R	1,280

F. O. Cost Variance (4,320 – 5,600) = 1,280 (A)

F. O. Exp Variance (6,000 – 5,600) = 400 (F)

F. O. Volume Variance (20,000 – 14,400) x 0 .3 = 1,680 (A)

Admin O.H

To Bank	6,400	By Recovery	4,320
		(14,400 x .3) By U/R	2,080

Admin O.H. Cost Variance (4,320 – 6,400) = 2,080 (A)

Admin O.H. Volume Variance

(20,000 – 14,400) x 0 .3

= 1,680 (A)

Admin O.H. Expenses Variance

(6,000 – 6,400)

= 400 (A)

Sales Margin Volume Variance (23,000 – 16,560) = 6,440 (A)

Sales Margin Volume Variance
(20,000 – 14,400) x 1.15
= 6,440 (A)

Sales Margin Price Variance
(1.15 - 1.15) x 14,400
= 0

Case Study – 35

The budget output of a single product manufacturing company for 2013-14 was 5,000 units. The financial results in respect of the actual output of 4,800 units achieved during the year were as under:-

	₹
Direct Material	29,700
Direct Wages	44,700
Variable Overheads	72,750
Fixed Overheads	39,000
Profit	36,600
Sales	2,22,750

The standard direct wage rate is ₹ 4.50 per hour and the statement variable overhead rate is ₹ 7.50 per hour.

The cost account recorded the following variance for the year:-

Variance	Favorable (₹)	Adverse (₹)
Direct Material Price	-	300
Direct Material usage	-	600
Direct Labour Rate	750	-
Direct Labour Efficiency	-	2,250
Variable Overhead Exp	3,000	-
Variable Overhead Efficiency	-	3,750
Fixed Overhead Expenses	-	1,500
Selling Price	6,750	-

Required:

i. Prepare a statement showing the original budget.
ii. Prepare the standard product cost sheet per unit.
iii. Prepare a statement showing the reconciliation of originally budgeted profit and the actual profit.

Step 1
Statement Showing Cost Sheet
Budgeted production = 5,000 units

DM (28,800/4,800 x 5,000)	30,000	6.00
DL (43,200/4,800 x 5,000)	45,000	9.00
VO (72,000/4,800 x5,000)	75,000	15.00
FO	37,500	7.50
Budgeted Cost	1,87,500	37.50
Budgeted Profit	37,500	7.50
Budgeted Sales	2,25,000	45.00

Step 2
Profit & Loss Account – Actual Production (given)
Actual profit = 36,600
Step 4
Analysis of Variance
Material Variance – Actual Production = 4,800 units

Standard			Actual		
Unit	**Rate**	**Amt**	**Unit**	**Rate**	**Amt**
–	–	28,800	–	–	29,700

Labour Variance

Hrs.	Rate	Amt	Hrs.	Rate	Amt
9,600	x 4.5	= 43,200	10,100	x 4.43	= 44,700

Variable Overhead

Hrs.	Rate	Amt	Hrs.	Rate	Amt
9,600	7.5	72,000	10,100	x 7.21	72,750

Fixed Overhead

Units	R.R	Exp	Units	Exp
5,000	7.5	37,500	4,800	39,000

Sales margin variance

Units	Rate	Amount	Units	Rate	Amount
5,000			4,800	x 8.90625	42,750

Material Cost Variance

(28,800 - 29,700)= 900 (A)

Material Usage = 600 (A)

Material Rate = 300(A)

Labour Cost

(43,200 - 44,700)= 1,500 (A)

Labour EFF Variance

(9,600 - 10,100) x 4.5= 2,250 (A)

Labour Rate = 300(A)

(4.5 - 4.43) x 10,100= 750 (F)

Variable Overhead

(72,000 - 72,750)= 750 (A)

VOH EFF Variance

(9,600 - 10,100) x 7.50= 3,750 (A)

VOH Expenditure (Rate)

(7.50 - 7.21) x 10,100= 3,000 (F)

Fixed Overhead A/c

To Bank	39,000	By Recovery (4,800 x 7.50)	36,000
		By Under Recovery	3,000
	39,000		39,000

FOH Cost
(36,000 - 39,000)= 3,000 (A)

FOH Exp Variance	FO Volume Variance
(37,500 - 39,000) =1,500 (A)	(5,000-4,800) x 7.50 = 1,500 (A)

Sales Margin Variance
(37,500 - 42,750)= 5,250 (F)

Sales Margin Volume	Sales Margin Rate/Price
(5,000-4,800) x 7.50 =1,500 (A)	(45- 46.40,625) x 4,800
Actual profit (p.u)	= 6,750 (A)
Actual s.p (p.u)	(2,22,750/4,800)= 46.40625
Budgeted Cost (p.u)	(37.5)
Actual profit (p.u)	8.90625

Step 3 Statement Showing Reconciliation

	₹
Profit as Per Cost Sheet	37,500
Due to Material Usage Variance	(600)
Due to Material Rate Variance	(300)
Due to Labour efficiency Variance	(2,250)
Due to Labour Rate Variance	750
Due to V. O. Eff Variance	(3,750)
Due to V. O. Exp/Rate Variance	3,000
Due to F.O. Expenses Variance	(1,500)
Due to F.O. Volume Variance	(1,500)
Due to Sales Margin Volume variance	(1,500)
Due to Sales Margin Price	6,750
Profit transfer to P&L A/c	**36,600**

Case Study – 36

Jagan Manufacturing Company has furnished the following financial data relating to the actual output of 9,600 units produced in the last quarter:

		₹
Sales		4,45,500
Costs:		
Direct Material	59,400	
Direct Wages	89,400	
Variable Overheads	1,45,500	
Fixed Overheads	**78,000**	**3,72,300**
Profit		73,200

The standard wage rate is ₹ 4.50 per hour. And the standard variable overhead rate is ₹ 7.50 per hour. The company uses a JIT system and the budgeted production and sales quantity is 10,000 units.

The following are the variances from standard cost recorded during the last quarter:

		₹
Direct Material	Price Variance	600 (A)
	Usage Variance	1,200 (A)
Direct Wages	Rate Variance	1,500 (F)
	Efficiency Variance	4,500 (A)
Variable Overheads	Expenses Variance	6,000 (F)
	Efficiency Variance	7,500 (A)
Fixed Overheads	Expenses Variance	3,000 (A)
Sales	Price Variance	13,500 (F)

Required:

(i) Prepare the Original budget and Standard Cost sheet per unit of output;

(ii) (ii) Produce a statement reconciling the budgeted profit with actual profit.

Step No (1) Statement Showing Cost Sheet

	Budget Production = 10,000	
	Total	**Per Unit**
	₹	**₹**
DMat (57,600/9,600 x 10,000)	60,000	6
DLab (86,400/9,600 x 10,000)	90,000	9
V. O.H.(44,000/9,600 x 10,000)	1,50,000	15
F. O.H.	**75,000**	**7.5**
Budget Cost	3,75,000	37.5
Budget Profit	**75,000**	**7.5**
Budget Sales	4,50,000	45

Step 2: P & L A/c = Given

Actual Profit = 73,200

Step 3: Statement showing Reconciliation

Profit as per Cost Sheet	75,000
Due to: Material Usage Variance	(1,200)
Material Rate Variance	(600)
Labour Efficiency Variance	(4,500)
Labour Rate Variance	1,500
VOH Efficiency Variance	(7,500)
VOH Expenses Variance	6,000
FOH Expenses Variance	(3,000)
FOH Volume Variance	(3,000)
Margin Volume Variance	(3,000)
Margin Rate Variance	13,500
Profit as per P&L	**73,200**

Step 4: Analysis of Variance

Material Variance : Actual Production = 9,600 units

Standard

Qty	x	Rate		Amt
-		-	=	57,600

Actual

Qty	x	Rate		Amt
-		-	=	59,400

Labour Variance: Actual Production = 9,600 units

Standard

Hrs	x	Rate		Amt
19,200	x	4,050	=	86,400

Actual

Hrs		Rate		Amt
20,200	x	4.43	=	89,400

Variable Overheads Variance: Actual Production = 9,600 units

Standard

Hrs		Rate		Amt
19,200	x	7.50	=	1,44,000

Actual

Hrs		Rate		Amt
20,200	x	7.21	=	1,45,500

Fixed O.H.: Budget units = 10,000

Standard

Units		R.R		Amt
10,000	x	7.5	=	75,000

Actual

Units	Exp
9,600	78,000

Sales Margin Variance

Units		Rate		Amt
10,000	x	7.5	=	75,000

Units		Rate		Amt
9,600	x	8.90625	=	85,500

Actual Profit = Actual Selling Price (−) Budget Cost Price

(4,45,000 /9,600) = (46.40 - 37.5) = ₹ 8.90625

Material Cost Variance

(x – 59,400) = 1,800 (A) **∴ x = 57,600**

Material Usage

1,200 (A)

Material Rate

600 (A)

Labour Cost Variance

(x – 89,400) = 3,000 (A) ∴ x = 86,400

Labour EFF Variance

(19,200 - x) 4.5= - 4,500

4,500 (A)

Labour Rate Variance

(4.5 - x) 20,200 = 1,500

1,500 (F)

x = 4.43

∴ x = V. O. H Cost Variance

(x – 1,45,500) = 6,900 (A)

= 1,500 **∴ x = 1,44,000**

V. O. EFF Variance
(19,200 - x) 7.5= - 7,500
∴ x = 20200
= 7,500 (A)

V. O. Exp/ Rate Variance
(7.5 - 7.21) 20,200
= 6,000 (F)

Fixed Overhead A/c

To Bank	78,000	By Recovery (7.5 x 9,600)	72,000
		By Under Recovery	**6,000**

F. O.H Cost Variance

(72,000 – 78,000) = 6,000 (A)

F. O Exp Variance
(x – 78,000) = 3,000 (A)
∴ x = 75,000
= 3,000 (A

F. O. H Volume Variance
(10,000 – 9,600) 7.5
= 3,000 (A)

Sales Margin Variance

(75,000 – 85,500) = 10,500 (F)

Sales Margin Volume
(10,000 – 9,600) 7.5
= 3,000 (A)

Sales Margin Price
(x - 8.90625) 9,600 =13,500
x = 7.5

= 13,500 (F)

Verification:

Sales Price Variance = Sales Margin Price Variance
(x - 46.40625) x 9,600 = 13,500 (F)
x = 45 (which same as cost sheet ∴ V)

Case Study - 37

Reconciliation of Budgeted Profit with Actual Profit with Given Budgeted Profit & Loss Account and Actual Profit & Loss Account.

The following information is available from the record of Prince Ltd. which produces only one product:

Budgeted Income Statement: January 2013

	(₹)	(₹)	(₹)
Sales Revenue			
(20,000 units at ₹ 5)			1,00,000
Production Costs			
(Budgeted Production 20,000 units)			
Direct Materials			
A (10,000 Kg. @ ₹ 0.30)	3,000		
B (10,000 Kg. @ ₹ 0.70)	7,000	10,000	
Direct Labour			
Skilled (9,000 Hrs. @ ₹ 3.00)	27,000		
Un-skilled (5,200 Hrs. @ ₹ 2.50)	13,000	40,000	
Production Overhead			
Fixed	20,000		
Variable (20,000 units @ ₹ 0.50)	10,000	30,000	
		80,000	

STEP NO. (1) COST-SHEET (GIVEN)

STEP NO. (2) P.COST ACCOUNT (GIVEN)

STEP NO.(3) STATEMENT SHOWING RECONCILIATION

		₹
Profit As Per Cost Sheet		20,000
Due to Material	Price Var	600
	Mix Var	1,200
	Yield Var	(1,000)
Due to Labour	Rate Var	20
Due to Labour EFF Variance		(3,752)
Due to Labour Idle Time Variance		(3,000)
V.O EFF -Variance		–
V.O EXP - Var		3,000
F.O EXP - Var		1,980
F.O Volume Variance		4,000
Sales Margin Volume Variance		2,000
Sales Margin Price Variance		(2,000)
As Per Profit & Loss Account		17,050

STEP NO.(4) ANALYSIS OF VARIANCE

ACTUAL PRODUCTION = 24,000

	STANDARD			ACTUAL		
	Kg.	**Rate**	**Amt**	**Kg.**	**Rate**	**Amt**
A	12000 x (10,000/20,000 x 24,000)	0.30	3,600	16,000	x .20	3,200
B	12,000 x (10,000/20,000 x 24,000)	0.70	8,400	10,000	x.80	8,000
	24,000		12,000	26,000		11,200

Labour Variance - Actual Production = 24,000

STANDARD			**ACTUAL**		
Hrs.	**Rate**	**Amt**	**Hrs.**	**Rate**	**Amt**
SK (9,000 / 20,000 x 24,000)	10,800 x 3.00	32,400	13,000	x 2.95	38,350
UNSK (5,200/20,000 x 24,000)	6,240 x 2.50	15,600	6,300	x 2.60	16,380
	17,040	**48,000**	**19,300**		**54,730**

*** Abnormal Idle = 1,000**

Units	**Rate**	**Amt**	**Units**	**Rate**	**Amt**
24,000	x 0.50	= 12,000	24,000	x .625	= 15,000

Budget		**Fixed O.H**	**Actual**	
Units	**R.R**	**Exp**	**Units**	**Exp**
20,000	1	20,000	24,000	18,020

Sales- Margin Var

Units	**R.R**	**Total**	**Units**	**Rate**	**Total**
20,000	1	20,000	22,000	0.90	20,000

Actual S.P (PO) = (1,08,000 ÷ 22,000) = 4.9090 – 4 = 0.90

Material Cost Variance

Material Cost Variance

(12,000 - 11,200) = 800 (F)

Material Usage Var
A (12,000 - 16,000) x .30 = 1,200 (A)
B (12,000 - 10,000) x .70 = 1,400 (F)
200 (F)

Material Rate Variance
(.30 - .20) x 16,000
(.70 - .80) x 10,000
= 1,600 (F)
= 1,000 (A)
600(F)

Material Sub Usage Var
(2,40,000 - 26,000) x 12,000/24,000
= 1,000 (A)

Material Mix Variance
A (12,000/24,000 x 26,000)
(13,000 - 16,000) x 0 .30
= 900 (A)
B (12,000/24,000 x 26,000)
(13,000 - 10,000) x 0.70
= 2,100 (F)
1,200 (F)

Labour Cost Variance (12,000 – 11,200) = 800 (F)

Labour
EFF Var
SK (10,800 - 12,000) x 3
UNSK (6,240 - 6,300) x 2.50
= 3,600 (A)
= 150 (A)
3,750 (A)

Lab. Ideal
Time Var
1,000 x 3
= 3,000 (A)

Lab Rate
Var
(3 - 2.95) x 13,000
= 650 (F)
(2.50 - 2.60) x 6,300
= 630 (A)
20 (F)

V.O COST VARIANCE

(12,000 - 15,000) = 3,000 (A)

V.O EFF VARIANCE
(2,40,000 - 24,000) x 0 .5
= 0

V.O Exp/ Rate
(0 .5 - .625) x 24,000
= 3,000 (A)

FIXED O.H

To Bank	18,020	By Received (24,000 x 1)	24,000
TOO/R	**5,980**		
	24,000		24,000

F.O COST VARIANCE
(24,000 - 18,020) = 5,980 (F)

F.O Exp Variance
(20,000 - 18,020) = 1,980 (F)

F.O Volume Variance
(20,000 - 24,000) x 1
= 4,000 (F)

SALES MARGIN VARIANCE
(20,000 - 20,000) = 0

Sales Margin Volume
(20,000 - 22,000) x 1
= 2,000 (F)

Sales Margin Price
(1 - .90) x 22,000
= 2,000 (A)

Case Study - 38

The following profit reconciliation statement has been prepared by the Cost Accountant of GHI Ltd. for March, 2013

	₹
Budget Profit	3,60,000
Sales Price Variance	76,500 (F)
Sales Volume Profit Variance	63,000 (A)
Material Price Variance	23,820 (A)
Material Usage Variance	4,800 (F)
Labour Rate Variance	1,17,600 (F)
Labour Efficiency Variance	48,000 (A)
Variable Overhead Expenditure Variance	12,000 (F)
Variable Overhead Efficiency Variance	18,000 (A)
Fixed Overhead Volume Variance	2,94,000 (A)
Fixed Overhead Expenditure Variance	6,000 (F)
Actual Profit	1,30,080

Budgeted Production and sales volumes for March, 2013 were equal and the level of finished goods stock was unchanged, but the stock of raw materials decreased by 6,400 kg (valued at standard price) during the month.

The standard cost card is as under:

	₹
Material 4 kg @ ₹ 3.00	12.00
Labour 4 hours @ ₹ 48.00	192.00
Variable Overhead 4 hours @ ₹ 18.00	72.00
Fixed Overheads 4 hours @ ₹ 42.00	168.00
Standard Cost	444.00
Standard Profit	36.00
Standard Selling Price	480.00

Required:

i. Calculate actual quantity of material purchased
ii. Calculate actual production and sales volume
iii. Calculate actual number of hours worked
iv. Calculate actual variable and fixed overhead cost incurred.

Step No-1 Statement Showing Cost Sheet

	Budget Units = 10,000 (3,60,000 ÷ 36)	
	Total	**Per Unit**
	₹	**₹**
Direct Material	1,20,000	12.00
L Lab	19,20,000	192.00
V. O	7,20,000	72.00
F. O	16,80,000	168.00
Budget Cost	44,40,000	444.00
Budget Profit	3,60,000	36.00
Budget Sales	48,00,000	480.00

Step No (2) Profit and Loss A/c

	₹		₹
To Dmat A/c	1,18,020	By Sales	40,36,500
To DLab	15,14,400	(8,250 x 489.27)	
To V.O.	6,00,000		
To F.O.	16,74,000		
To Net profit	1,30,080		

Step No.3 Statement Showing Reconciliation (Given)

Step 4: <u>Material Variance</u>

Actual Production = 8,250 units

Standard

Kg		Rate		Amt
33,000 (8,250x4)	x	3	=	99,000

Actual

Kg		Rate		Amt
31,400	x	3.7585	=	1,18,020

Labour Variance:

Standard

Hrs		Rate		Amt
33,000 (8,250x4)	x	48	=	1,58,400

Actual

Hrs		Rate		Amt
34,000	x	44.51	=	15,13,340

Variable Overheads Variance:

Standard

Hrs		Rate		Amt
33,000 (8,250 x 4)	x	18 R.O	=	5,94,000

Actual

Hrs		Rate		Amt
34,000	x	17.64	=	6,00,000

Budget

Units		R.R		Exp
10,000	x	168	=	16,80,000

Actual

Units	Exp
8,250	16,74,000

Sales Margin Variance

Units		Rate		Amt
10,000	x	36	=	3,60,000

Units		Rate		Amt
8,250	x	45.27	=	3,73,500

Actual Profit P.U

Actual S.P (P.U)	489.27
Budget Cost (P.U)	444
Actual Profit (P.U)	45.2727
Purchase	25,000
(+) Stock	6,400
Consumed	31,400

Material Cost Variance (90,000 – 1,18,020) = 28,020 (A)

Material Usage Variance
(33,000 – 31,400) x 3
= 4,800 (F)

Material Rate Variance
(3 - 3.7585) x 31,400
= 23,820 (A)

Labour Cost Variance(15,84,000 – 15,14,400) = 69,600 (F)

Labour EFF Variance
(33,000 – 34,000) x 48
= 48,000 (A)

Labour Rate Variance
(48 - 44.54) x 34,000
= 1,17,600 (F)

V. O. Cost Variance (5,94,000 – 6,00,000) = 6,000 (A)

V. O. EFF Variance
(33,000 – 34,000) x 18
= 18,000 (A)

V. O. Rate Variance
(18 - 17.64) x34,000
= 12,000 (F)

To Bank	16,74,000	By Recovery (8,250 x 168) By UR	13,86,000 2,88,000

F. O. Cost Variance (13,86,000 – 16,74,000) = 2,88,000 (A)

F. O. Exp Variance
(1,68,000 – 16,74,000)
= 6,000 (F)

F. O. Volume Variance
= 2,94,000 (A)

Sales Margin Variance (3,60,000 – 3,73,500) = 13,500 (A)

Sales Margin Volume Variance
(10,000 – 8,250) x 36
= 63,000 (A)

Sales Margin Rate Variance
(36 - 45.27) x 8,250
= 76,500 (F)

Ans No (i)
Actual Qty of Material Purchased = 25,000 Kg
Ans No (ii)
Actual Production & Sales = 8,250 units
Ans No (iii)
Actual No. of Hrs. worked = 34,000
Ans No (iv)
Actual V. O = 6,00,000

Case Study - 39

The following is the Operating Statement of a company for April 2013:

				(₹)
Budgeted Profit				1,00,000
Variances:		**Favourable (₹)**	**Adverse (₹)**	
Sales	Volume	----	4,000	
	Price	9,600	----	
Direct Material				
	Price	----	4,960	
	Usage	----	6,400	
Direct Labour				
	Rate	----	3,600	
	Efficiency	3,600	----	
Fixed Overheads				
	Efficiency	2,400	----	
	Capacity	----	4,000	
	Expense	1,400	----	5,960 (A)
Actual Profit				**94,040**

Additional information is as under:

Budget for the year.....1,20,000 units

Budget Fixed overheads.....4,80,000 per annum

Standard Cost of one unit of product is:

Direct Materials .....5 Kg. @ ₹ 4 per Kg.

Direct Labour..... 2 hours @ ₹ 3 per hour

Fixed overheads are absorbed on direct labour hour basis.

Profit.....25% on sales

Required:

Prepare the Annual Financial Profit / Loss Statement for April, 2013 in the following format:

Account	Qty./Hours	Rate / Price (₹)	Actual Value (₹)
Sales	--	--	--
Direct Material	--	--	--
Direct Labour	--	--	--
Fixed Overheads	--	--	--
Total Cost	--	--	--
Profit	--	--	--

Solution

If budgeted & Actual Production is not given

Case Study 25 Pg 12.12

Step 1 Statement showing cost sheet (1,00,000 / 10) = 10,000 units

	Budget Production = 10,000 units	
	Total	**Per Unit**
	₹	**₹**
Direct Material	2,00,000	20.00 (5 Kg x 4)
Direct Labour	60,000	6.00 (2 hr x 3)
F. O.H.	40,000	**4.00 (48,000 ÷ 12,000)**
Budget Cost	3,00,000	30.00
Budget Profit	1,00,000	10.00
Budget Sales	4,00,000	40.00

Step 2 Statement Showing Profit and Loss

Account	**Qty./Hours**	**Rate / Price (₹)**	**Actual Value (₹)**
Sales	9,600	41.00	3,93,600
Direct Material	--	--	2,03,360
Direct Labour	--	--	57,600
Fixed Overheads	--	--	**38,600**
Total Cost	--	--	**2,99,560**
Net Profit	--	--	94,040

Step 3 Analysis of Variance

Standard **Actual**

Material Variance Actual Production = 9,600 units

Kg	**Rate**		**Amt**
48,000 (9,600x5)	4	=	1,92,000

Kg		**Rate**		**Amt**
49,600	x	4.1	=	2,03,360

Labour Variance:

Standard **Actual**

Hrs	**Rate**		**Amt**
19,200 (9,600x2)	3	=	57,600

Hrs	**Rate**		**Amt**
18,000	3.2	=	57,600

FO Budgeted

Standard **Actual**

Units	**R.R**		**Amt**
10,000	4	=	40,000

Units	**Exp**
9,600	38,600

Hours	R.R		Amt
20,000 (10,000x2)	2	=	40,000

Units	Exp
18,000	38,600

Sales Margin Variance

Units	Rate		Amt
10,000	10	=	1,00,000

Units	Rate		Amt
9,600	11	=	1,05,600

Actual SP (p.u) 41

Budget Cost (p.u) 30

Actual Profit (p.u) 11

Sales Margin Variance (1,00,000 – 1,05,600) = 5,600 (A)

Sales Volume Variance

(10,000 – 9,600) x 10

= 4,000 (A)

Sales Rate Variance

(10 - 11) x 9,600

= 9,600 (F)

Material Cost Variance (1,92,000 – 2,03,360) = 11,360 (A)

Material Usage Variance

(48,000 – 49,600) x 4

= 6,400 (A)

Material Rate Variance

(4 - 4.1) x 49,600

= 4,960 (A)

Labour Cost Variance (57,600 – 57,600) = 0

Labour EFF Variance

(19,200 – 18,000) x 3

= 3,600 (F)

Labour Rate Variance

(3.2 - 3.0) x18,000

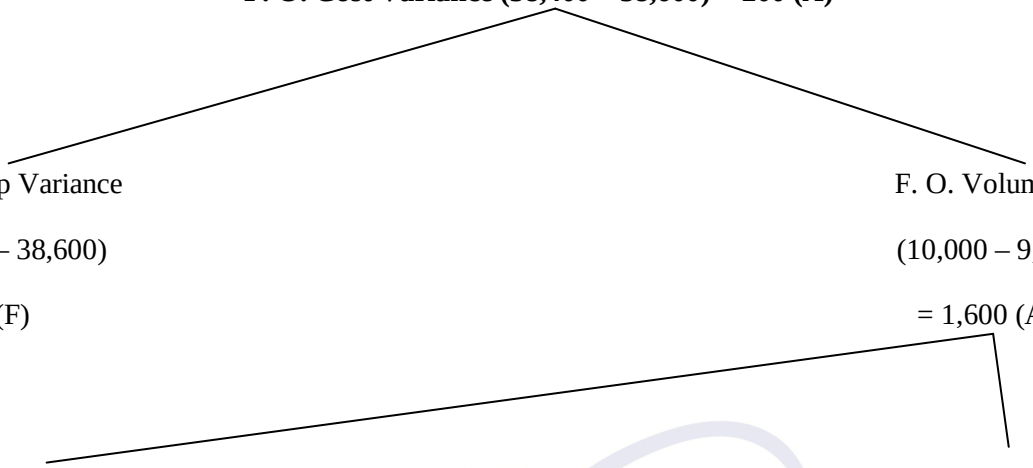
= 3,600 (A)

FO A/c.

To Bank 38,600 By Recovery (9,600 x 4) = 38,400

200

F. O. Cost Variance (38,400 – 38,600) = 200 (A)



F. O. Exp Variance

(40,000 – 38,600)

= 1,400 (F)

F. O. Volume Variance

(10,000 – 9,600) x 4

= 1,600 (A)

F. O Capacity Variance
(20,000 – 18,000) x 2
= 4,000 (A)

F.O. Efficiency Variance
(19,200 – 18,000) x 2 = 2,400 (F)

Units	**Hrs**
10,000	20,000
9,600	19,200

Case Study - 40

The following profit reconciliation statement has been prepared by the Cost Accountant of RSQ Ltd. for March, 2012.

Budget Profit ₹	2,40,000
Sales Price Variance	51,000 (F)
Sales Volume Profit Variance	42,000 (A)
Material Price Variance	15,880 (A)
Material Usage Variance	3,200 (F)
Labour Rate Variance	78,400 (F)
Labour Efficiency Variance	32,000(A)
Variable Overhead Expenditure Variance	12,000 (F)
Variable Overhead Efficiency Variance	8,000(A)
Fixed Overhead Volume Variance	1,96,000(A)
Fixed Overhead Expenditure Variance	4,000 (F)
Actual Profit	**86,720**

Budgeted Production and sales volumes for March, 2012 were equal and the level of finished goods stock was unchanged, but the stock of raw materials decreased by 6,400 kg (valued at standard price) during the month.

The standard cost card is as under:

Material 4 kg @ ₹2.00	8.00
Labour 4 hours @ ₹ 32.00	128.00
Variable Overhead 4 hours @ ₹ 12.00	48.00
Fixed Overheads 4 hours @ ₹ 28.00	112.00
Standard Cost	296.00
Standard Profit	24.00
Standard Selling Price	320.00

You are required to calculate:

i. Actual quantity of material Purchased
ii. Actual Production and sales volume
iii. Actual number of hours worked
iv. Actual variable and fixed overhead cost incurred

Step No-1 Statement Showing Cost Sheet

	Budget Units = 10,000 (24,000 ÷ 24)	
	Total	**Per Unit**
Direct Material	80,000	8.00
L lab	12,80,000	128.00
V. O.	4,80,000	48.00
F. O.	11,20,000	112.00
Budget Cost	29,60,000	296
Budget Profit	2,40,000	24
Budget Sales	32,00,000	320

Step No (2) Profit and Loss A/c

Particulars	**₹**	**Particulars**	**₹**
To D Mat	78,680	By Sales	26,91,000
To D Lab	10,09,600	(326.18 x 8,250)	
To V.O.	4,00,000		
To F.O.	11,16,000		
To Net profit	86,720		
	26,91,000		26,91,000

Step 3: Statement Showing Reconciliation (Given)

Step 4: Analysis of Variance

Material Variance
Actual Production = 8,250 units

Standard

Kg		**Rate**		**Amt**
33,000 (8,250x4)	x	2	=	66,000

Actual

Kg		**Rate**		**Amt**
31,400	x	2.5057	=	78,680

Labour Variance:

Standard

Hrs		**Rate**		**Amt**
33,000 (8,250x4)	x	32	=	10,56,000

Actual

Hrs		**Rate**		**Amt**
34,000	x	29.69	=	10,09,600

Variable Overheads Variance:

Standard

Hrs		Rate		Amt
33,000 (8,250x 4)	x	12	=	3,96,000

Actual

Hrs		Rate		Amt
34,000	x	11.76	=	4,00,000

R.O Budget

Units		R.R		Amt
10,000	x	112	=	11,20,000

Actual

Units	Exp
8,250	11,16,000

Sales Margin Variance

Units		Rate		Amt
10,000	x	24	=	2,40,000

Units		Rate		Amt
8,250	x	30.18	=	2,49,000

Actual Profit P.U

Actual S.P (P.U) 326.18

Budget Cost (P.U) (296)

Actual Profit (P.U) 30.18

Purchase 25,000

(+) Stock Dec. 6,400

Consumed 31,400

Material Cost Variance(66,000 – 78,680) = 12,680 (A)

Material Usage Variance
(33,000 – 31,400) x 2
= 3,200 (F)

Material Rate Variance
(2 -)
= 15,880 (A)

Labour Cost Variance (10,56,000 – 10,09,600) = 46,400 (F)

Labour EFF Variance
(33,000 – 34,000) x 32
= 32,000 (A)

Labour Rate Variance
(32 - 29.69) x 34,000
= 78,400 (F)

V. O. Cost Variance (3,96,000 – 4,00,000) = 4,000 (A)

V. O. EFF Variance
(33,000 – 34,000) x 12
= 12,000 (A)

V. O. Rate Variance
(12 - 11.76) x 34,000
= 8,000 (F)

To Bank	11,16,000	By Recovery	= 9,24,000
		By UR (8,200 x 112)	(1,92,000)

F. O. Cost Variance (9,24,000 – 11,16,000) = 1,92,000 (A)

F. O. Exp Variance
(11,20,000 – 11,16,000)
= 4,000 (F)

F. O. Volume Variance
(10,000 – 8,250) x112
= 1,96,000 (A)

Sales Margin Variance (2,40,000 – 2,49,000) = 9,000 (F)

Sales Volume Variance
(10,000 – 8,250) x 24
= 42,000 (A)

Sales Rate Variance
(24 - 30.18) x 8,250
= 51,000 (F)

Ans No (i)
Actual Qty of Material Purchased = 25,000 Kg

Ans No (ii)
Actual Production & Sales = 8,250 units

Ans No (iii)
Actual No. of Hrs. worked = 34,000 hrs.

Ans No (v)
Actual V. O = 4,00,000

Case Study -41

A company following standard marginal costing system has the following interim trading statement for the quarter ending 30th June, 2013, which reveals a loss of ₹ 17,000 detailed below:

	₹
Sales	4,99,200
Closing Stock (at prime cost)	18,000
Direct Material	1,68,000
Direct Labour	1,05,000
Variable Overhead	42,000
Fixed Overhead	1,20,000
Fixed Administration Overhead	40,000
Variable Distribution Overhead	19,200
Fixed Selling Overhead	40,000
Loss	17,000

Additional information is as follows:

1) Sales for the quarter were 1,200 units. Production was 1,400 units, of which 100 units were scrapped after complete manufacture. The factory capacity is estimated at 2,000 units.
2) Because of low production, labour efficiency during the quarter is estimated to be 20 % below normal level.

Required:

Analyse the above and report to the management giving the reasons for the loss.

Step No. (1) STATEMENT SHOWING COST SHEET

Production	**1,400 Units**	
	Total	**P.U.**
Raw Material	1,68,000	120
Labour (105,000 / 1,750) $\frac{1,400 \times 100}{80}$	105,000	60
V.O	42,000	30
V.O (Selling) (19,200 / 1,200)	19,200	16
		226
Contribution	1,84,200	190
Sales	4,99,200	416
(4,99,200 / 1,200) Contribution (1,200 x 190)	2,28,000	
Fixed Cost		
Factory 1,20,000		
Admin 40,000		
Selling 40,000	2,00,000	
Standard Profit	**28,000**	

STATEMENT SHOWING RECONCILATION

Profit As Per Cost Sheet	28,000
Due to Units Scrapped (100 x 210)	(21,000)
Due to Labour in EFF (350 x 60)	(21,000)
Under Variation of Closing Stock (210 - 180) x 100	(3,000)
Actual Profit	(17,000)

Case Study - 42

The following figures are available. Find out the missing figures, giving appropriate formulae:

	₹
Budgeted Profit	15,000
Less: Adverse Variance	
Contribution Price Variance	10,600
Direct Material Variance	1,000
Fixed Overhead Variance	600
Add: Favorable Variance:	
Contribution Quantity variance	1,800
Direct Wages Variance	600
Variable overhead variance	1,800
Actual Profit	7,000

There is no inventory. Production units equals to Sales units for both actual and budget.

Standard selling Price	₹ 18 / unit
Standard Variable Cost	₹ 15 / unit
Budgeted Sales	10,000 units
Actual selling price	₹ 17 / unit

Standard material cost per unit ……. ₹ 1 (which is 5 Kg. @ ₹ 20 Paise/kg.)

Material usage variance ……. ₹ 400 (A)

Actual labour hours @ actual rate ……. ₹ 63,000

Actual labour hours @ standard rate ……. ₹ 61,950

Variable overhead standard rate ……. ₹ 2

Standard hours of production ……. 4 per unit

Variable overhead at standard rate ……. ₹ 84,800

Variable overhead expenditure variance ……. ₹ 400 (A)

Budgeted fixed overhead ……. ₹ 15,000

Required:

Find out the following-

i. Actual Sales Units
ii. Actual Sales rupees
iii. Actual quantity of raw material used
iv. Labour Efficiency variance
v. Actual variable overhead in rupees
vi. Variable overhead efficiency variance
vii. Actual fixed overheads
viii. Operating profit variance.

Step No-1 Statement Showing Cost Sheet

	Budget Production = 10,000	
	Total	**Per Unit**
Material	10,000	1.00
Labour	60,000	6.00
V. O.	**80,000**	**8.00**
V Cost	1,50,000	15.00
Fixed Cost	**15,000**	**1.50**
Budget Profit	16,50,000	16.50
Budget Sales	**15,000**	**1.50**
Sales	**18,00,000**	**18.00**

Step No (2) Profit and Loss A/c

Particulars	₹	Particulars	₹
To Mat A/c	11,600	By Sales	1,80,200
To Wages	63,000	(10,600 x 17)	
To V.O.	83,000		
To F.O.	15,600		
To Net profit	7,000		
	1,80,200		**1,80,200**

Step 3: Material Variance Material Variance = 10,600 units

Standard

Kg		Rate		Amt
53,000 (10,600 x 5)	x	.20	=	10,600

Actual

Kg		Rate		Amt
55,000	x	.21	=	11,600

Labour Variance:

Standard

Hrs		Rate		Amt
42,400 (10,600 x 4)	x	1.50	=	63,600

Actual

Hrs		Rate		Amt
41,300	x	1.53	=	63,000

Variable Overheads Variance:

Standard

Hrs		Rate		Amt
42,400 (10,600 x 4)	x	2	=	84,800

$$\frac{80{,}000 \times 10{,}600}{10{,}000}$$

Actual

Hrs		Rate		Amt
41,300	x	2.0096	=	83,000

Fixed O.H:

Budget

Units		R.R		Amt
10,000	x	1.5	=	15,000

Actual

Units	Exp
10,600	15,600 (15,000 + 600)

Sales Margin Variance

Budget

Units		Rate		Amt
10,000	x	3	=	30,000 (1,80,000 – 1,50,000)

Actual

Units		Rate		Amt
10,600	x	2	=	21,200

(Actual S.P - Budget Cost) = Actual P&L

(17 - 15) = 2

Material Cost Variance (10,600 – 11,600) = 1,000 (A)

Material Usage Variance

(53,000 – 55,000) x .20

= 400 (A)

Material Rate Variance

(.20 - .21) x 55,000

= 600 (A)

Labour Cost Variance (63,600 – 63,000) = 600 (F)

Labour EFF Variance

(42,400 – 41,300) x 1.5

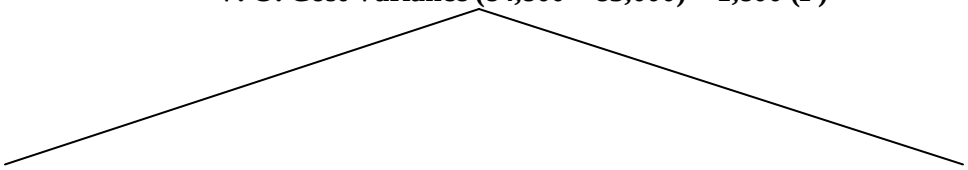
= 1650 (F)

Labour Rate Variance

(1.50 - 1.53) x 41,300

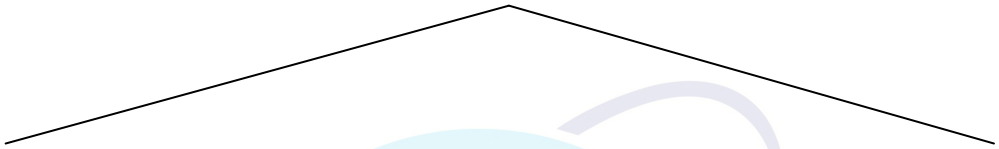
= 1050 (A)

V. O. Cost Variance (84,800 – 83,000) = 1,800 (F)



V. O. EFF Variance	V. O. Exp/ Rate Variance
(42,400 – 41,300) x 2	(2 - 2.0096) x41,300
= 2,200 (F)	= 400 (A)

Sales Margin Variance (30,000 – 21,200) = 8,800 (F)



Sales Margin Volume Variance	Sales Margin Rate Variance
(10,000 – 10,600) x 3	(3 - 2) x10,600
= 1,800 (F)	= 10,600 (A)

Case Study - 43

Young Chin Limited uses standard and marginal costing system. It provides the following details for the year 2012-13 relating to production, cost and sales:

Particulars	Budget	Actual
Sales units	24,000	25,600
Sales Value (₹)	6,000	6,784
Materials (₹)	960	1,080
Labour (₹)	1,440	1,664
Variable overheads (₹)	2,400	2,592

The sales budget is based on the expectation of the company's estimate of market share of 12%. The entire industry's sales of the same product for the year 2012-13 is 2,40,000 units. Further details are as follows:

Particulars	Standard (In ₹)	Actual (In ₹)
Material price per kg.	8.00	7.50
Labour rate per hour	6.00	6.40

Required:

(a) Prepare a statement reconciling the budgeted contribution with actual contribution on the basis of important material variances, labour variances, variable overhead variances and sales variances.

(b) Compute market size variance and market share variance also.

Step No-1 Statement Showing Cost Sheet

	Budget Production = 24,000	
	Total	Per Unit
	₹	₹
Direct Material	960	.04
DLab	1,440	.06
V. O.H.	**2,400**	**.10**
Budget Cost	4,800	.20
Profit	**1,200**	**.05**
Budget Sales P	**6,000**	**.25**

Step No (2) Profit and Loss A/c

Particulars	₹	Particulars	₹
To Mat A/c	1,080	By Sales	6,784
To Labour	1,664		
To V.O.H	2,592		
To Net profit	1,448		

Step 3: Statement showing Reconciliation

	₹
Profit as per Cost Sheet	1,200
Due to: Material Usage Variance	(128)
Material Rate Variance	(72)
Labour Efficiency Variance	(24)
Labour Rate Variance	(104)
VOH Efficiency Variance	(40)
VOH Rate Variance	8
Sales Margin Volume Variance	80
Sales Margin Rate Variance	384
Profit as per P&L	**1,448**

Step 4: Analysis of Variance Material Variance: Actual Production = 25,600 units

Standard

Qty		Rate		Amt
128	x	8	=	1,024
Labour Variance : ₹960 x $\frac{25,600}{24,000}$ ₹				

Actual

Qty		Rate		Amt
144	x	7.5	=	1,080

Standard

Hrs		Rate		Amt
256	x	6.00	=	1,536

Variable Overheads Variance: $\left(\frac{1,440}{24,000} \times 25,600\right)$

Actual

Hrs		Rate		Amt
260	x	6.40	=	1,664

Standard

Hrs		Rate		Amt
256	x	10	=	2,560

Sales Margin Variance : $\left(\frac{2,400}{24,000} \times 25,600\right)$

Actual

Hrs		Rate		Amt
260	x	9.97	=	2,592

Units		Rate		Amt
24,000	x	.05	=	1,200

Units		Rate		Amt
25,600	x	.065	=	1,664

=Actual P&L= (Actual S.P - Budget Cost)

$\left(\frac{6,784}{25,600}\right) = 0.265$

Budget Cost $\left(\frac{.200}{.065}\right)$

Material Cost Variance (1,024 – 1,080) = 56 (A)

Material Usage Variance
(128 - 144) x 8
= 128 (A)

Material Rate Variance
(8 - 7.50) x 144
= 72 (F)

Labour Cost Variance (1,536 – 1,664) = 128 (A)

Labour EFF Variance
(256 - 260) x 6
= 24 (A)

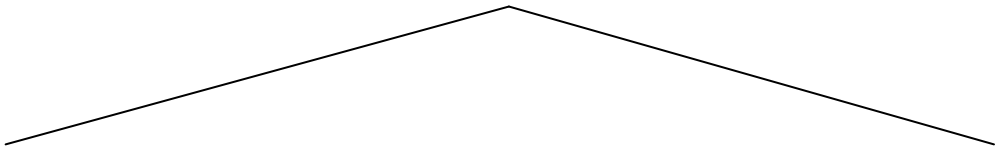
Labour Rate Variance
(6 - 6.40) x 260
= 104 (A)

V. O. Cost Variance (2,560 – 2,592) = 32 (A)

V. O.H EFF Variance
(256 - 260) x 10
= 40 (A)

V. O. Rate Variance
(10 - 9.97) x 260
= 8 (F)

Sales Margin Variance (1,200 – 1,664) = 464 (F)



Sales Volume Variance
(24,000 – 25,600) x .05
= 80 (F)

Sales Rate Variance
(.05 - .065) x 25,600
= 384 (F)

Ans (a) (i) Market Size - Variance

Budget Market Share - Actual Market Share Budget Cost Per Unit

(2,00,000 – 2,40,000) x 12% x .05 = 240 (F)

$$\left(\frac{24{,}000}{12} \times 100\right)$$

(ii) Market Share Variance
Budget share in Actual Size - Actual Size = Budget cost per unit
(28,800 – 25,600) x .05 = 160 (A)
(2,40,000 x 12 %) = 80 (F)
Which is also sales margin volume variance.

Case Study - 44

Under the single plan, record the journal entries giving appropriate narration, with indication of amounts of debits or credits alongside the entries, for the following transactions using the respective control A/c.

i. Material price variance (on purchase of materials)
ii. Material usage variance (on consumption)
iii. Labour rate variance

Journal Entries in Single Plan	
Sr. No.	Journal Entries
(i)	Dr. Material Control A/c Dr. or Cr. Material Price Variance A/c Cr. Creditors A/c. (Being recording of Price Variance during purchase of materials)
(ii)	Dr. WIP Control A/c. Dr. or Cr. Material Usage Variance A/c. Cr. Material Control A/c. (Being recording of usage Variance at Standard Cost of excess/under-utilized Quantity)
(iii)	Dr. Wages Control A/c. Dr. or Cr. Labour Rate Variance A/c. Cr. Cash (Being entry to record wages at Standard Rate)

Incomplete Ledger, Computation of Variances

Case Study - 45

Transparent Ltd. manufactures paint. It uses a standard costing system and the variances are reported to the management on fortnightly basis. A fire destroyed some important records of the company. You have been able to collect the following information from the spoilt paper/records and as a result of consultation with accounting personnel in respect of a fortnight:

a. The paint requires two types of raw material RM_1 and RM_2. The standard quantity of RM_2 in final product is 5 litres and standard cost thereof is ₹ 36 per litre.

b. The company purchased 200 Kg. of RM_1 and 550 litres of RM_2 during that fortnight.

c. The standard wage rate is ₹ 24 per labour hour. Actual labour hours were 460 during the fortnight.

d. Variances as disclosed from some spilled paper are:

(i) Price Variance (RM_2)	……	₹ 1,320 (A)
(ii) Usage Variance (RM_1)	……	₹ 240 (F)
(iii) Labour Efficiency Variance	……..	₹ 1,440 (A)

e. Some incomplete ledger entries for that fortnight reveal

	₹		₹
	(1) Sundry Creditors		
		Purchase of Raw Material	25,440
	(2) RM_2		
Opening Balance	3,600	Closing Balance	8,280
	(3) RM_1		
Opening Balance	0		3,600
		Closing Balance	1,200
	(4) Works-in-Progress		
Opening Balance	0		
RM_2	14,400	Closing Balance	0
	(5) Wages		
Paid & Outstanding	10,350		

Required:

Compute the meaningful variances to be presented before management. (Key computations should form part of the answer).

SUNDRY- CREDITIORS A/C.

		By Purchase A/C	25,440
Top of Balance (100 x 36)	RM 3,600	(2) A/C	
		By Balance Carried Forward (230 x 36)	8,280
	RM	(1) A/C	
To OP-Balance	–	Qty Issued (150 x 24)	3,600
		By Closing Balance (50 x 24)	1,200
	W.I.P	CON A/C	
TO OP-Balance To RM -2	14,400		
	WAGES	By Bal. Carried Forward A/C	0
To Bank O/S	10,350		

Step No.(1) ANALYSIS OF VARIANCE MATERIAL VARIANCE

STANDARD			
	Kg.	**Rate**	**Amt.**
RM-1	160	x 24	3,840
RM-2	400	x 36	14,400
	(80 x 5)		
			18,240

ACTUAL		
Kg.	**Rate**	**Amt.**
150	21.6	3,240
420	38.4	16,128
		19,368

Labour Variance			**Actual PWD =**		
Hrs.	**Rate**	**Amt.**	**Hrs.**	**Rate**	**Amt.**
400	x 24	9,600	460	22.50	10,350

MATERIAL PRICE VARIANCE

RM_1 (24 – 21.60) x 150 = 360 (F)
RM_2 (36 – 38.40) x 550 = 1320 (A)

MATERIAL USAGE VARIANCE

RM_1 (160 – 150) x 24 = 240 (F)
RM_2 (400 – 420) x 36 = 720 (A)

Labour Rate Variable

(24 – 22.50) x 460 = 690 (F)

Labour EFF Var

(400 – 460) x 24 = 1,440 (A)

Labour Cost Var(9,600 – 10,350)

= 750 (A)

Actual Output

Standard of RM_2 in Final Product

$\frac{14{,}400}{5\,l\,ltrs.\times 36}$(RM_2- WIP)

= 180

=80 Units

Purchase Price Variance

RM_2 (36 – 38.40) 550 = 1,320 (A)

RM_2

open stock	=	100”
Purchases	=	550 ltrs.
Closing Stock	=	(230)
Consumed (Issued)		**420**

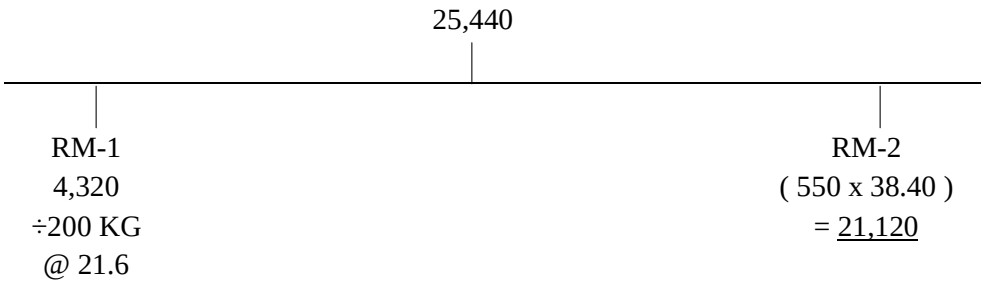
STANDARD COST PER KG RM−1

	₹
Issued to Production	(3,600)
Balance	(1,200)
Total	4,800
	÷200 kg

Standard Rate Per Kg = 24.00

Material Usage Variance (RM-1)

$$\frac{\text{Total Purchase Cost}}{(RM_1 + RM_2)}$$



Planning & Operational Variances, Controllable and Non –Controllable Variances

Case Study - 46

C Preserves produces Jams, Marmalade and Preserves. All the products are produced in a similar fashion; the fruits are cooked at low temperature in a vacuum process and then blended with glucose syrup with added citric acid and pectin to help setting.

Margins are tight and the firm operates a system of standard costing for each batch of Jam.

The standard cost data for a batch of raspberry jam are-

Fruits extract	400 kgs @ ₹ 16 per kg.
Glucose syrup	700 kgs @ ₹ 10 per kg.
Pectin	99 kgs. @ ₹ 33.2 per kg.
Citric acid	1 kg at ₹ 200 per kg.
Labour	18 hours @ ₹ 32.50 per hour
Standard processing loss 3%	

The climate conditions proved disastrous for the raspberry crop. As a consequences, normal prices in the trade were ₹ 19 per kg for fruits extract although good buying could achieve some savings. The impact of exchange rates for imported sugar plus the minimum price fixed for sugarcane, caused the price of syrup to increase by 20%.

The retail results for the batch were -

Fruits extract	428 kgs @ ₹ 18 per kg.
Glucose syrup	742 kgs @ ₹ 12 per kg.
Pectin	125 kgs @ ₹32.8 per kg.
Citric acid	1 kg at ₹ 95 per kg.
Labour	20 hours @ ₹ 30 per hour

Actual output was 1,164 kgs. of raspberry jam.

Required:

i. Calculate the ingredients planning variance that are deemed uncontrollable.
ii. Calculate the ingredients operating variances that are deemed controllable.
iii. Calculate the mixture and yield variances.
iv. Calculate the total variance for the batch.

Solution

Material Variance (Actual Output - 1164)

Standard					Actual		
Input	**Qty**	**Rate**	**Revised Std**	**Total**	**Qty**	**Rate**	**Amt**
Fruits	400 kg	16	19	7,600 (400 x 19)	428	18	7,704
Glucose	700 kg	10	12	8,400 (700 x 12)	742	12	8,904
Pectin	99 kg	33.2	33.2	3,286.80 (99 x 33.20)	125	32.8	4,100
Citric	1 kg	200	200	200 (1 x 200)	1	95	95
	1,200		**19,486.8**		1,296		**20,803**

Labour Variance

Hrs		Rate		Amt
18	x	32.5	=	585

Hrs		Rate		Amt
20	x	30	=	600

(1) Planning variance which are uncontrollable

F (16 - 19) x 400 = 1,200 (A)

G (10 - 12) x 700 = 1,400 (A)

2,600 (A)

(3) Material Cost Variance (19,486.8 - 20,803) = (316.2)

Material Usage Variance

F (400 - 428) x 19 = 532 (A)

G (700 - 742) x 12 = 504 (A)

P (99 - 125) x 33.20 = 863.2 (A)

C (1 - 1) x 200 = 0

1,899.2 (A)

Material Rate Variance

(19 - 18) x 428 = 428 (F)

(12 - 12) x 742 = 0

(33.2 - 32.8) x 125= 50 (F)

(200 - 35) x 1 = 105 (F)

583 (F)

Material sub usage

$(1{,}200 - 1{,}296) \times \frac{1{,}9486.8}{1{,}200}$

1,558.944 (A)

Material Yield Variance

Input	**Output**
1,200	1,164
1,296	1,257.12

$(1{,}257.12 - 1{,}164) \times \frac{1{,}9486.8}{1{,}164}$

= 1,558.944 (A)

Material mix variance

F $\left(\frac{400}{1{,}200} \times 1{,}296\right)$ - 428 x 19 = 76 (F)

G $\left(\frac{700}{1{,}200} \times 1{,}296\right)$ - 742 x 12 = 168 (F)

P $\left(\frac{99}{1{,}200} \times 1{,}296\right)$ - 125 x 33.20 = 600.256 (A)

C $\left(\frac{1}{1{,}200} \times 1{,}296\right)$ - 1 x 200 = 16 (F)

340.256 (A)

Labour Cost Variance (585 – 600) = A(15)

(3) Total Variance

Material Cost Variance	1316.12 (A)
Labour Cost Variance	15.00 (A)
	1331.12 (A)

Case Study - 47

Managing Director of Petro-KL ltd (PTKLL) thinks that Standard Costing has little to offer in the reporting of material variances due to frequently change in the price of materials.

PTKLL can utilize one of two equally suitable raw materials and always plan to utilize the raw material which will lead to cheapest total production costs. However PTKLL is frequently trapped by price changes and the material actually used often provides, after the event, to have been more expensive than the expensive than the alternative which was originally rejected.

During the accounting period, to produce a unit of 'P' PTKLL could use either 2.50 Kg of 'PG' or 2.50 kg of 'PD'. PTKLL planned to use 'PG' as it appeared it would be cheaper of the two and plans were based on a cost of 'PG' of ₹ 1.50 per Kg. Due to market movements the actual prices changed and if PTKLL had purchased efficiently the cost would have been:

'PG' ₹ 2.25 per Kg;

'PD' ₹ 2.00 per Kg

Production of 'P' was 1,000 units and usage of 'PG' amounted to 2,700 Kg at a total cost of ₹ 6,480/-

Required:

Analyze the material variance for 'P' by:

(i) Traditional Variance Analysis; and

(ii) An approach which distinguish between Planning and Operational Variances.

Solution

Traditional Variance

Material Variance - Actual Production = 1,000

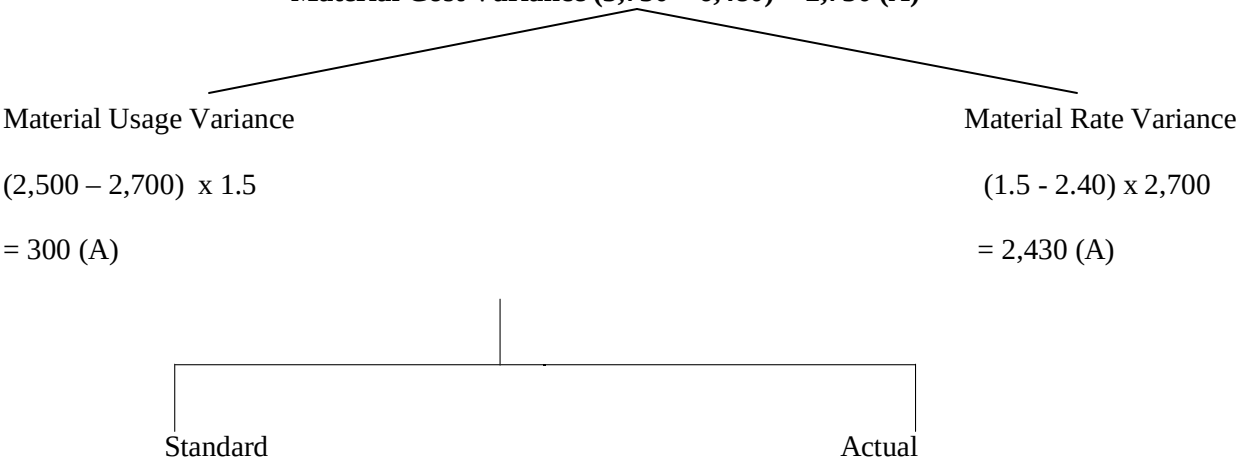
Standard

	Kg		**Rate**		**Amt**
PG	2,500 (1,000 x 2.50)	x	1.50	=	3,750

Actual

Kg		**Rate**		**Amt**
2,700	x	2.40	=	6,480

Material Cost Variance (3,750 – 6,480) = 2,730 (A)



	Kg	Rate	Revised Std	Total	Qty	Rate	Amt
PG	2,500 kg (1,000 x 2.5)	1.50	2.25	5,625 (2,500 x 2.25)	2,700	2.40	6,480

OPERATIONAL VARIANCE

Price-Variance = (2.25 - 2.40) x 2,700 = 405 (A)
Usage-Variance = (2,500 – 2,700) x2.25 = 450 (A)
855 (A)

PD Price-Variance = (1.5 - 2) x 2,700 = 1,350 (A)
Usage-Variance = (2 - 2.40) x 2,700 = 1,080 (A)
2,430 (A)

Case Study - 48

Osaka Manufacturing Co. (OMC) is a leading consumer goods company. The budgeted and actual data of OMC for the year 2013-14 are as follows:-

Particulars	Budget	Actual	Variance
Sales / Production (units)	2,00,000	1,65,000	(35,000)
Sales (₹)	21,00,000	16,92,900	(4,07,100)
Less: Variable Costs (₹)	12,66,000	10,74,150	1,91,850
Less: Fixed Costs (₹)	3,15,000	3,30,000	(15,000)
Profit	5,19,000	2,88,750	(2,30,250)

The budgeted data shown in the table is based on the assumption that total market size would be 4,00,000 units but it turned out to be 3,75,000 units.

Required:

Prepare a statement showing reconciliation of budget profit to actual profit through marginal costing approach for the year 2013-14 in as much detail as possible.

Solution

Step No 1 Statement Showing Cost Sheet

	Budget Units = 24,000	
	Total	**Per Unit**
Sales (units)	2,00,000	
	₹	
Sales	21,00,000	10.5
V. Cost	(12,66,000)	(6.33)
Contribution	8,34,000	4.170
F. Cost	(3,15,000)	1.575
	5,19,000	2.595

Step No 2 Statement Showing Profit and Loss

Sales (units)	16,92,900
V. Cost	(10,74,150)
Contribution	6,18,750
Fixed Cost	(3,30,000)
	2,88,750

Step 3: Statement showing Reconciliation

	₹
Profit as per Cost Sheet	5,19,000
Due to V.O Cost Variance	(29,700)
F.O Cost Variance	(15,000)
Due to Sales Margin (Size Variance)	(52,125)
Sales Margin Sale Variance	(93,825)
Due to Sales Margin Price Variance	(39,600)
Profit as per P&L	**2,88,750**

Step No 4 Analysis of Variance

Standard

Units		**Rate**		**Amt**
2,00,000	x	4.170	=	8,34,000

Actual

Units		**Rate**		**Amt**
1,65,000	x	3.93	=	6,48,450

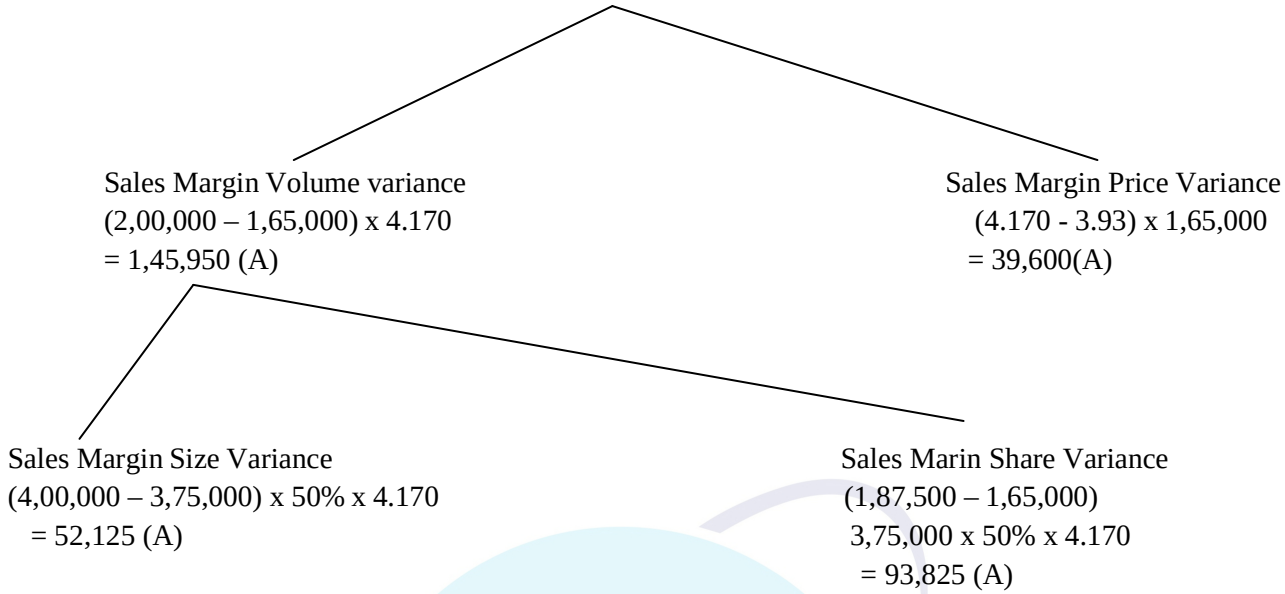
Actual Selling Price (p.u) = 10.26

(16,92,900 ÷ 1,65,000)

Budget Cost (p.u) = (6.33)

3.93

Sales Margin Variance (8,34,000 – 6,48,450) = 1,85,550 (F)



Variable Cost Variance Actual Production = 1,65,000 units

Standard

Units		**Rate**		**Amt**
1,65,000	x	6.33	=	10,44,450

Actual

Units		**Rate**		**Amt**
1,65,000	x	6.51	=	10,74,150

(12,66,000 ÷ 2,00,000 x 1,65,000) = 10,44,450

V.O. Cost Variance

(10,44,450 – 10,74,150) = 29,700

Fixed O.H. Cost Variance

(3,15,000 – 3,30,000) = 15,000 (A)

CHAPTER 13
LEARNING CURVE THEORY

Case Study -1

A company has 10 direct workers, who work for 25 days a month of 8 hours per day. The estimated down time is 25% of the total available time. The company received an order for a new product. The first unit of the new product requires 40 direct labour hours to manufacture the product. The company expects 80% (index is -0.322) learning curve for this type of work. The company uses standard absorption costing and the cost data are as under:

Direct Material	₹ 60per unit
Direct labour	₹ 6 per direct labour hour
Variable Overheads	₹ 5 per direct labour hour
Fixed overheads	₹ 7,500 per month

(i) Calculate the cost per unit of the first order of 30 units.
(ii) It the company receives a repeat order for 20 units, what price will be quoted to yield a profit of 25% on selling price?

Solution

Initial Batch	Hrs. Per batch	Learning Curve Ratio
14	40	80%

$$\text{Standard Absorption Rate Per Hour} = \left(\frac{7,500}{1,800}\right) = 5.00$$

Total Hrs. Available	=	2,000
110 hrs. x 25 days x 8 hrs.		
(-) 2.5 % down time		(500)
		1,800

Hrs. required if production = 30 units
(Note no. 1)

Hrs. required for production = 20 units
Hrs. for 50
Hrs. for 30
Hrs. for 20

Note No. (i) If Production = 30 units

$$\text{Hrs. per batch} = \log 40 + \left(\frac{\log 80}{\log 2}\right) \text{x} \log 30$$

$$= 1.6021 + \left(\frac{-1 + 0.9,031}{0.3,010}\right) \text{x } (1.4771)$$

= **1.12658 (Antilog)**

= 1.1266 (Antilog)

= 1,337

2

13.39

= 13.39 x 30

= 401.00

= **402**

If Production 50 units

$= \log 40 + \left(\frac{\log 80}{\log 2}\right) \text{x} \log 50$

$= 1.6021 + \left(\frac{-1 + 0.9031}{0.310}\right) \text{x } (1.0990)$

= 1.0551 (Antilog)

= 11.35

$\text{Total}\left(11.35 \text{ x } \frac{50}{1}\right)$

= **50,750 ~ 568**

Statement Showing Cost Sheet

	30 units		**20 units**	
	Total	**p.u**	**Total**	**p.u**
Direct Cost				
Direct Material	1,800	60	1,200	60
Direct Labour	2,412	60.4	996	193
Prime Cost	$\left(\frac{402 \text{ hrs. x } 6}{4{,}212}\right)$	140.41	$\left(\frac{166 \text{ x } 6}{2{,}196}\right)$	109
Ind - Cost				
Variable Overhead	2,010	567	830	84
Fixed Overhead	2,010	67	830	41
Total Contribution	(402 x 5) 8,232		3,896	
Profit & Sale	$\left(8{,}232 \text{ x} \frac{25}{75}\right) = 2{,}744$		$\left(3{,}856 \text{ x} \frac{25}{75}\right) = 1{,}286$	
			5,142	

The learning curve ratio is only applicable for human & not for machine.

Case Study -2

An electronics firm which has developed a new type of fire-alarm system has been asked – to quote for a prospective contract. The customer requires separate price quotations for each of the following possible order:

Order	**Number of fire-alarm systems**
First	100
Second	60
Third	40

Solution Note No.1

X		Learning Curve Ratio (80%) y
100	$\frac{100}{100} = 1.00$	normal
60	$\frac{160}{100} = 1.60$	80.1 % from table
40	$\frac{200}{100} = 2.00$	80%

		Hrs. required	
Dept. A	100 Nos. →	(100 x 20 hrs.) =	2,000 hrs.
	60 Nos. →	(60 x 20 hrs.) =	1,200 hrs.
	40 Nos. →	(40 x 20 hrs.) =	800 hrs.

Hrs. for 160 5,510.4 hrs.
(160 x 40 x 86.11)
Hrs. for 100 (21,000)
1,510.4 (511)

l
hrs. for 200 6,400
(200 x 40 x 80%)
Hrs. for 160 (5,510.4)
8,896.60 (890)

	100 Nos.	60 Nos.	40 Nos.
Labour Cost			
Dept A	20,000	12,000	800
	(2,000 hrs. x 10)	(1,200 hrs. x 10)	(800 hrs.)
Dept B	60,000	22,665	13,350
	(4,000 hr. x 15)	(1,511 x 15)	(890 x 15)
Total	**80,000**	**34,665**	**21,350**
Variable Overhead	16,000	6,933	4,270
(20 % ─ lab cost)	(80,000 x 20 %)	(34,665 x 20 %)	(21,350 x 20 %)
Fixed Overhead			
Department A	16,000	9,600	6,400
	(2,000 x 8)	(1,200 x 8)	(800 x 8)
Department B	20,000	7,555	4,450
	(4,000 x 5)	(1,511 x 5)	(890 x 5)
	36,000	**1,71,555**	**10,880**

Statement Showing Cost Sheet

	100 Nos.		60 Nos.		40 Nos.	
	Total	**p.u**	**Total**	**p.u**	**Total**	**p.u**
Direct Material	50,000	500	30,000	500	20,000	500
Direct Labour	80,000	800	34,665	577.75	21,350	533.75
Prme Cost	1,30,000	1,300	64,665	1,077.75	41,350	1,033.75
Ind Cost						
(1) Variable Overhead	16,000	160	6,933	115.55	4,270	106.75
(2) Fixed Overhead	36,000	360	17,155	285.91	10,881	271.3
Total Cost	1,83,000		88,753		56,470	
(+) Profit	45,500		22,188.25		14,117.50	
Sales	2,27,500		1,10,941.25		705,875	

Case Study -3

The firm estimates the following cost per unit for the first order:

Direct Materials - ₹ 500
Direct Labour -
Deptt. A (Highly automatic) 20 hours at ₹ 10 per hour.
Deppt. B (Skilled Labour) 40 hours at ₹ 15 per hour.
Variable Overheads 20 % of direct labour
Deptt. A ₹ 8 per hour
Deppt. B ₹ 5 per hour

Determine a price per unit for each of the three orders, assuming the firm uses a markup of 25% on total costs and allows for an 80% learning curve.
Extract from 80% Learning Curve table:

X	1	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
Y (%)	100	91.7	89.5	87.6	86.1	84.4	83	81.5	80

x represents the cumulative total volume produced to date expresses as a multiple of the initial order.
y is the learning curve factor, for a given X value, expressed as a percentage of the cost of the initial order.

Case Study -4

CYZ CO. has observed that a 90% learning curve ratio applies to all labour related costs each time a new model enters production. It is anticipated that 320 units will be manufacture during 1999. Direct labour cost for the first lot of 10 units amounts to 1,000 hours at ₹ 8 per hour. Variable overhead cost is assigned to products at the rate of ₹ 2 per direct labour hour.

You are required to determine:

i) Total Labour and labour related costs to manufacture 320 units of output
ii) Average cost of (a) the first 40 units produced (b) the first 80 units, (c) the first 100 units.
iii) Incremental cost of (a) units 41 – 80 and (b) units 101 – 200.

Solution Given

Initial Order	Hrs. Required (P.B)	Learning Curve Ratio
10 units	1,000	90%
20	900	(1,000 x 90 %)
40	810	(900 x 90 %)
60	729	(810 x 90 %)
160	656.1	(729 x 90 %)
320	590.49	(656 x 90 %)

Ans (i) Statement showing Total Labour & Related Cost

If production = 320 units

$$\text{Total hrs. Required} = \left(590.49 \text{ x} \frac{320 \text{ units}}{10 \text{ units}}\right)$$

= 18,895.65 hrs.

Total Cost = 18,895.65 hr. x ₹ 10

= **21,88,956.8**

Labour Cost per hour	5.00
Variable cost per hour	2.00
Total Cost per hour	**10.00**

Labour Cost per hour	5.00
Variable cost per hour	2.00
Total Cost per hour	10.00

(ii) If production = 40 units

$$\text{Total hrs. required} = \left(810 \text{ x} \frac{404}{100}\right) =$$ 3,240 units

Total cost = (3,240 x 10) = 1,32,400

Average Cost p.u = (32,400 ÷ 40) = 810.00 p.u

b) If product 80 unit

$$\text{Total hrs. required} = \left(728 \text{ x} \frac{804}{104}\right) =$$ 5,832 hr.

total hr = (5,832 x 10) = 2,58,320

Average Cost p.u = (58,320 ÷ 80) = ₹ 729.00 p.u

c) If production = 100 units

Ans (iii)

If production = 100 units

If log table value is not given

If log table value is given

Hrs. Required Per Batch = Log K + $\left(\frac{\text{Log Learning Curve Ratio}}{\text{Log 2}}\right)$ x log *x*

Log K ↓ Base Hrs./Base Cost

Given ↑ Log Learning Curve Ratio / Log 2 ↓ Given / constant

log *x* ↓ No. of Batch

$= \log 1{,}000 + \left(\frac{\log 0.90}{\log 2}\right) \text{x} \log 10$

$= 3.0000 + \left(\frac{-1 + 0.9542}{0.3010}\right) \text{x } 1.0000$

= 2.8478 (Antilog)

7,031

13

704.4

$\text{Total hrs. required} = \left(704.40 \text{ x} \frac{100 \text{ units}}{10 \text{ units}}\right)$

Total cost = (7,044 hrs. x 10) = 70,440

Average cost = (70,440 ÷ 100) = 704.40 (p.u)

If product = 200 units

$\text{Hours required} - \text{per product} = \log 1{,}000 + \left(\frac{\log 0.90}{\log 2}\right) \text{x} \log 10$

$= 3.0000 + \left(\frac{-1 + 0.9542}{0.3010}\right) \text{x } (1.3010)$

= 2.8020 (Antilog)

6,33.9

$\text{Total hr.} = \left(633.90 \text{ x } \frac{200}{10}\right) = 12{,}678$

$\text{Total cost } = (12{,}678 \text{ x } 10\ ) = 1{,}26{,}780$

$\text{Average cost } = (1{,}26{,}780 \div 200\ ) = 633.9$

- **It is the question, the language is used like incremental, differential, repeat, additional then calculation will be as total**

(iii) **41-804**

Total cost for 80 units	58,320
Total cost for 40 units	(32,400)
Int 41 -80	**29,920**

101-200

Total cost for 200	1,26,780
Total cost for 100	(70,440)
	56,340

Case Study -5

XYZ &Co. has given the following data:

80% Average – Time Curve

Cumulative Units(X)	Average Hours	Total Hours	Marginal Hours
1	100	100	100
2	80	160	60
3	?	?	?
4	64	256	?

Required: Fill in the blanks.

Initial Balance	Hrs. per Batch	Learning Curve Ratio	Total Hrs.	Marginal Hrs.
1	100	80%	1 x 100 = 100	100 - 0 = 100
2	80 (p.b)	(80 % x 100)	$\left(\frac{2}{1}\text{ x }80\right) = 160$	160 - 100 = 60
3	70.21	(i)	$\left(\frac{3}{1}\text{x }70.21\right) = 210.63$	210 .63 - 160 = 50.63
4	64	(80 % x 80)	256	256 - 210.63 = 45.37

Note No. 1

If production = 3 units

Group B

$$= \log 100 + \frac{\log 0.80}{\log 2} \text{x} \log 3$$

$$= 2.000 + \frac{-1 + 0.9031}{0.3010} \text{x } 0.4{,}771$$

= 1.8464 (Antilog)

7,015
+ 6
7,021
100

Case Study -6

A customer has asked your company to prepare a bid on supplying 800 units of a new product. Production will be in batches of 100 units. You estimate that costs for the first batch of 100 units will average ₹ 100 a unit. You also expect that a 90% learning curve will apply to the cumulative labour cost on this contract.

Required:

a) Prepare an estimate of the labour costs of fulfilling this contract.
b) Estimate the Incremental labour cost of extending the production run to produce an additional 800 units.
c) Estimate the incremental labour cost of extending the production run from 800 units to 900 units.

Initial Order	Cost	Learning Curve Ratio
	(P - B)	
100	10,000	90%
200	9,000	(10,000 x 90 %)
400	8,100	(9,000 x 90 %)
800	7,290	(8,100 x 90 %)
1,600	6,561	(7,290 x 90 %)

a) If production – 800 units

$$\text{Total Cost} = \left(7{,}290 \text{ x } \frac{800 \text{ units}}{100 \text{ units}}\right) = 58{,}320$$

b) Incremental = 800 units

$$\text{Cost for 1,600 units} = \left(6{,}561 \text{ x } \frac{1{,}600}{100}\right) =$$

	104,976
Cost for 800 units	(58,320)
Increment - (800 - 1,600)	**46,656**

c) Incremental as 800 unit to 900 unit

If production = 900 units

$$\text{Using log table} = \log 10{,}000 + \left(\frac{\log 0.90}{\log 2}\right) \text{x} \log 10$$

$$= 4.000 + \left(\frac{-1 + 0.9542}{0.3010}\right) \text{x } (0.9542)$$

= 3.8545 (Antilog)

7,145
+ 13
7,158

$$\left(7{,}158 \text{ x} \frac{900 \text{ units}}{100 \text{ units}}\right)$$

= 64,422

Cost for 900	=	64,422
Cost for 800	=	(58,320)
Cost for 800 - 900 units		**6,102**

CHAPTER 14
LINEAR PROGRAMMING PROBLEM

Case Study -1

A manufacturer produces two produces two products A and B, and has his machines in operation for 24 hours a day. Production of A requires 2 hours Production of B requires 8 hours of processing in machine M_1 and 2 hours in machine M_2.The manufacturer earns a profit of □ 5 on each unit of A and □ 2 on each unit of B. How many units of each product should be produced in a day in order to achieve maximum profit?

Solution

Step 1: Tabulation

	A = X_1	**B = X_2**	**Maximum Hrs.**
M_1	2 hrs.	6 hrs.	24 hrs.
M_2	6 hrs.	2 hrs.	24 hrs.
Maximum Profit	□ 5	□ 2	

Step 2: Formulation

Max (2) = S X_1 + 2 X_2

2 X_1 + 6 X_2 $\leq$ 24

6 X_1 + 2 X_2 $\leq$ 24

X_1, X_2 $\geq$ 0

2 X_1 + 6 X_2 = 24

15 X_1 = 0 X_2 = 4

15 X_2 = 0 X_1 = 12

6 X_1 + 2 X_2 = 24

15 X_1 = 0 X_2 = 12

15 X_2 = 0 X_1 = 4

Statement Showing Maximum Profit

	X_1	+	**X_2**	=	**Maximum Profit**
(a)	0 x 5	+	0 x 2	=	0
(b)	4 x 5	+	0 x 2	=	20
(c)	3 x 5	+	3 x 2	=	(21)
(d)	0 x 5	+	4 x 2	=	8

∴ Point C Alternatively, if no time as per new syllabus if they have not said solve graphically; we can do simultaneous equation

$2 X_1 + 6 X_2 = 24 \times 3$

i.e. $6 X_1 + 18 X_2 = 72$

$6 X_1 + 2 X_2 = 24$

$16 X_2 = 48$

$\therefore X_2 = 3$ By Substituting $X_1=3$

Case Study -2

A Ltd. makes 2 products, Tables (T) and Chairs (C), which must be processed through Assembly (A) and Finishing (F) departments Assembly has 60 hours available per week, finishing can handle upto 48 hours a week.

Manufacture of one table requires 4 hours of assembly and 2 hours in finishing. Each chair requires 2 hours in assembly and 4 hours in finishing.

Profit is ₹ 80 per table and ₹ 60 per chair. Choose the best combination of chairs and tables to produce to maximum profit.

1. Formulate the Linear Programming model equations.
2. Present graphically.
3. What is the maximum profit?

	Tables = X_1	**Chairs = X_2**	
Assembly	4	2	60 hrs.
Finishing	2	4	48 hrs.
Net Profit	₹ 80	₹ 60	

Max (Z) = $80 X_1 + 60 X_2$

$4 X_1 + 2 X_2 \leq 60$

$2 X_1 + 4 X_2 \leq 48$

$X_1, X_2 \geq 0$

$\therefore 4 X_1 + 2 X_2 \leq 60$

$X_1 = 0 \quad X_2 = 30$

$X_2 = 0 \quad X_1 = 15$

$2 X_1 + 4 X_2 \leq 48$

If $X_1 = 0 \quad X_2 = 12$

$X_2 = 0 \quad X_1 = 24$

Statement Showing Maximum Profit

	X_1	**+**	**X_2**	**=**	**Maximum Profit**
(a)	80 x 0	+	60 x 0	=	0
(b)	80 x 15	+	60 x 0	=	1,200
(c	80 x 12	+	60 x 6	=	1,320
(d)	80 x 0	+	60 x 12	=	720

$\therefore$ Maximum Profit of ₹ 1,320 at $X_1 = 12$, $X_2 = 6$

Alternative, Simultaneous Equation:

$4 X_1 + 2 X_2 \leq 60$
$2 X_1 + 4 X_2 \leq 48 \times 2$

$\therefore$ ~~$4 X_1$~~ $+ 2 X_2 \leq 60$
~~$4 X_1$~~ $+ 8 X_2 \leq 96$
$- \quad -$
$6 X_2 = 36$
$X_2 = 6$

By substituting $X_1 = 12$

$\therefore$ Maximum Profit at $X_1 = 12$, $X_2 = 6$

	Fan = X_1	**Sewing Machine = X_2**	
Cost Space	360	240	5,760
			20
Maximum Profit	22	18	

Max (2) = $22 X_1 + 18 X_2$
$X_1, X_2 \geq 0$
$360 X_1 + 240 X_2 \leq 5{,}760$
$X_1 + X_2 \leq 20$

$360 X_1 + 240 X_2 \leq 5{,}760$

If $X_1 = 0$ $X_2 = 24$
$X_2 = 0$ $X_1 = 16$

$X_1 + X_2 \leq 20$

If $X_1 = 0$ $X_2 = 20$
If $X_2 = 0$ $X_1 = 20$

Statement Showing Maximum Profit

	X_1	+	**X_2**	=	**Maximum Profit**
(a)	0 x 22	+	0 x 18	=	0
(b)	16 x 22	+	0 x 18	=	352
(c)	8 x 22	+	12 x 18	=	392
(d)	0 x 22	+	20 x 18	=	360

Alternatively, solving simultaneous
$360 X_1 + 240 X_2 \leq 5{,}760$
$360 X_1 + X_2 \leq 20 \times 360$

$360 X_1 + 240 X_2 \leq 5{,}760$
$360 X_1 + 240 X_2 \leq 5{,}760$
$- \quad - \quad -$
$120 X_2 = 1{,}440$
$X_2 = 12$

Substituting $X_1 = 8$

Case Study -3

A Sports Club is engaged in the development of their players by feeding them certain minimum amount of Vitamins (say A, B and C). In addition to their normal division view of this, two types of products X and Y are purchased from the market. The contents of Vitamin constituents per unit are shown in the following table :

Vitamins Constituents	**Vitamin contents in products**		**Minimum requirement for each player**
	X	**Y**	
A	36	06	108
B	03	12	36
C	20	10	100

The cost product X is ₹ 20 and that of Y is ₹ 40.
Formulate the Linear Programming problem for the above and minimize the total cost, and solve problem by using graphic method.
Ans:- The optional solution is to purchase 4 units of products X and 2 units of product Y.

Solution

	$X = X_1$	**$Y = X_2$**	**Min Requirement**
A	36	6	108
B	3	12	36
C	20	10	100
Cost	20	40	

Min (2) = $20 X_1 + 40 X_2$
$36 X_1 + 6 X_2 \geq 108$
$3 X_1 + 12 X_2 \geq 36$
$20 X_1 + 10 X_2 \geq 100$
$X_1 , X_2 \geq 0$

$36 X_1 + 6 X_2 \geq 108$

If $X_1 = 0$ $X_2 = 18$
$X_2 = 0$ $X_1 = 3$

$3 X_1 + 12 X_2 \geq 36$

If $X_1 = 0$ $X_2 = 3$
$X_2 = 0$ $X_1 = 12$

$20 X_1 + 10 X_2 \geq 100$

If $X_1 = 0$ $X_2 = 10$
$X_2 = 0$ $X_1 = 5$

Statement Showing Analysis of Minimum Cost

	X_1	+	X_2	= Cost
(a)	0 x 20	+	18 x 40	= 720
(b)	2 x 20	+	6 x 40	= 640
(c)	4 x 20	+	2x 40	= 160
(d)	12 x 20	+	0 x 40	= 240

$\therefore$ Minimum Cost =₹ 160 at $X_1 = 4$, $X_2 = 2$

Case Study -4

A dealer wishes to purchase a number of fans and sewing machines. He has only ₹ 5,760 to invest and has space utmost for ₹ 20 items. A fan costs him ₹ 360 and a sewing machine ₹ 240 His expectation is that he can sell a fan at a profit of ₹ 22 and a sewing machine at a profit of ₹ 18 Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit ? Formulate this problem as a linear programming problem and then use graphical method to solve it.

	Fan = X_1	**Sewing Machine = X_1**	**Maximum**
Investment	360	240	5,760
Sale			20
Profit	22	18	

Max (2) = 22 X_1+ 18 X_2

X_1

360 X_1 + 240 X_2 $\leq$ 5,760

1 X_1 + 1 X_2 $\leq$ 20

X_1 , $X_2 \geq 0$

Solution

Max (2) = 22 X_1+ 18 X_2

X_1

360 X_1 + 240 X_2 $\leq$ 5,760

$X_1 = 0$, $X_2 = 24$

$X_1 = 16$, $X_2 = 0$

1 X_1 = 1X_2

$X_1 = 0$, $X_2 = 20$

$X_1 = 20$, $X_2 = 0$

Statement Showing Analysis of Profit

	X_1	**X_2**	**Profit**
a)	0 x 22	0 x 18	0
b)	16 x 22	0 x 18	352
c)	8 x 22	12 x 18	392
d)	0 x 22	20 x 18	360

Case Study -5

A firm manufactures two products namely A and B. The contribution per kg of output is ₹ 240 and ₹ 140 respectively for products A and B. The total fixed costs amount to ₹ 1,200 per week. The production of

two products is restricted by limited supplies of three items of raw materials namely P, Q and R. The quantities of P, Q and R which are necessary to produce single units of the products A and B together with the total stock of materials available each week are given below:

	Product A	**Product B**	**Total Quantity available per week kg**
Raw material P	16	20	160
Q	10	25	150
R	4	0	32

Using the graphical approach of Linear Programming (LP), calculate the maximum Profit per week.
Ans:- Maximum Profit is ₹ 944

Solution

	A = X_1	**B = X_2**	
P	16	20	160
Q	10	25	150
R	4	0	32
	240	140	FC = 1,200

Max (2) = 240 X_1+ 140 X_2 – 1,200
16 X_1+ 20 X_2 ≤ 160
10 X_1 + 25 X_2 ≤ 150
4 X_1 ≤ 32

16 X_1+ 20 X_2 ≤ 160
If X_1= 0 X_2 = 8
X_2 = 0 X_1 = 10

10 X_1 + 25 X_2 ≤ 150
If X_1= 0 X_2 = 6
X_2 = 0 X_1 = 15

4 X_1 ≤ 32
X_2 = 0 X_1 = 8
X_1 = 0 X_2 = 0

Statement Showing Maximum Profit

	X_1	+	X_2	= Total Contribution	Fixed Cost	=	Profit
(a)	0 x 240	+	0 x 140	= 0	1,200	=	(1,200)
(b)	8 x 240	+	0 x 140	= 1,920	1,200	=	720
(c)	8 x 240	+	1.6 x 140	= 2,144	1,200	=	944
(d)	5 x 240	+	4 x 140	= 1,760	1,200	=	560
(e)	0 x 240	+	6 x 140	= 840	1,200	=	(360)

∴ Maximum profit at X_1 = 8 of ₹ 944 X_2 = 1.5

Case Study -6

A manufacture produces two products D_1 and D_2 using two machines R_1 and R_2. Products D_1 requires 2 hours on machine R_1 and 6 hours on machine R_2. Product D_2 utilizes 5 hours of machine R_1 only. Total

hours available per day on machine R_1 is 16 and R_2 is 30. Profit margin from D_1 and D_2 is ₹ 2 and ₹ 10 per unit respectively. Using simplex method find out the daily production mix to optimis profit.
Ans:- 32

Solution Step No. 1

	D = X_1	**D = X_2**	**Maximum Hrs.**
R_1	2	5	16
R_2	6	0	30
Profit	2	10	

Max (2) = 2 X_1+ 10 X_2
Subject to
2 X_1+ 5 $X_2 \leq 16$
6 $X_1 \leq 30$
X_1 , $X_2 \geq 0$
Introducing the stack variable so the equation can be written as

Max (2) = 2 X_1+ 10 X_2 + 0 S_1+ 0 S_2
Subject to
2 X_1+ 5 X_2 + S_1 = 16
6 X_1 + 0 X_2 + S_2 = 30

Simplex Table

Fixed Ratio	**Profit**	**Products**	**(cj) Quantity**	**2 X_1**	**10 X_1**	**0 S_1**	**0 S_2**	**Replacement Ratio**
—	0	S_1	16	2	5	1	0	16 ÷ 5 = 3.2
0/5 = 0	0	S_2	30	6	0	0	1	30 ÷ 0 = 0
			2j	0	0	0	0	
				(0 x 2 + 0 x 6)	(0 x 5 + 0 x 0)	(0 x 1 + 0 x 0)	(0 x 0 + 0 x 1)	
		N Ɛ R	(cj - 2j)	2	10	0	0	
	10	X_2	16 / 5	2/5	1/5	1/5	0	
	0	S_2						
			cj	4	10	2	0	
				(10 x 2/5 + 0 x 6)	(10 x 1 + 0 x 0)	(10 x 1/5 + 0 x 0)	(10 x 0 + 0 x 1)	
		N Ɛ R	(cj - 2j)	— 2	0	— 2	0	

Working Note

Other Than Key Factor Row	**—**	**Fixed Ratio**	**x Key Factor Product**
30	—	(0 x 16)	= 30
6	—	(0 x 2)	= 6
0	—	(0 x 5)	= 0
0	—	(0 x 1)	= 0
1	—	(0 x 0)	= 1

Product	**Quantity**	**x**	**Rate**	**Maximum Profit**
x 2	16/5	x	10	= 32

Case Study -7

The budgeted data relating to two products manufactured by a company for a month are as under:

	Product A	Product B
Selling price	300	200
Variable manufacturing costs	160	60
Sales commission	60	40

Each unit of product incurs costs in the company's two departments P and Q. The total capacity available for the month under review is budgeted to be 1,400 hours in department P and 2,000 hours in department Q. The capacity costs amount to ₹ 14,000 and ₹ 20,000 respectively per month for P departments to complete one unit of output is as under:

	A	B
Department P	2	4
Department Q	5	4

The maximum output which the company can sell in the month is restricted to 400 units of either of the products.

You are required to formulate the Linear Programming (LP) model and solve it graphically to determine the optimal product mix and profit.

Ans (i) Optimal Profit ₹ 7,000

Solution

Products	$A = X_1$	$B = X_2$	
P	2 hrs.	4 hrs.	1,400 hrs.
Q	5 hrs.	4 hrs.	2,000 hrs.
Selling Price (p.u)	300	200	
(—) Variable Cost of Manufacturing	(160)	(60)	
(—) Sales Contribution	(60)	(40)	
Contribution p.u	80	100	Fixed Cost 14,000 + 24,000 = 34,000
Maximum Sales	400	400	

$2 X_1 + 4 X_2 = 1,400$

$5 X_1 + 4 X_2 = 2,000$

Max (2) = $80 X_1 + 100 X_2 - 34,000$

$X_1 \leq 400$

$X_2 \leq 400$

$X_1 X_2 \geq 0$

$2 X_1 + 4 X_2 = 1,400$

If $X_1 = 0$ $X_2 = 350$

If $X_2 = 0$ $X_1 = 700$

$5 X_1 + 4 X_2 = 2,000$

If $X_1 = 0$ $X_2 = 500$

If $X_2 = 0$ $X_1 = 400$

$X_1 = 400$, $X_2 = 400$

Statement Showing Maximum Profit

	X_1	+	X_2	— Fixed Cost	=	Profit
(a)	0 x 80	+	0 x 100	— 34,000	=	(34,000)
(b)	400 x 80	+	0 x 100	— 34,000	=	(2,000)
(c)	200 x 80	+	250 x 100	— 34,000	=	7,000
(d)	0 x 80	+	350 x 100	— 34,000	=	1,000

Alternatively, Simultaneous Equation

$2 X_1 + 4 X_2 = 1{,}400$

$5 X_1 + 4 X_2 = 2{,}000$

— — —

$3 X_1 = 600$

$X_1 = 200$

By Substituting $X_2 = 250$

Maximum Profit of 7,000 at $X_1 = 200$, $X_2 = 250$

CHAPTER -15
STRATEGIC COST MANAGEMENT & PERFORMANCE EVOLUTION CASE STUDY THEORY

ESSENTIALS FOR CASE STUDY

- Case Study is not about the quantity but the quality
- Prepare a plan for each issue
- Decide what models to use and prioritize the issues.
- Identify the impact and alternative actions that could be taken as well as the relevant concepts and calculations required.
- Answer should have a logical flow.
- Offer a detailed analysis of the issues and conclude with sound, well justified recommendations.
- Not to spend too much time on calculations.
- Do not place too much attentions and time on the presentation.
- Quality of discussion on each issue which is most important, not the ranking order.
- Discuss each of the issues in depth, explaining their impact.
- Do not leave any of the Issue undecided.
- Recommendations should include 'what to do', 'why to do it' and 'how to do it'.
- Identify ethical issues and the briefly justify.
- Recommendations should appear at the end of the report.
- Practice makes perfect.

SUPPLY CHAIN MANAGEMENT

CASE STUDY NO: 1

Sun Electronics manufactures and sells various electronic goods like mobile phone, laptops, television, refrigerator etc. The company sells these goods through the 80 stores situated in different parts of the country. The stores managers place a request to the centralized them situated in Mumbai on a monthly basis. On store can send only one requisition per month.

The requirements of the stores are forwarded to the production planning team which is responsible for scheduling and manufacturing of these products. Once, the goods are manufactured, the goods are sent to central warehouse in Mumbai and are dispatched to different stores according to the stores requirements. The time taken from placing a request from store to the delivery of product to the store takes about 30-40 days on an average. In the process the company procures parts from more than 100 vendors. The company has faced quality related issues with many vendors leading to delay in production.
The average holding period of inventory in Sun Electronics is very high at 45 days as against and industry average of 15 Days. Since the order to delivery time at a store is very high, the company has traditionally allowed high inventory holding to reduce the stock outs at store level. The company is under severe pressure to improve its working capital cycle.

A high amount of inventory held at each store also means that the products become obsolete quickly. In case of products like mobile phones, new and upgraded versions are available in the market as early as six months from the date of initial launch of a particular model. A significant portion of inventory of mobile phones becomes obsolete every year. The company generally resorts to a discounted sale to liquidate such obsolete models.

The management at Sun Electronics has identified e-commerce as an opportunity for faster growth, both in terms of revenues and profitability. The company is considering launch of its own e-commerce website to sell all produces which are currently being sold in physical stores. Depending upon the success of online sales, the company might choose to optimize and close certain physical stores in the next couple of years.

The management of the company is cognizant of the fact that existing inventory procurement and management system will not fir in the new e-commerce business. E—commerce works on an inventory light model and quick as well as on time delivery of products of the customers. The fact that customers could be from a location other than those where Sun Electronics has physical presence makes the matter complex.

Required

The company is considering implementations of a supply chain management system. Willa supply chain management system is of use to Sun Electronics in light of the e-commerce venture? You are required to EXPLAIN the concept of Supply Chain Management and EVAULATE the applicability of in the current case.

Solution

Issue

Sun Electronics Manufactures and sells various electronics product through its physical stores. The existing manufacturing system does not take into consider the demand of products in the market. Store managers are allowed to submit only one order per month. A high level of inventory can be seen at Sun Electronics as compared to the industry average. The store managers tend to keep high level of inventories as a safeguard against stock outs. Whereas, keeping inventory to meet customer requirement is good, high level of inventories due to inefficient processes is not advisable.

The company also has a longer working cycle because of a long order to deliver time and excess holding of inventory. A significant amount of working capital is blocked due to this practice. Technology changes rapidly and the company is expected to roll out latest products in the market. A product like mobile gets outdated very soon and the company has to resort to discounted sales. This results in financial losses to the company.

The Company Has identified an opportunity in e-commerce. E-commerce businesses require leaner models and faster response time. The production must be based on the demand from the customer and not on an ad-hoc basis. In the following paragraphs, the importance of supply chain management (SCM) and its applicability in the current case is discussed.

Supply Chain Management (SCM)

Supply Chain Management can be defined as the management of flow management of flow of products, service and information, which begins from the origin of products and ends at the product's consumption at consumer's end. SCM also involves movement and storage of raw material, work-in-progress and finished goods. In the other words, supply chain management involves management of all activities associated with moving goods from the raw materials stage to the end user. An important objective of SCM is to correlate the production and distribution of goods and services with demand of the product

The following are the various activities which an organization carries out to meet the customer requirements (Primary activities under value chain model)-

- Inbound Logistics covering procurement and related activities

- Operations covering conversion of raw material into finished products
- Outbound Logistics covering movement of products from plants to end users
- Marketing and Sales
- Service

Supply Chain Management looks each of the above activities as integrated and interrelated to each other. None of the activities can be looked in silos. In the case of Sun Electronics, there is a restriction on number of orders which a store manager can place. This would lead to excess ordering because of the fear of stock-outs.
The customer demand is completely ignored and hence the production is not in sync with market demand. This could lead to excess production, higher inventory holding and longer working capital cycles.

- The facts presented in the case indicate the following problems in Sun Electronics
- Production planning is not based on customer demand & is done on an ad-hoc basis.
- Inventory Holding period is very high (45 days against and industry average of 15 days)
- The working capital cycle is longer.
- The time take to fulfill an order from the store is very high.
- The production is dispatched to a central warehouse for further deliveries to the stores. This could be an inefficient process.
- Liquidation of products at discount for products with low shelf life.

SCM Process and applicability to Sun Electronics

The SCM process is explained below:

- **Plan** – The first step In SCM process is to develop a plan to address the requirements of the customer. Sun Electronics must shift its focus from ad hoc and predetermined production planning to understanding the requirements of customers. Production must be planned based on the demand of products. The focus must be on producing what the customer wants.
- **Develop (procure)** – In this step, the material required for production is sourced from various suppliers. A good relationship with supplier is required to ensure that the parts/materials are received as and when required by the production team. It is also important that the vendors supply quality material which is not the case in Sun Electronics. The company must select suppliers which are dependable can deliver quality products in the situated time. The company must focus in reducing the lead time required for sourcing materials which will reduce the inventory holding period.
- **Make** – The third step is making or manufactured the products required by the customer. This is quite different from the existing practice in Sun Electronics where store managers are allowed to place only one order. This would means that the company is not considering the ever changing demands and tastes of the customers.

- **Deliver** – The fourth stage is to deliver the products manufactured the products manufactured for the customers. This stage is concerned with logistic. The time required to deliver to the store in case of Sun Electronics is very high. The company must evaluate if the centralized warehouse is causing delay of products to the stores.

Logistics is one of the important components of the entire supply chain process. Right from procurement of material, movement of raw material in the plats and final delivery of products of customers, logistics play a critical role. An excellent system must be in place to ensure that the movement of material and final product are uninterrupted.

Warehousing also plays an important role in today's business environment the company has a centralized warehouse to meet the needs of all its stores. This would not be the most efficient way. The company must evaluate creation of additional storage facility which would ensure timely delivery of goods to the stores. Newer products can reach the market faster.

Benefits of SCM to Sun Electronics

SCM looks at the entire value chain process as an integrated process. There is seamless flow of information and products between suppliers and customers. The customer's requirements would be captured to plan the production. The suppliers would be intimated to supply the materials according the production plan. An effective logistics system implementing in integrated ERP which would also interact with vendors on real time basis.
The following benefits of SCM can be envisaged for Sun Electronics –

- Better Customer Service as customer is supplied with what he/she wants in the minimum time.
- Better delivery mechanism for goods.
- Improves productivity across various functions and departments.
- Minimizes cost (both direct and indirect)
- Reduces the inventory holding time and improves the working capital cycle
- Enhance inventory management and assists in implementation of JIT System.
- Assists companies in minimizing wastes and reduce cost.
- Improves supplier relationship

E-commerce and SCM

The SCM is the backbone of E-commerce industry. Customers buying products Online want deliveries to be faster. Another distinct feature of e-commerce is that buyers could be located in any corner of the country and not just restricted to the cities where Sun Limited has physical presence. The definitely means that the company must have an effective Supply Chain Management in place which could meet the customer's requirement.

Customer Orders

The company must have an effective mechanism to capture customer orders and feed it into the production planning on a real time basis. An integrated ERP System would be required for this purpose. Any delay in intimating the production team would mean delay in production and delivery which would not be taken positively by the customers. The existing system of one order per month from store would not fir the purpose. A real time flow of information would mean lower inventory holding.

Procurement

The material requirement must be communicated to suppliers seamlessly. The company must identify those vendors who can deliver quality materials in the required time frame. A delay in suppliers would delay the production process. A company cannot afford this in e-commerce business. Automatic exchange of information using EDI (Electronic Data Interchange) or Integrated ERP system would ensure that the vendors receive material requirement in a timely.

Production

As discussed earlier, the production must be in accordance with the customer order. This requires a shift in approach of the production team. Business environments have shifted from "Customer will buy what we produce" to "We have to produce what the customers require". The company would ideally not produce products t store them and sell later.

Logistics

Logistics would be the backbone of entire e-commerce set up. Right from sourcing of materials of delivery of products at the customer's door step, logistic would play an important role. IF the company has an in-house logistic facility, the logistic team must be trained with the requirement of the new business. If the company has outsourced the logistics, vendors must be briefed about the requirements of thee-commerce. The company night have to tie up with new logistic vendors to avoid any delay in deliveries

TRANSFER PRICING

CASE STUDY NO: 2

Business Model

Real Easy Company is a rapidly growing start-up in the technology sector. It develops customized ERP packages for client across various business sectors. The business comprises primarily of two departments (1) consultant (2) customer support. Consultant department has highly qualified professional from management, accounting and technology background, who approach client as a team and work out solutions that meet support through telephone. E-mail or on-site. Currently, the strength of the consultants department is 200 while that of customer support is 150.

Yash. Has founder and CEO of the company. Is very passionate about this business model. To deliver high-quality product solutions, he believes that his staff should be well-trained and up-o-date with developments in their professional fields. Therefore, Rest Easy provides periodic training to it staff in-house. All employees are expected to undergo 2 weeks of training annually. A training department has been set up with qualified trainers in various fields, who provide periodic training sessions to both Consultant and Customer Service departments. The training department has 5 trainers. Training sessions are aimed at providing skills that the executives need to provide better service to their clients. This in house focus of high-quality delivery is the key factor that Yash believes would set apart Rest Easy from its competitors.

In addition to delivering training sessions, trainers are responsible for developing training material for routine, on-going as well as specialized training sessions. They attend conference, train the trainer sessions and subscribe to journals to keep themselves up-to-date with various developments that consultants and customer support executives need to be aware of.

At the beginning of each year, heads of consultant and customer service departments advice the training department on the expected number of training sessions that their staff would undertake. In special situations, where developments need to be communicated rapidly, extra sessions can also be conducted. Training department budgets are prepared based on these needs

Transfer Pricing – Training Cost Allocation

Cost incurred by the training department is allocated to the consultant and customer service department based on the training sessions availed by both departments. A standard quote (transfer Price) based on budgets is provided at the beginning of the year. At the end of the year, actual cost is allocated based on actual training sessions of each department.

Each of the user department use the transfer price to prepare their individual budgets, that further gets built into their pricing models used for billing clients. One of the metric for manager appraisal is also the financial performance of their individual departments. Hence, managers of both consultant and customer service departments are very cost conscious.

Figures for budget and actual costs for 2017 of the training department are as follows:

Cost Particulars	Budget	Actual
Salaries	25,00,000	30,00,000
Depreciation on Office Equipment	2,00,000	5,00,000
Software Licenses for Training Packages	80,000	1,05,000
Conference Travel for Train the Trainer Sessions	10,000	15,000
Telephone	20,000	25,000
Training Supplies	50,000	60,000
Trainee Lunch	1,00,000	1,20,000
Total Expenses	**29,60,000**	**38,25,000**

Consultant and Customer service departments are charged based on the number of training sessions actually availed. Details of training sessions for each department are:

Department	Budget	Actual
Consultant	100	100
Customer Service	100	80
Total	**200**	**180**

Problem of Goal Congruence

In accordance with the above to explanation, the training department quoted a rate of 14,800 per sessions based on budgeted cost and budgeted training session. (Budgeted Cost Rs. 29, 60,000 for 200 training sessions). Actual cost per sessions is Rs. 21,250 (Actual cost Rs. 38, 25,000 for 180 training sessions). Cost overrun of Rs. 6,450 per session, a jump of 44% from the original quote.

Consequently, a meeting was called that was attended by the managers of consultant, customer service and training department, along with CEO Yash.

The user departments were unhappy with the higher charge. Manager of the consultant department raised the following concerns:

(a) The market rate for similar trainings provided by external vendors was only, Rs 12,000 per session. He has accepted a higher transfer price of Rs. 14,800 per session only because the in-house training program was more customized towards Rest Easy's end-user-clients. However, if the department is actually going to be charged Rs. 24,250 per session, he would rather source the training to the outside vendor.

(b) Further, he pointed out that while his department had adhered to its commitment of 100 training sessions, the customer service department has availed off 20 lesser sessions than its commitment. Reviewing the cost structure of the training department, most of the expenses are fixed in nature. Therefore, when the transfer price is based on the actual cost and actual training sessions, the per session cost has increased because the customer service department did not undergo the entire 100 sessions. He questions, why he should bear a higher allocation of cost due to variance in actual and budgeted usage of training resources of the customer service department?

Manager of the customer service department explained that the variance of 20 training session is on account of the executives handling high-priority work pressure that did not allow them enough time to complete some of the training session. At the same she contended that she should not be charged for these 20 sessions for which no training was availed.

Manager of the training department explained that the Rs. 5, 00,000 cost overrun on salary due to new hire of a trainer. The trainer's experience is very valuable to the company and hence to get her on board, the company had to offer equipment was higher by Rs. 3, 00,000 due to higher replacement cost of ageing equipment. A specialized software license resulted in an excess spend of Rs. 25,000. The manager argued that the rest of the expenses were normal increases which were not controllable.

Yash, the CEO, was understandably not happy with the cost overrun. Higher internal transfer price to end user departments would affect employee morale. However, even though a cheaper option was available from an outside vendor, he could still foresee the value of investing in in-house training programs. Intangible benefits from these customized sessions, would definitely help the company's growth. To conclude, he was not willing to shut down the training department. At the same time, he had to resolve the dispute resulting from internal transfer pricing is an amicable way like profits teamwork is critical to success.

Required

(i) IDENTIFY the threats to goal congruence due to internal transfer pricing.

(ii) During the meeting, an alternate transfer pricing methodology based on two-part pricing system was formulated. Costs would be arrived based on budgeted costs and budgeted usage. The standard rate for fixed cost will be applied to the budgeted training sessions and charged to the user departments. The standard rata for variable cost will be applied to the actual training session and charged to the user departments. Fixed cost would be defined as those that are not directly impacted by the number of training sessions.
CALCULATE the transfer price to be charged to each department under this method.

(iii) EVALUATE how the two-part pricing price method of transfer pricing address the threats to goal congruence as identified in question 1?

Solution

(i) Threats to goals congruence due to internal transfer pricing are:

(a) User groups, consulting and customer service department are concerned that training department is not controlling its costs. Since the entire actual cost efficiently. Since the financials of user departments are affected, it may lead to conflict between the departments.

(b) Yash, the CEO is a firm believer of in-house training and its benefits. However, there are outside vendors that provide similar service at substantially reduced costs. Performance assessment of mangers of consulting and customer service is based on their department's financial metrics. Higher internal transfer price for training would affect employee morale since they have no control over these allocated costs. However, there performance is being evaluated based on uncontrollable factors. This could lead to discontent among the mangers. Alternatively, Yash may want to re-consider his strategy of in-house training. When suitable, training can be sourced to cheaper options available in the market, without compromising on quality.

(c) Most costs of the training department are fixed in nature, as they need to be incurred irrespective of the number of training sessions. These costs are being allocated to the user based on actual training sessions. The budgeted target price is used by the user departments, to determine their billing model to Rest Easy's end user client. Hence it is important that the budget transfer price is not very different from the actual transfer price charged at the end of the year. In the given problem, internal transfer price has been based on 200 sessions. Here the customer service department does not adhere to its commitment of 100 training sessions, training sessions actually availed are only 80. Since cost are mostly fixed in nature, the actual cost per training session increases. This is then charged out to the consultant and customer service department bear a higher cost

allocation due to variance in the usage of training resources. This can lead to friction between user departments.

(ii) By segregating the costs into fixed and variable components, Rest Easy is working out two-part pricing system for transfer price.
Two-Part Pricing System = Lump-Sum Charge + Marginal Cost
To segregate the costs into fixed and variable categories, the criteria is whether the costs change per additional training sessions. Accordingly, the
classification of costs will be as below:

Cost Particulars	**Budget**	**Classification**
Salaries	25,00,000	Fixed
Depreciation on Office Equipment	2,00,000	Fixed
Software Licenses for Training Packages	80,000	Fixed
Conference Travel for Train the Trainer Sessions	10,000	Fixed
Telephone	20,000	Fixed
Training Supplies	50,000	Variable
Trainee Lunch	1,00,000	Variable
Total Expenses	**29,60,000**	

The lump-sum charge would be based on the fixed cost budget. Marginal cost would be based on the variable cost budget.

Total budget fixed expenses = Rs 28,10,000 and total budget variable expenses = Rs 1,50,000. Number of training sessions is 200, that is 100 each for consultant and customer service departments. Hence the fixed cost allocation rate would be Rs. 14,050 per session and variable cost allocation rate is Rs. 750 per session.
Transfer price to the consulting department = lump-sum charge * marginal cost
= (Standard Fixed Cost per session * Budgeted Training Sessions) + (Standard Variable Cost per Session * Actual Training Sessions)
= (14,050 * 100) + (750 * 100)
= 14,05,000 + 75,000
= 14,80,000.

Transfer price to the customer service department = lump-sum charge + marginal cost
= (Standard Fixed Cost per session * Budgeted Training Sessions) + (Standard Variable Cost per session * Actual Training Sessions)
= (14,050 * 100) + (750 * 80)
= 14,05,000 + 60,000
= 14,65,000.

Total transfer price allocation is Rs. 29,45,000 versus actual expenses of Rs. 38,25,000 Unallocated expenses are Rs. 8,80,000.
(iii) Evaluate how the two-part transfer pricing model would address the goal congruence issues listed in question?

(a) Since transfer prices are based on budgets, the training department would become more cost-conscious. As explained above, as per this transfer pricing method, unallocated expenses of Rs. 8, 80, 00 would have to be borne by the training department. As given in the problem, this variance is mainly an account of extra cost for the newly hired trainer and higher depreciation expenses. The department will be more cautions while taking future decisions. However, Yash

the CEO must ensure that the quality of training is not compromised and remains in line with the company's strategic policy.

(b) Internal Transfer Price of Rs. 14,800 per session is still higher that the outside rate of Rs.12, 000 per session. Further decisions would be based on the company's strategic objectives. At the same time, if the number of training sessions are expected o increases beyond the budget, this transfer pricing method charges the user department only a marginal cost of Rs. 750 per session. This is definitely lower that the external rate.

(c) Under this method, fixed expenses that from majority of the cost are allocated based on budgeted cost and budgeted usage. Variable expenses are allocated based on actual training sessions. Hence, any variance in the utilization of training resources, does not impact the other user department.

Therefore, most of the goal congruence issues can be addressed through this methodolog

KAIZEN COSTING

CASE STUDY NO:3

Zen Limited is a leading mobile manufacturing company and sells its mobile phone across the world. In a fast-changing technological environment. Zen has been able to maintain its leadership in smart phones segment for third year in row now. Though the revenues have grown year on year, the costs have increased at a higher rate in the mobile phone industry as a whole.

"We have been leaders in revenue. We must lead in coat reduction front as well. I believe we can achieve this with improvements overtime, however minor they might be!"

The net profit margins of the company has fallen from 10% in 2016 to 8% in 2017 owing to rise in raw material & repair cost. Another significant rise in the cost was on account of repairs of mobiles which are under warranty. There was an increase in these repair cost by Rs.1.5 crores which represents 1% of the total turnover of the company.

The process of repairs/replacement of under warranty product is outlined below:

- The company own 200 repair centers in various cities in India.
- A customer whose phone and the service centre sends the phone to a centralized repair center at Mumbai. The phones are sent Mumbai even for minor repairs which can be done locally if requisite infrastructure is provided to the service centers.
- The phones are sent in batches. Each Service centre creates 3-4 batches of mobile phones in a day. (A recent study showed that the batches could be combined into a single batch per day).
- The phones are repaired in Mumbai's centralized centers and sent back to the respective service centers for handing them back to the customer. The phones which are repaired are sent in separate batches and those which are replaced are sent in separate batches.

Required

You are working as a Finance Manager in Zen. The finance director has approached you to understand whether the minor improvement would be useful given the size of the company. The Finance Director has asked you to examine the process of warranty repairs and replacement and submit a report covering the following aspects:

(i) What is CEO referring to when he says "minor improvements"?
(ii) What are the benefits of such minor improvements?
(iii) Apply the above process to the warranty claim process and explain how the process can be improved.
(iv) Any offer matter which you consider relevant

Solution Issue

Zen limited is a leader in manufacturing of mobiles and is concerned about increasing costs. The increase in warranty related costs has been significant in the current year as compared to previous year. This has reduced the net profit of the company by 1% of sales.

Applicability of Kaizen Costing

"Kaizen" is a Japanese word which means "Change for Better". In business Kaizen is used to refer to small and continuous improvement across all functions, processes and employees. Kaizen costing is a costreduction system. Yashihuro Moden defines Kaizen costing as "the maintenance of present cost levels for products currently being manufactured via systematic efforts to achieve the desired cost level. Toyota Production System is considered as a pioneer in Kaizen costing. Though the model was used for eliminating wastage from production at factory initially, the concept can be applied in any change or disruptive innovation is not expected in Kaizen Costing.

The following are the key features of Kaizen –

- Kaizen processes focus in eliminating waste in the systems and processes of an organization, improving productivity and achieving sustained continual improvement.
- Application of small, incremental changes routinely applied and sustained over a long period can lead to significant improvements.
- It aims to involve workers from multiple functions and levels in the organization.
- A value chain analysis helps to quickly identify opportunities to eliminate wastage.
- Although incremental changes can often be too small to be seen, Kaizen can be very effective in the long run. An airline which identified that 75% of its flyers would leave the olive from salad, the airline decided to remove it from its servings. This saved the airlines $ 40,000 per year. Another example is where an airline stopped printing its logo in the rubbish bags as it did not add value saved over $ 3, 00,000 per year.

The CEO referring to Kaizen costing when he mentions minor improvements to save costs over time. Kaizen costing takes into consideration various costs such as costs of supply chain, manufacturing costs, marketing, sales, distribution costs etc.

Benefits of Kaizen Costing:

- Kaizen reduces waste in areas such as employee waiting time, transportation, excess inventory etc., which leads to improved efficiency in overall business processes and systems.
- A company applying Kaizen philosophy can achieve cost reduction through small incremental improvements and cost saving.
- Kaizen looks at function and processes at all levels of organization and requires participation of all employees and massive as well as open communication system. This participative approach improves teamwork across the organization.
- Products improvement using Kaizen is likely to result in less number of defective products leading to customer satisfaction and reduction in warranty related costs.
- The reduction in wastage, improved efficiency and cost reduction improves the overall profitability of the company.

Implementation of Kaizen in the Current Case

- The implementation of kaizen as a cost reduction technique can take several forms. The key question to ask for implementation is – "Can we eliminate waste?". The waste can take several forms like –
- Unnecessary movement of material and men – Travelling for meeting in cases where a video conferencing could help.
- Unwanted part in product which u removed is not likely to impact on performance of the product. (Nano sim card has a reduced a significant portion to use fiber boards as compared to the traditional sim cards.)
- Defects which involve extra cost in terms of reworks.
- Waiting time – A simple example could be locating for files in your computer which has not be arranged properly. This leads to waste of time.
- The above is just an indicate list where improvements can be made. However, an important point to note is that reduction of waste should not be done by compromising the quality of product. Apple launched I phones 5c as a budget phone by using plastic material instead of Aluminum. The market did not like the product as it was considered to be an inferior product as compared to I phones 5s.

Another way of looking at kaizen is asking following questions –

- Can we eliminate functions from the production process without compromising the quality and utility of end products? - Removing unnecessary movements of material and me.
- Can we eliminate some durability? - Use of unbreakable plastic for producing disposable glasses would be waste of recourses.
- Can we minimize design? - E.g. use of Nano sims.
- Can we substitute parts of the product being manufactured?
- Can we take supplier's assistance to get better quality parts?
- Is there a better way? - This is a question which must be asked continuously to ensure that the improvement is not a one-time exercise.

(The above questions also form a part of the Value Engineering Process)
Application of Kaizen at Zen Limited

The current warranty claim process at Zen involves movement of mobile phones from various service centers across the country to a centralized centre in Mumbai. The possible improvements in the claim process is explained below -

- The company needs to analyze whether it requires to own 200 centers by itself across the country. The company can evaluate closing down centers with less customer footfalls or outsource the once which are not located at the strategic location. This would save some cost to the company.
- The current process requires each service centre to send the faulty mobile phones back to Mumbai for repair or replacement. This is done even in case of minor repairs which can be handled locally. The company can provide necessary infrastructure to the service centers to carry out minor repairs locally. This would save logistic cost of sending the phones to Mumbai and back to the service centre. The company should analyse the past data to understand the proportion of phones which require minor repair. Repairing the phones locally would also reduce the turnaround time and the customer will get back the phone faster.
- The current process is to send phones in 3-4 batches in a day. This effectively mean creating 3-4 consignment, documents for dispatches and incurring extra costs for transportation. Combining

the phones in a single batch would reduce the cost of transportation and administration cost as well.

- The phones can be sent back from Mumbai in single batch instead of creating multiple batches to save transportation costs.

The above improvements must be revisited continuously to derive required benefit from Kaizen process.

Apart from eliminating waste in the warranty claim process. the company must also identify root causes of increases in warranty claims in the current year as compared to previous year. Every phone being sent back for repair/replacement involves avoidable cost. The company must also revisit the manufacturing process and quality control processes to eliminate wastage in production process and improve quality.

- Zen can consider producing better quality mobiles at the manufacturing process to reduce the warranty claims.
- The pattern of warranty claim must be analysed to understand whether there is certain common problem related to repair claims. If the issue hassome relation with parts used in mobile, the issue can be taken up with supplier of such parts.

BALANCED SCORECARD

CASE STUDY NO: 4

Fair Limited manufacturing and sells motor vehicles in India and different parts of the world. The company has its head office in New Delhi and three regional offices. The manufacturing plants are situated in Pune and Bhubaneshwar. The company has over 10,000 employees who are paid a fixed salary and a performance related pay (PRP).

The PRP is determined using the financial performance as a measure. The performance of departments which are profit centers is based upon the revenues and profits and departments generate. The performance of cost centers is based upon the cost savings against the budget.

Of late, the company has identified critical issues with the motor vehicles manufactured and sold in the market. In the last one year, itself, the company has recalled more than 2 lakh vehicles owing to quality issues like faulty gearbox, issues with axle, braking systems etc. The company was also penalized for selling vehicles which does not meet the emission norms.

The board of directors carried out an internal review of these frequent recalls and issues with the vehicles. In most of the cases, it appeared that the recall of vehicles was on account of lower quality of material and parts used. A couple of critical quality and emission checks were ignored to dispatch more vehicles in the limited time, leading to higher sales and profits.

The board is concerned with the reputational risk with issue related with recalls. The company was consumer's most trusted brand for last three years in a row. It is unlikely to win the award this year due to negative feedback from customers. The board wants to win the trust of the customers back and be profitable well.

Required

You are the advisor to the board. The board seeks your advice on the following aspects.

(I) Advantages and disadvantages of using financial measures as a performance measure.

(II) SUGGEST an alternative performance measure which includes non-financial measures as well.

(III) IDENTIFY 2 critical success factors and 2 Key Performance Indicators for the performance measure chosen in (II).

Solution

What is the issue?
Fair Limited is into manufacturing of motor vehicle. The company has use financial measures for performance. Of late, the company has faced quality related issues leading to vehicles recalls. The company has also been using financial measures only; it appears that non-financial aspects related to quality have been ignored. The company has adopted the principle of profit at any cost which can be seen from use of low quality materials and parts as well as skipping key quality checks.

Financial Performance Measures

Financial performance measures focus on financial result or aspects. These measures focus on the profits made by a business or a unit of business. They also include costs saved against budgets. Various financial performance indicators include - growth in revenue, profitability, various from budget, Return on Capital Employed etc.
In the case of Fair Limited, the performance of employees is done on basis of financial performance indicator. When performance is evaluate on financial parameters, the employees and managers tend to focus only on profitability in anticipation of higher bonuses and pays.

The problems related to quality issues in vehicles produced by Fair Limited might be linked to be the use of financial performance measure. Low quality parts are used to save costs and improve profitability. The quality checks prior to sales were also skipped to sell more vehicles with limited resources. This is apparent case of compromise in quality for seeking higher profits and revenues. In light of above, te advantages and disadvantages of financial performance measures are given below.

Advantages

- Focus on financial objectives and is linked to the overall objectives of wealth creation of shareholders.
- Such measures are objective.
- Qualification to results is possible.
- The measures are comparable across companies of a particular industry.
- The framework to measure financial performance is established in most of the cases

Disadvantages

- Focus on short term profits and ignores long term profits and Ignores long term sustainable growth. As can be seen in the case of fair limited, the company has compromised quality for short tern profits. This is harmful to the company in the longer run.
- This measure can be distorted by inflation. A 5% growth in sales might be good but if the inflation is 6%, the real growth is negative.
- Financial information might be manipulated to show a better performance.

Non-Financial performance measures use measures other than financial to measure performance of employed and departments. The advantages of non-financial measures are

- Non-financial measure helps business to measure every area whether financial or non-financial. Financial measure would not be suitable measure areas like performance of IT department.
- IT focuses on qualitative aspects as well.
- These measures take a long-term view unlike financial measure where employees tend to take a short term view.

The disadvantages of Non-financial measures are:

- These require huge amount of information to measure each area of performance and might lead to shift of focus from core goals and values.
- These can be subjective as non-financial measures cannot be generally quantified.
- Non-financial measures like measures of quality are difficult to measure.

Balanced Scorecard:
An alternative performance measure which focuses on both financial and non-financial measure is the Balanced Scorecard, It outlines four key areas in which company and divisional performance should be measured to focus on both the short and long term needs of the organization. The key idea is that managers are to be appraised on a variety of measures which include non-financial measures so that their focus is both long and short term.

As discussed earlier, it appears that managers at Fair Limited have ignored long term sustainable growth and qualitative factors and focused on short term profit. The company can start measuring performance both as financial as well as non-financial aspects. This would ensure that employees are not short signed on profits alone.
The four areas or perspectives in s Balanced Scorecard are –

- Financial Perspective
- Financial perspective focuses on financial performance of the business and divisions. The various financial used by companies are profitability, revenue growth, cost control etc. This is currently being used in Fair limited to measure performance.
- Customer Perspective
  This perspective views organizational performance from the point of view the customer or other key stakeholders that the organizational is designed to serve. These could include measures like customer satisfaction index, percentage of goods delivered on time etc.
- Internal Business Perspective
- This perspective views organizational performance through the lenses of quality and efficiency related to product or service or other key business processes. The measures under internal business perspective could be number off defective products produced, production performance per unit of time etc.
- Training and Development/Learning and Growth Perspective
  This perspective views organizational performance through the lenses of human capital, infrastructure, technology, culture and other capacities that are key to breakthrough performance. The key measure could be number of new products produced, amount invested in training and development etc.

In each category/Perspective, this organization must follow through from the business strategy, to ensure they are focused on the long-term direction of the business. Clear objectives should be set under each category according the SMART criteria (Specific, Measurable, Achievable, Relevant and Time-bound), measured at the end of the period, and lessons learnt from actual results to help to improve performance in future periods and keep the organization on track to achieve its strategic goals.
Applying Balanced Scorecard to Fair Limited

The issues related to quality have arisen at Fair Limited as the managers and divisions focused on profits at the cost of quality. The recall of vehicles was primarily on account of use of sub-standard parts. The company should consider using non-financial measures as well as a performance measure. Balance Scorecard can be effective tool to apply financial and non-financial measures.

The company must take step to put focus on quality related aspects as well as financial aspects. A proper application of various Key Performance indications under the respective Critical Success Factors can help the company overcome the current issue.
Critical Success factor (CSF) is a management term for an element that is necessary for an organizational or project to achieve its mission. It is critical factor or activity required for ensuring the success of a company for an organization. These are the key areas in which the organization has to do well if they are to remain competitive and profitable.

The critical success factors have to be linked with the overall strategy of the organization.

Key Performance Indicator (KPI's) is the ways in which the organization performance for the CSF can be measured. It is a measurable value that demonstrates how effectively company is achieving by business objectives. Organizations use KPI's to evaluate their success at reaching targets.

The Critical Success Factors and Corresponding KPI's for Fair limited for each of the perspective in the balanced scorecard is given below:

Perspective	**Critical Success Factor**	**Key Performance Indicator**
Financial	Be the most Profitable Company in Motor Vehicle Industry. Become the No. 1 company by in terms of Market Share in five years.	Profitable ratios. Revenue growth. Variance to budget.Number of vehicles sold
Customer	Be No. 1 Choice of Customers. Implement Zero Recall Policy	Number of vehicles sold vis-à-vis those sold by competitors. Number of recall of vehicles. on time delivery of vehicles.
Internal Business	Total Quality Management. Zero Idle Time at factory.	Number of defective cars produced Number of cars returned by customer as faulty. Number of hours spent in waiting by labours at assembly line.
Training and Development	Upto Date Technology used in Manufacturing Facilities. Skill Development for Labour and Supervisors.	Amount spent in research and development year on year. Number of training hours undergone by workers and supervisor. Number of new model of vehicles launched.

PERFORMANCE PRISM

CASE STUDY NO:5

Galaxy Limited is in the business of logistics and distribution. In 2002, Galaxy limited had implemented Balance Scorecard as a performance measurement & management system. The balanced scorecard measures performance across financial, customer, Business and innovation perspective. The implementation of Balance Scorecard had the following impact

- The company's financial performance improved substantially.
- The complaints from customers regarding poor service reduced.
- The company has pioneered in innovation is the field of door to door delivery of goods.

All these to improvement in profitability of the company. The share price are trading life time highs, Since the ultimate objectives of a commercial organization is to maximize shareholder's wealth, the CEO of the company is extremely pleased with the affairs at the company.

Of late, the company has witnessed high employee turnover ratio. Though the company has a formal exit interview process for the resigning employees, the inputs received from these interview that left the company was that there is too much pressure to perform and improve customer service without adequate support of systems and processes.

Also, the truck drivers who move consignment from one city to another have been on strike thrice in the last one year demanding better pay and working conditions. These drivers are generally hired on contractual basis. They are not entitled to any retirement benefits applicable to employees of the company.

The above two issues were discussed in one of the board meetings. The directors wondered if they had the right performance measurement mechanism to address the issues. The company is doing great financially but must also ensure that the employees and other stakeholders are taken care of apart from shareholders. The board is also concerned that they have too much of data and report to look at on performance management as the current measurement is done on a monthly basis. However, the alignment of such reports to the overall strategy of the company is missing.

Required

RECOMMEND the alternative performance measurement mechanism which considersall stakeholders instead of just shareholders and employees.

Solution

Issue

Galaxy Limited use Balance Scorecard to measure performance. Balance Scorecard focuseson the financial, parameters and customer satisfaction parameters. However, of late the company has been facing issues related to high employee turnover and dissatisfaction of the truck drivers.

The board of Directors is also concerned about the volume of performance measurement data and alignment of performance measurement with the strategy of the company. An alternate performance measurement mechanism is Performance Prism.

Performance Prism

Performance Prism is considered to be a second-generation performance management framework conceptualized by Andy Neely and Chris Adams. The following are the factors which make Performance prism should replace the models like Balanced Scorecard -

- Organization cannot afford to focus on just two stakeholder group - Investors and Customers. Other stakeholders group like employees, suppliers, government etc. should not be forgotten. This is important for sustainable growth of companies profit and non-profit oriented.
- Most of the performance measurement models do not focus on changes that could be made to the strategies and processes. The underlying assumption is that if right things are measured, the rest will fall into place automatically.
- Stakeholders expect something from the organization. There is a 'Quid Pro Quo' relationship between the stakeholders and organization.

Another problem highlighted by Andy Neely and Chris Adams was that management are measuring too many things. They believe that in doing so they are controlling the organization well. The problem with increased measurement is that the management starts micro-managing things and lose sight of the strategic direction. This negatively impacts the organization in the longer run.

The performance Prism aims to measure performance of an organization from five different facts listed below:

- Stakeholder's Satisfaction
- Stakeholder's Contribution
- Strategies
- Processes
- Capabilities

Stakeholder Satisfaction

The first facet of prism focuses on stakeholder's satisfaction. Though balanced scorecard also focuseson stakeholder's satisfaction, it is primarily concerned with shareholders and customers and ignores other stakeholders. This is precisely the issue at Galaxy limited where the shareholder and customer are happy with the company, other stakeholders are not.

The company must identify all stakeholders and determine relative importance of each of the stakeholders. The company can use Mendelow's matrix to identify key shareholders in terms of power and interest of stakeholders. A stakeholder group which has high power and high interest (say a trade union) must be kept satisfied. The key stakeholders for a company are:

- Investors - They want return on investment.
- Customers - They want good quality products at cheap prices.
- Suppliers - They want better price for products.
- Government - The want revenues and development.
- Society at large - They want employment opportunities.

Each of the stakeholders group exercise different level of power/influence on the company. The interest of each stakeholder group in the company also differs. Based on the power andinterest of the stakeholders, the company must appropriately perform activities for stakeholder's satisfaction.

After identification of the stakeholders, the company must identify the requirement of each of the stakeholders group. What must the company do to ensure stakeholder satisfaction?

Galaxy limited must ensure satisfaction of the two stakeholders highlighted above. The company must take step to improve employee satisfaction and reduce the employee turnover. The company must also address the issues related to truck drives and involve them in a dialogue. The impact of not keeping these stakeholders group satisfied that the company might suffer financially in longer run.

Performance measure - Employee Turnover Ratio, Average employment duration of employees, Number of strikes by truck drivers etc.

Stakeholders Contribution

In the second facet of Performance Prism, the organization identifies the contribution required from the stakeholders. The organization must then define ways to measure the contribution of stakeholders. This aspect is different from traditional measures where the organization was just concerned with what could contribute to the stakeholders.

The company in Galaxy limited, the company could improve the employee satisfaction with better pay, training and growth opportunities. In turn, the employees must perform better to contribute to the company as a whole. Similarly, the drivers must be given better working condition and in turn, they should contribute towards improving efficiency and on-time deliveries.

Performance measure - Efficiency of Employees, Productivity, on time deliveries by truck drivers.

Strategies

In the strategies facet of the Prism, the organization should identify those strategies which the organization would adopt to ensure that -

- The wants and needs of the stakeholders are satisfied.
- The organization own requirements are satisfied by the stakeholders.

After the company identifies strategies, the performance measure must be put in place to confirm that the strategies are working. The various aspects to be considered appropriate communication of strategies, implementation of strategies by managers and continuous evaluation of appropriateness of strategies.

Galaxy limited might come out with a strategy of to retain employees by means of better pay and growth opportunities within the company. This strategy can be called successful if the higher pay ensures that employee's turnover is reduced. As a strategy, the company can start to hire drivers on the payrolls of the company.Performance measure - Number of employees leaving the organization after getting pay hike, Efficiency of deliveries after Truck drivers are put on employment of company.

Processes

After indentifying the strategies, organization need to find out if they have the correct business processes to support the strategy. The various business processes can have sub-processes. Each process will have a process owner who is responsible for functioning of the process.

The organization must develop measure to evaluate the how well the processes are working. The management must be careful to evaluate most important process instead of evaluating all the processes. Porter's Value Chain analysis can be used to identify and evaluate various processes in the organization.

Galaxy limited could device a recruitment process which result in transparency in hiring and pay of employees. The process could be owned by the Human Resource Manager. The working condition of drivers can be improved by providing structured training and working condition.

Capabilities

Capabilities refer to the resources, practice, technology and infrastructure required for a particular process to work. The company must have right capabilities in order to support the processes. The company must identify performance measure to set how well the capabilities are being-performed.

While Galaxy limited might choose to increase the salaries of employees, an important question to answer in whether the company has financial capability to do so.

Conclusion

The facet of Performance Prism is interlinked and must support each other. The company must first identify the stakeholder's wants and what the company wants from those stakeholders. The required strategies for these are identified and the processes to achieve the strategy followed by identifying the capabilities to perform these processes.

TOTAL PRODUCTIVE MAINTENANCE

CASE STUDY NO:6

Super Refineries Limited is a leading refining company operating in India. The company has three plants - one each situated in North, South and West. The company has a refining capacity of 30 million barrels. The company currently enjoys a 40% share of the domestic market. The plants run on all 365 days in year and operate at 100% of the capacity. The company currently does not have any maintenance schedule in place for its plant and machinery. Any repair requirement of plant and machinery is carried out an ad-hoc basis.

The company has implemented Total Quality Management (TQM) to ensure that the company rolls out top quality products. The company did not receive any complaints from its customers regarding poor quality of products or products not meeting the speculations. The entire production team is quite excited with superior quality of products.

However, in the last three months, about 30% of the dispatches to customers were delayed. This comes at a time when the entire plant had to be shut or maintenance activity due to breakdown in the maintenance of the week. The company also witnessed 20% rejection of the final product. The customers claimed that the products did not meet the specification agreed by them with the company. The Director of Refineries is worried situation of production at plants. Another concern for the director is the increase in number of accidents and loss of productive time due to this.

The chairman of the company convened an urgent meeting of the Board of Directors to understand the impact and reasons of the situation at production plants. A key issue highlighted by plant supervisors is that the scheduled maintenance activity for plants was never carried out. The underlying assumption for not carrying out such maintenance activity was - "Since the plant is running smoothly, there is no requirement of preventive maintenance activity. Such activities cost a lot in terms of money and also cause loss of productive time which could otherwise be used for production". The maintenance departments and production department functioned in silos with almost no co-ordination amongst themselves. The most critical parts of the plant were not maintained for a long time

The chairman called you after the meeting and asked you to help him understand the current issue at the plant. "We had Total Quality Management (TQM) in place at all our plants. I understand from the production director that TQM is working as intended. Why are we facing the breakdown problem inspite of having a TQM in place"- said the Chairman.

Required

The Chairman has asked you to quickly prepare a note highlighted the following points -
(i) What could be the likely losses arising due to breakdown of machinery due to non-maintenance?
(ii) What kind of maintenance programme could address the issue being faced by the company?
(iii) EXPLAIN the key features of such programme.
(iv) COMPARE the pregramme identified above and TQM.
(v) What are the various types of maintenance practices that the company can implement?

Solution

Issue

Super Refining Limited has implemented a Total Quality Management and is known for producing top quality products. The company enjoys 40% market share in the domestic market. The plants operate at 100% Capacity and on all days of the year. This indicates that the company does not carry out preventive and corrective maintenance. The company has not received any complaints with respect to quality from its customers. This can be attributed a solid TQM in place. The delay in suppliers could be attributed to the breakdown in the machineries. The production could have been of an inferior quality if the production managers would have rushed in meet the production deadline due to loss of production time owing to breakdown.

The discussion at the board meeting indicates that the company has not prioritized preventive maintenance. Maintenance is being carried out on an ad-hoc basis with a proper preventive maintenance schedule. The company is concerned about costs of maintenance and hence no preventive maintenance was carried out. Further, there is no co-ordination between the production team and maintenance team.

Losses Arising Due to Breakdown

The following are the losses which can be associated with the breakdown of machinery at Super Refining Limited -

- Equipment failure leading to unexpected loss of time - The production at plants was interrupted and the supplies to customers were delay in case of Super Refining Limited.
- Idle waits and stoppages due to ad hoc maintenance requirements. Since the interruption is unplanned, the productive labour time is wasted.
- Production of inferior quality products causes financial losses. The company would also incur additional cost to remake the product without any additional revenues.

- The company would also incur losses in terms of additional set up costs. Every time a machine break down, a significant amount of time would be wasted in setting up the production processes again.

Total Productive Maintenance (TPM)

Based on the facts of the case, it is very clear that the company has not prioritized maintenance. The company can use TPM philosophy to address the issue.

TPM is a maintenance philosophy aimed at eliminating production losses due to faulty equipment. The objective of TPM is to keep equipments (plant, machinery etc) in such as position to produce expected quality products at the maximum capacity with no unscheduled stops. This also includes attaining:

- Zero breakdowns
- Zero downtimes
- Zero failures attributed to poor condition of equipment.
- No loss of efficiency or production capacity due to the equipment.

The concept was initially applied to equipment i.e. plant and machinery. Of late, the concept has also been extended to processes and employees. TPM focuses in keeping equipment and employees in top working condition to avoid any breakdowns and delays in manufacturing process.

Traditionally, maintenance work has been considered as a responsibility of the Maintenance Team which is different from the production team. Total Productive Maintenance seeks to involve workers in all departments and levels in ensuring operations of the plant. When both the teams work in alignment, learning can be shared with each other. The production team also takes ownership of maintenance requirement. A sole focus on higher production without taking care of maintenance requirement can hamper the long-term production requirements, as could be seen in the case of Super Refining Limited.

Features

- Traditional maintenance is centered in the maintenance department. However, TPM seeks to involve workers at all departments and levels. There is a great amount of co-ordination between the production and maintenance team in TPM.
- Autonomous maintenance focuses on training operators to be able to take care of minor maintenance tasks. This receives specialized maintenance staff to focus on critical issues.
- TPM focus on achieving and sustaining zero loses with respect to minor stops, measurement and adjustment, defects, and unfavorable downtimes.
- Planned Maintenance is aimed to have trouble free machines and equipment producing defect free products for total customer satisfaction. This approach here is proactive maintenance instead of reactive maintenance. Super Refining limited had a reactive approach to maintenance where maintenance was carried out on an ad hoc basis.
- TPM emphasis on training of workers across all level and departments. The ultimate objectives are to have a factory full of skilled workers.

The issues factory by Super Refining Limited due to unplanned shutdowns can be addressed using a Total Productive Maintenance philosophy.

The following are the Eight Pillars or Principle of TPM -

- Autonomous Maintenance
- Focused Improvement
- Planned Maintenance
- Early Equipment Management
- Quality Maintenance
- Education and Training
- Office TPM

- Safety, Health and Environment

TQM and TPM

Total Quality Management (TQM) and Total Productive Maintenance are often used interchangeably. However, TQM and TPM are considered as two different approaches. TQM attempts to increase the quality of goods, service and concomitant customer's satisfaction by raising awareness of quality concern across the organization. In the other words, TQM focuses on the quality of the product, while TPM focuses on the equipment used to produce the products. By preventing equipment break-down, improving the quality of the equipment and by standardizing the equipment, the quality of the products increases. TQM and TPM can both result in increase of quality. However, the approach of each is different. TPM can be seen as a way to help achieving the goal of TQM.

Super Refining Limited has implemented TQM and is delivering high quality products to its customers. TQM focuses on the end product being supplied to the customer in the process of producing high quality and volumes of products, the maintenance aspects of plant and machinery. The TPM philosophy would focus on the equipment which supports production of high quality products under TQM.

Types of Maintenance under TPM

The following are the types of Maintenance Programmes which Super Refining Limited can implement-

Breakdown Maintenance

No maintenance is carried out unless the equipment actually fails. This is approach taken by Super Refining Limited currently. This type of maintenance is used when the equipment failure does not impact the operations and production significantly and the only cost incurred is the cost of repair. This is not advisable in case of Super Refining as breakdown of machines have led to significant delays in deliveries and poor quality of production.

Preventive Maintenance

It is a daily maintenance (cleaning, inspection, oiling and re-tightening), designed to retain the healthy condition of equipment and prevent failure through the prevention of deterioration, periodic inspection or equipment condition diagnosis, to measure deterioration. This can be compared with a routine and periodic maintenance activity of a vehicle.

CorrectiveMaintenance

Corrective Maintenance focuses on making machines easier to clean and maintain. There could be reconfiguration of certain parts of the machines (say, a lubricating pipe) to ensure that the maintenance staff can carry out maintenance activity of a vehicle.

Maintenance Prevention

Through the analysis of maintenance data, the maintenance technicians can work with the designers of our machines to create machines that are more reliable. Maintenance and repairs that are required can be made as simple and as easy as possible to reduce time, save money and improve safety.

Autonomous Maintenance

In case of autonomous maintenance, minor and day to day repairs are carried out by the operator of plant themselves instead of waiting for techniques. Activities like lubricating, bolt lightening etc. are done along with the minor repairs by the floor workers or operators. Maintenance team is called only when sophisticated and highly technical maintenance work is required. You may change the tires of your car on your own but to repair a puncture or wheel alignment or wheel alignment, you visit a technician.

Conclusion

Super Refining Limited should implement a TPM which would complement and support the TQM philosophy. This would also address the issue of the production team and maintenance team not working in co-ordination. Down time for maintenance should not the considered as a cost or unproductive

activity. This should be an integral part of the overall manufacturing plan. This would ensure that emergency downtime is kept to a minimum.

ETHICAL AND NON-FINANCIAL CONSIDERATION
CASE STUDY NO: 7

Star Limited is in the business of manufacturing copper rods. The copper rods are sold to various cable wires manufacturer across the country. The growth in economy, especially the power sector, has led to sharp increase in demand of cable wires and copper rods. The company is considering an opportunityto set up its own wire manufacturing plant and gain a share of cable wire's market. A detailed study was carried out to understand the market of cable wires,market growth, competitive landscape, financial landscape, financial feasibility etc. The Chairman has asked the Director of Finance to review the financial feasibility study and highlight concerns, if any.
The following paragraphs contain summarized information of financial study carried out:

- The project of setting up a new cable ire manufacturing plant is expected to yield a Net -Present Value of Rs. 200 crores considering a project life of 20 years. The initial cost of setting up the plant is Rs. 500 crores which is readily available with the company. The project would yield on IRR of 17.5% which is higher than IRR other plants under operation.
- The plant would be employ about 70% of labour on contractual basis. This labour would mostly comprise immigrants from neighboring countries. The feasibility study has assumed that the immigrant's labours would be paid 15% less wage than that paid to other workers. However, the wage paid to immigrants would still be higher than the minimum wage requirements. The contribution to retirement funds is also not considered in the project year and thus there is no requirement to contribute to retirement funds.
- The existing plants of the company do not company do not have free space available and hence the company will need to buy and adjacent to its existing plant. A part of the proposed land to be acquired falls under the forest reverse area where no commercial activity is allowed. The company officials are in liaison with the government officials to get the land parcel approved. A certain amount of the value of land would be paid to certain government officials through a consultant. This cost is not a part of the project evaluation report.
- The new plant would also produce certain chemically harmful waste which would be disposed off into a nearby river after treatment. The company however does not have any technology to treat the waste fully. A new treatment plant would cost about Rs. 100 crores.

The finance director has forwarded the entire report to you for comments.

Required

(i) LIST various non-financial and ethical considerations in decision making.
(ii) EVALUATE the impact of the various issues in the financial study and give your RECOMMENDATION.

Solution

Issue

Star Limited manufactures copper rods and is considering commencing a new plant for manufacturing of cable wire. A financial evaluation has been carried out and the project appears to be financially viable. The project has a positive NPV of RS 200 crore and an IRR of 17.5% though the project is financial viable, there are certain concerns relating to the project.

Non-Financial and Ethical Consideration In Decision Making

Capital Budgeting or Investments decisions are generally made based on the various financial evaluations like Net Present Value, Internal Rate of Return, and Payback Period etc. The financial considerations in capital budgeting decisions are important because the end objective of every for profit business is maximization of shareholders wealth. However, an important aspect of capital budgeting is that investment decisions cannot be purely based on financial analysis; there are other soft non-financial

aspects of the investment appraisal that need to be thoroughly looked into. Some of the non-financial considerations that a company factors for capital budgeting or investment decision are listed below

Environmental Factors

Environmental factors like pollution, deforestation, impact on climate and weather, greenhouse effects etc. must be considered by companies while selecting a project for implementation. Any project which adversely affects the environment is not taken positively by common public and environmentalists. A lot of projects have been stalled or delayed due to the protests by pro-environment groups leading to cost and time overrun. The government through ministry of environment could penalties on projects which are violating environment norms or green norms.

Staff Motivation

Staff Motivation and satisfaction is another important factor which companies might consider while choosing projects. IF, for example, a company decides to implement automation in its plants for operations which would resort to strikes and lockouts to protest against such decisions. The company should adopt a participative approach while taking such decisions considering the impact it would have on the labours.

Government Regulations

The companies must comply with relevant government regulations while implementing projects. Some projects might be profitable and yield excellent returns. However, if the profit and cash flows are generated by violating government regulation, it could be harmful in the longer run for company and its brand. The companies must ensure that all relevant laws and regulation are complied with.

Availability of Resources

The evaluation of any project must also consider availability of key resources like raw material, manpower, logistic infrastructure, electricity etc. If there is any constraint on any of the key resources at a future date, a financially viable and excellent project could well turn into a failed project. It is thus important that the requirements and availability of key resources are analyzed in advance.

Availability of Project Site

Site Selection involves measuring the needs of a new project against the merits of potential locations. This indicates the practice of new facility location, keeping in mind project requirements. A wrong or unsuitable project location may mar the very benefits of financially lucrative investment proposal.

Corporate Social Responsibility

Corporate Social Responsibility refers to "the ethical principle that an organization should be responsible for how its behavior might affect society and the environment. The companies do not function in silos but are a part of the larger society and environment to use the various resources judiciously and ensure a sustainable development. Companies are expected to uplift the well being of the society at large an d to not harm the environment through operations. The aspects of corporate social responsibility must also be considered while deciding the project to be implemented.

Ethics

Ethics are a set of guiding moral principles for individuals and corporate. Every company has a duty of care to various stakeholders (shareholders, employees, suppliers, customer etc). A company is expected to act in a fair and transparent manner and be honest in all its dealings with stakeholders.

Issues in the Financial Study

A discussed earlier, the project is financial viable with as very good NPV and IRR.The amount required to build the plant is also available with company. Financially, the project must be accepted. However,

there are certain non--financial issues which must be addressed before a decision to build the plant is taken.

Payment to Labour and Ethics

An explained earlier, every company has a duty of care to all stakeholders and the stakeholders must be treated fairly. Labours are key stakeholders for the construction and running of the plant. The company has chosen to pay 15% lower wage to immigrant workers and not contribute anything towards their retirement benefits.

The company paying a higher wage to the labors than required by law and hence there is nothing illegal in such payments. However, the company must not discriminate between workers who are doing same nature of work just because the workers are immigrants. The reputation of the company might be affected because of the lower wages paid to immigrants. There is a possibility that these labours go on protests and strikes or decide not to work for the company.

The company has also decided not to contributed to retirement funds for these workers. This could have a legal implication as well. The financial impact of paying wages at par with other workers and contributing to the retirement fund for immigrant's workers is not known. However, the company should reconsider this decision and pa all the workers the same level of wages. The company should also contribute to the retirement fund of employees.

Availability of land and bribery

The existing plant does not have sufficient space to build a new plant and hence the company is planning to acquire additional land which falls under forest reserve area where no commercial activity is allowed. The company would also be paying bribes indirectly to the government officials to get the land allotment approved.

The payment to bribes to government officials, whether directly or indirectly would be unethical. The company could face litigation for acquiring land by unfair means and in future, there is possibility of such allotments being cancelled. The company's reputations would also be dented if news of bribery is published by the media. The company also has a responsibility towards the environment and must contribute towards a sustainable development. The Society at large would not take acquisition of forest land by unfair means positively. This impact the overall goodwill and brand image of the company.

The company must evaluate if land at other sites can be acquired for construction of the plant. Such acquisition would be at a higher cost but would be beneficial to the company in the longer run.

Chemical waste and technology

The proposed plant is likely to emit chemically harmful waste which would pollute the environment. The technology available with the company can treat such waste partially. The company has to incur an additional cost of Rs 100 crores to build a new treatment plant. This means that the NPV of the project would be reduced by Rs 100 crores and IRR also be lesser if the new treatment plant is built.

An discussed earlier, the company must operate in a socially responsible manner and consider implication of its action on the environment. The pollution caused by plants affects the surrounding environments and might lead to protests by local residents. Sometimes such protests are backed by NGO's as well. The commissioning of environmentally sensitive projects is difficult at times and can cause projects delays as well.

The company should consider acquiring a new chemical waste treatment plant to ensure that there is no discharge of harmful waste from the company's plant. Though, there is an additional cost involved in building a new plant, it is important that the society at large perceives that the company is operating in a socially responsible manner. The company operates in a society and is an integral part of it and is an integral part of it and hence, it has certain responsibilities towards the society as well.

Conclusion

The ultimate objective of a company is to maximize shareholders wealth. The company must, however, operate in a socially responsible manner in achieving the objective of wealth maximization. The

company has a duty of care to other stakeholders like employees, society at large etc. In some cases, there may be conflict between different stakeholder's objectives. For instance, a new waste treatment plant would be good for the environment and society would be incurred. The company must definitely consider non-financial factors along with financial factors while deciding on whether to build a new plant or not.

VALUE CHAIN ANAYSIS

CASE STUDY NO: 8

S-MART was founded in 1990 as a departmental store catering to the entire household requirements (from grocery to clothing) of middle income groups. The company since was grown leaps and bounds and inaugurated its 100th store in 2017. S-Mart is known for high quality products which are available at discount to the market price as its store. The company claims to give at least 5% discount on listed price across product segments. The sales of the company have been grown 30% on Y-o-Y basis. The company has highest net profit margin and highest return on equity in the industry.

S-Mart has tie-ups with more than 500 vendors across India was provide high quality products on demand. S-Mart pays all its suppliers in advance and hence enjoys preferential pricing as compared to its competitors. The company procures products using the Just-In-Time (JIT) philosophy which helps it to keep low level of inventories and thereby freeing up significant amount of working capital. The products are directly delivered to this stores by company owned trucks and mini-vans and hence, there is no requirement of warehouse to store products.

The company sells products which are required by households on a day to day basis and is not keep to sell premium products which have higher margin but lower demand. This ensures that inventory is moved out of the stores faster and increases the inventory turnover ratio. The company owns all the stores which it operates under its brand name.

There is no third-party franchisee appointed to operate the stores. Since the products are directly procured from he manufactures and sold to customers, there are no intermediaries in between.

S-Mart invests the superior quality products and high level of customer service than aggressive marketing. The company believes that it can attract more customers by offering quality products at reasonable prices rather than spend huge amount on marketing. However, need based marketing activities are carried out by the company. S-Mart aims to build customer loyalty through high level of customer service as its store.

S-Mart one of the few companies which witnessed low employment in which it operate. The motivation level of employees is very high which results in excellent performance across all levels. Company rewards its employees generously periodically to stock option plan. The company conducts training session for its employees periodically to equip team with latest techniques in areas of procurement, sales, marketing and customer service. The result of these efforts is clearly visible in the company's growth.

The company has a solid Information Technology infrastructure for all its activities. The company has leveraged technology across all departments -be it procurement, logistics or sales. It has implemented SAP-R3 which is one of the leading Enterprise Resource Planning systems globally. Various reports relating to inventory levels, sales, liquidity position etc are available on a real time basis to the senior management.

Requirement

Map the various activities performed at S--Mart to the Porter's Value Chain model.

Solution

Introduction

Value chain is defined as "a chain of value added activities; products pass through the activities in a chain, gaining value at each stage." Value chain focus in systems and how business inputs are changed into business undertakes to convert inputs to outputs are interlinked to each other. A business carries out these activities to earn a profit or margin.

A business should undertake only those activities which add value to the end product being delivered to the customer. A value chain analysis helps business identify those activities which are not adding value (in order words wasteful activities). An example of a wasteful activity could be unnecessary storage of products with increases the inventory and working capital requirement. Such activities must be removed to ensure must be removed to ensure that the margin of business improves. Value Chain Analysis is one way of identifying which activities are best undertaken by a business and which are best outsourced.
Porter's value chain classifies activities into primary activity and secondary activity.

Primary Activities

Primary activities are those activities that are directly related with creating and delivering a product to the end customers. The following activities are considered as primary activities-

Inbound Logistics

Inbound logistic involves arranging inbound movement of materials or finished goods from suppliers to the manufacturing plants or retail stores. Since S-Mart is not involved in manufacturing, all the activities that it undertakes to deliver the products to its retail stores would from part of Inbound Logistics. The company has its own transport fleet to ensure timely delivery to products to the retail stores. The company also has a JIT system in place which ensures minimum inventory level. A reason why the company is own fleet of trucks is ensure that there is no failure on the supply side. In JIT system and especially in retail business, it is very important that stock outs are avoided.

Operations

Operations involve those activities which are concerned with conversion of input into outputs in case of manufacturing companies. In retail business, it comprises those activities which are concerned with running of stores, planning of inventory levels of various products, deciding the layout of various stores etc. The company operates through 100 stores which are owned by itself. The company does not have franchisee or agent model for operation of its stores. The ownership of the stores ensures that the quality standards are maintained across various stores and customer get the best value. Since the stores are owned, the company does not face any risk of closing the stores due to expiry of lease arrangements. The company can also invest to build the best layout for the stores.

Outbound Logistics

These include planning and dispatch, distribution management, transportation, warehousing, and order fulfillment. In case of a retail business, this includes activities carries out to deliver the product to the customer. S-Mart operates through its own stores and there is no outsourcing or franchisee arrangement. The company does not have any warehousing requirement as the product is directly delivered to the retail stores. The customers directly pick up the products from the stores and there is no transport requirement in this case. The company must however ensure that the
Customer waiting time is low at the time of invoicing and checkout from the store.

Marketing and Sales

Marketing and sales are the means whereby customers and consumers are made aware f the product which is ultimately sold to them. The activities include selling products to the end customers covering activities like product management, price management, promotion and marketing management. S-Mart builds customer loyalty by offering high quality products at affordable pricing. The company does not spend a huge amount on marketing

Service

In case of manufacturing industry, service generally refers to the after sales services which are required to maintain the value of product and includes activities like installation, repair etc. In case of retail store, service would encompass a superior experience at the stores and managing return of products by the customers. S-Mart aims to build customer loyalty through high level of customer service as its store.

Secondary Activities

Secondary activities are those activities which support the primary activities in their function. The following are the board of secondary activities:

Procurement

Procurement refers to the processes of acquiring various products and include activities like identifying sources of these products, vendor selection, placing an order, purchase of products etc.
The company deals with over 500 vendors across India on advance payment terms to procure high quality products at preferential pricing. This helps the company get better discounts which it can pass in ontocustomers. This ensures that the company does not carry the burden of discounts being offered to the customers.

Technology Development

Technology spans across all the primary activities of an organization. It includes activities like process automation, an Enterprise Resource Planning (ERP) system, inventory management system etc. The company has implemented SAP R/3 - an ERP package which helps in the management of various functions of procurement, logistics, and sales. A robust system is always necessary to ensure that the JIT system work effectively. Such system assists in real-time monitoring of inventory levels of triggering purchase orders when inventory levels are low. The entire flow of products from an order placement till the delivery to customer can be tracked seamlessly.

Human Resource Management

This involves areas of recruiting, managing, training, developing and rewarding people within an organization. S-Mart has a very low employee turnover and a very high level of employee motivation. The company rewards all its employees generously and conducts periodic training and development programme for its employees. This ensures that the employees are highly motivated which translate into a consistently high performance.

Infrastructure

This includes not only the physical infrastructure but also all departments of management, finance, legal which are required to keep the company's store operational. All these are important for organization's performance in primary activities.

ENVIRONMENTAL MANAGEMENT ACCOUNTING

CASE STUDY NO: 9

Shandaar Bangle Ltd(SBL) have been recognized as a manufacturers and exporters of high quality Bangles, designed and manufactured using optimum quality raw material, sourced from trustworthy vendors of the market.

Manufacturing Process

The process of manufacture of glass bangles is highly skilled labour oriented one comprising of the following main operations:

Glass Melting Phase → Parison Making Phase → Spiral/Coil Forming Phase

In first phase, glass batch materials like sand, soda ash, lime stone feldspar,boraxetc. With other additives and coloring materials in a suitable proportion are mixed manually and fed into the pot places in pot furnace. The raw materials is melted in the furnace at
A temperature of about 13001400(degree Celsius) to obtain molten glass.

In second phase, molten glass is drawn forum the pot of the furnace with the help of the iron piper and formed into gob to gather required quantity of glass for formation into parisons on iron plates. The parisons of different colors are joined together and reheated in an auxiliary furnace to obtain required designs.

In third phase, the reheated parison is then transferred to ‘Belan Furnace’ form which the glass is further drawn into spiral/coil of bangles on the spindle counted and rotated manually at uniform rate of revaluation synchronizing with the manually at the other end of the furnace. Spiral are then taken out

from the spindle and cut with the help of a pencil cutter to separate out the single pieces of bangles from spiral. These cut or un-joined bangles are then sent for joining of end, finishing cutting & polishing, decoration etc. The finished products are then neatly packed for sale.

Environmental Impact

But unfortunately, these processes have environmental impact at all stages of the process, including emissions off airborne pollution in the form of ashes, gases, noise and vibration.

Conditions of the Workplace

Due to the limitations of maintaining appropriate temperature for melting and molding of the glass, furnaces are kept burning. Therefore, workers have to work with such working conditions continuously without leisure time.

The above- mentioned factors become more harmful while working in immense heat and sound which is normally higher than permissible levels.

Health Impact

A recent study has revealed adverse impact of pollution over workers and people who are living in nearby area.

Management Initiatives

The management of company is worried about environmental impact and health impact and has taken certain initiatives in taking care of environment like- batch house cyclonic dust collector, noise absorbing device, natural gas fired furnace, better refractory materials, training for waste minimization, treatment of solid waste, research and development activities aimed at reducing pollution level, planting trees, treatment of nitrogen oxide and other harmful gases.

Management desires to adopt environmental management accounting as a part of strategic decision making process.

(i) EXPLAIN the requirement to have environmental management accounting and IDENTIFY the SBL's environmental prevention, appraisal, and failure costs.

(ii) ANALYZE the appropriateness of SBL incorporating the following in implementing Environmental Management Accounting :

- Activity based Costing
- Life Cycle Costing
- Input Output Analysis

(iii) EXPLAIN the need of non-financial consideration in decision making and suggest safety measures that can be taken into consideration for workers.

Solution

Environmental management accounting (EMA) is the generation and analysis of both financial and non-financial information in order to support internal environmental management processes i.e. identification, prioritization, qualification and recording of environmental cost into business decision.

By adopting EMA, SBL will have following benefits:

- Product Pricing.
- Budgeting.
- Investment Appraisal.
- Calculating Investing Options.
- Designing, Calculating Costs, Savings & Benefits of Environmental Projects.
- Setting Quantified Performance Targets.
- Assessment of Annual Environmental Costs.
- Environmental Performance Evaluation, Indicators and Benchmarking.
- External Reporting –Disclosure of Environmental Expenditures, Investments and Liabilities.

Environmental Costs of SBL

- Environmental Prevention Cost: These costs are basically incurred in relation to activities undertaken to prevent the production of waste that could harm the environment.
  Company's efforts to minimize the effect of its activities on the environment like installing batch house cyclonic dust collector, natural gas fired furnace, better refractory materials, training for waste minimization, research and development activities, noise absorbing device and
  Planting trees can be classified as Environmental Preventive Cost.

- Environmental Appraisal Costs: It means costs incurred in relation to activities undertaken to determine whether product processes and other activities within firm are complying with environmental standards.
  SBL may perform 'Contamination Test' to observe the environment compatibility of its processes can be categorized under environmental appraisal cost.

- Environmental Failure Cost: It means cost incurred in relation to activities dealing with pollution arising from the activities of entity includes costs related to treatment harmful gases and treatment of solid waste.

Appropriateness of Techniques for Identification and Allocation

Activity Based Costing

This costing techniques would help the SBL to separate environment costs from the general overheads and allocate them to glass bangles by identifying appropriate drivers of these environment cost. Possible environment activities for environmental cost and their drivers are:-

Activity	**Cost Drivers**
▪ Planting of trees	▪ Number of trees planted
▪ Treatment of nitrogen oxide (in the same way; activity and related cost driver for other gases would be determined)	▪ Volume of nitrogen oxide treated
▪ Solid waste removal	▪ Volume of such waste
▪ Research and Developmental activities	▪ Man hours worked for such activities

Life Cycle Costing

By using this costing in EMA, SBL would be able to identify record and control the environmental costs relating to various stages in the life of glass bangles. At each of following stage environmental cost would be incurred:

- In raw material stage, some natural products would be purchased.
- In manufacturing stage, emission and treatment of nitrogen oxide other gases and treatment of solid waste.
- In marketing and distribution stage, environmental cost relating to transportation of glass bangles of various customers.

Input/ Output Analysis

Here detail analysis of input and output of a system is done the purpose of assessment of ecological well being of entity's products, processes and other activities. This technique is based on the fact that whatever goes into system has to come out of it.

CASE STUDY NO 10

In what circumstances it may be justifiable to sell at a price below marginal cost?

Answer: It may be justifiable to sell at a price below marginal cost for a limited period under the circumstances:

1. Where materials are of perishable nature.
2. Where stocks have been accumulated large quantities and the market prices have fallen.
3. To popularize a new product.
4. Where such reduction enables the firm to boost the sale of other products having larger profit margin.
5. To capture foreign markets.
6. To obviate shut down costs.
7. To retain future market.
8.

CASE STUDY 11

Enumerate the factors involved in decision relating to expansion of capacity?

Answer: The factors involved in decision relating to expansion of capacity are enumerated as below:

1. Additional fixed overheads involved should be considered.
2. Possible decrease in selling price due to increase production capacity.
3. Whether the demand is sufficient to absorb the increased production.

Mention any four important factors to be considered in Marginal Costing Decisions and Distinguish between Marginal and Absorption Costing & Limitations of Absorption Costing?

Answer: In all recommendations of marginal costing decisions; the following factors are to be considered:

1. Contribution: Whether the product or productions line in questions makes a contribution.
2. Specific fixed cost, if any: Where a choice is to be made between two courses of action, the additional fixed overhead, if any. Should be taken into account.
3. CVP relationship: The affect of increase in volume on profits, and the rate of earning additional, Profits should be analyzed.
4. Incremental contribution: Where additional quantities can be old only at reduced prices, incremental contribution will be more effective in decision making, as it takes into account the additional sale quantity and additional contribution per unit.
5. Capacity: Whether acceptance of the incremental order, or additional product line is within the firm's capacity or whether key factor comes into play. Should be analyzed.
6. Non-cost factors: Non-cost factors should also be considered, wherever applicable.

The difference between Marginal Costing and Absorption Costing can ne narrated as below:

Absorption Costing	**Marginal Costing**
It is a total cost technique i.e. both variable and fixed cost is charged to products, processes or operations.	Here only variable costs are charged to products, processes or operations. Fixed costs are charged as period costs to be profit statement of the same period in which they are incurred.
Fixed factory overhead are absorbed by the production units on the basis of predetermined fixed factory overhead recovery rate based on normal capacity. Under/over absorbed overheads are adjusted before arriving at the figure of profit for a particular period.	The cost of production under this method does not include fixed factory overheads and therefore, the value of closing stock comprises of only variable costs. No part of the fixed expenses is included in the value of closing stock and carried over to the next period.
In spite of best possible forecast and equitable basis of apportionment/ allocation of fixed costs, under or over recovery of fixed overheads generally arises.	Since fixed overheads are not included in the cost of production. Therefore, the question of their under/ over recovery does not arises.
Managerial decisions under this costing technique are based on profit i.e. excess of sales value over total costs, which may at times lead to erroneous decisions.	Here decisions are made on the basis contribution i.e. excess of sales price over variable costs. This basis of decision making results in optimum profitability.

Absorption Costing: Limitations

1. Fixed cost treated as product cost.
2. Fixed cost is included in closing stock.
3. Entire fixed cost is not written off
4. Net profit/Depreciation/Dividend/Tax- All wrong.
5. The more the production, the more the profits.

CASE STUDY 11

What are the advantages of Marginal Costing and limitations of Marginal Costing?

Answer:

1. **Pricing Decisions:** Since marginal cost per unit is constant from period to period within a short span of time, firm decisions on pricing policy can be taken. IF fixed cot is included, the unit cost will change from day to day depending upon the volume of output. This will make decision task difficult.
2. **Overhead Variance:** Overheads are recovered in costing on the pre-determined rates. This creates the problem of treatment of under or over-recovery of overhead, if fixed overhead were included Marginal costing avoids such under or over recovery of overheads.
3. **True Profit**: It is argued that under the marginal costing technique, the stock of finished goods and work-in-progress are carried on marginal cost basis and the fixed expenses are written off to profit and loss account as period cost. This shows the true profit of the period.
4. **Break-Even analysis**: Marginal Costing helps in the preparation of break-even analysis, which shows the effect in increasing or decreasing production activity on the profitability of the company.
5. **Control over expenditure**: Segregation of expenses as fixed and variable helps the management to exercise control over expenditure. The management can compare the actual variable expenses with the budgeted variable expenses and take corrective action through variance analysis.

6. **Business decision-making**: Marginal Costing helps the management in a taking a number of business decisions like make or buy, discontinuance of a particular product, replacement of machine etc.

Limitations of Marginal costing:

1. Marginal Costing assumes that all costs can be classified into fixed and variable. But it is not so, as there are costs which are neither fixed nor variable. For example, various amenities provided to workers may have no relation either to volume of production or time factor.
2. Contribution of a product itself is not a guide for optimum profitability unless it is linked with the key factor.
3. Marginal Costing ignores time factor and investment. For example the marginal cost of two jobs may be the same but the time their completion and the cost of machines used may differ. The true cost of a job, which takes longer time and uses costlier machine would be higher. This fact is not disclosed by marginal costing.
4. The overheads of fixed nature cannot altogether be excluded particularly in large contracts while valuing work-in-progress. In order to show the correct position, fixed overheads have to be included in work-in-progress.
5. In the long run, the selling prices should be based on total cost i.e. inclusive of fixed cost also. In the short run or in special situations when a products is sold below the total coast. Customers may insist on the continuation of reduced prices forever which may not be possible in all cases. Further, sales staff may mistake marginal cost for total cost and sell at a price which will result in loss or low profit. Hence sales staff should be cautioned while given marginal cost.
6. The main assumption regarding behavior of costs is not true. The variable costs do not remain constant per unit of output. There may be changes in the prices of raw materials, wage rates etc. after a certain level of output has been reached due to shortage of material storage of skilled labour; concessions of bulk purchases etc. Similarly the fixed cost does not remain static. They may change from one period to another. For example salaries bill may go up because of increments or due to change in pay rate etc.

CASE STUDY 13

What are the reasons to determine capacity?

Answer: Main reason for the determination of capacity is as follows:

1. Selecting a base activity for overhead rate determination or overhead distribution.
2. It is required in connection with Schedule VI of the Companies Act for indicating the licensed and installed capacity and also the actual production.
3. It is necessary for the Cost Auditor to give his comments on capacity utilization.
4. It helps to compare the actual capacity utilization with the budgeted capacity utilization and to analysis the deviation for taking corrective action.
5. Capacity utilization is an important factor in price fixation.
6. It enables the company to analyze the under or over absorption of overheads for proper treatment.
7. Capacity determination helps in preparationof flexible budgeting and achieving overall control over the operation of business.

CASE STUDY 14

Write short notes on the Break Even Point (BEP) & assumption and Limitations?

Answer: The Break-even point to a business is the point or a business situation at which there is neither a profit nor a loss to the firm. In either word, at this point, the total contribution equals fixed costs.

Assumptions underlying break-even analysis are as below:

1. All costs can be easily classified into fixed and variable components.
2. Both revenue and cost function are linear over the range of activity under consideration.
3. Prices of output and input remain unchanged.
4. Productivity of the factors of production will remain same.
5. The state of technology and the process of production will not change.
6. There will be no significant change in the level of inventory
7. The Company manufactures a single product.
8. In the case of a multi-product company, the sales mix will remain unchanged.

Limitations of a Break-even chart

The limitations of break even chart are as follows:-

1. While preparing a break-even chart, it is assumed that revenue and costs can be represented with the help of straight lines. It is not always be true.
2. The preparation of break-even charts requires the Segregation of semi-variable costs into fixed and variable components. It may not always be possible to segregate semi-variable costs into fixed and variable elements accurately. There may be situation when semi-variable costs cannot be split.
3. A break-even chart assumes that selling price and variable cost per constant at all levels of activity. It may not always be true. Selling price as well as variable cost may either increase or decrease with the change in volume. Fixed costs also tend to vary beyond a certain output.
4. When a firm purchases a number of products the appointment of fixed expenses over various products may be different and often it may be done arbitrarily.
5. A Breakeven chart assumes that business condition will not change. This is hardly so.
6. A break-even chart does not consider the amount of capital employed in the business, a very important factor for determining profitability of a concern.

CASE STUDY 15

Write short notes decisions involving dropping or adding a product line.

Answer: Since the objective of any business organization is to maximize its profits, the firm can consider the economies of dropping the unprofitable products, and adding a more remunerative product(s).

In such cases, the firm may have two alternatives as under:

(a) To drop the unprofitable product and to leave the capacity unutilized.
(b) To drop the unprofitable product and to utilize the capacity for the manufacture of a more remunerative product.

For this purpose, the contribution approach is adopted, taking the following factors into account:

1. Contribution from unprofitable product (i.e. Sale Revenue Less Variable Costs)

2. Specific Fixed costs of the unprofitable product, which can now be avoided or reduced.
3. Contribution from the other profitable product, which is proposed to produced with the balance capacity.

CASE STUDY 16

State the relative economics of the "Make or Buy" decision in Management Control?

Answer: The relative economics of the "make or buy" decision is management control. Generally for taking a make vs. buy decision comparison is made between the supplier's price and the marginal cost of making plus the opportunity cost/make vs. buy decisions is s strategic decision and therefore both short-term as well as long term thinking about various cost and other aspects needs to be done.

A Company generally but a component instead of making it under following situations:

1. If it costs less to buy rather than to manufacture it internally.
2. If the return on the necessary investment to be made to manufacture is not attractive enough.
3. If the company does not have the requisite skilled manpower to make.
4. If the concern feels that manufacturing internally will mean additional labour problem.
5. If adequate managerial manpower is not available to take charge of the extra work of manufacturing.

CASE STUDY 17

State non-cost factors to be considered in make/ buy decision.

Answer: Non-Cost factors in make/buy decisions:

1. Possible use of released production capacity and facility as a result of buying instead of making.
2. Sources of supply be reliable and they are capable of meeting un-interruptedly the requirement of the concern.
3. Assurance about the quality of goods supplied by outside supplier.
4. Reasonable certainty from the side of suppliers about, meeting the delivery dates.
5. The decision of buying the product/ component from outside suppliers should be discouraged, if the technical knowhow used is highly secretive.
6. The decision of buying from outside sources should not result in the laying off of workers and create industrial relation problem. In fact, on buying from outside the resources freed should be better utilized elsewhere in the concern.
7. The decision of manufacturing product / component is available to reduce the risk of outside buying.
8. In case the necessary technical expertise is not available internally then it is better to buy the requirements from outside.

CASE STUDY 18

List a few non-cost considerations in a Shut down or Continue decision

Answer:

1. Loss of market share to competition.
2. Strain in labour-management relations.
3. Risk of obsolescence of machinery
4. Need to maintain machine in operating condition

5. Availability of skilled labour on re-opening
6. Arrangement of finance for compensation payable, if any.

CASE STUDY 19

Indicate the possible advantage of treating divisions as profits centers.

Answer: The possible disadvantage of treating division as profit centers are as follows:

1. Division may compete with each other and make take decision to increase profit as the expenses of other divisions thereby overemphasizing short term results.
2. It may adversely affect co-operation between the divisions and lead to lack of harmony in achieving. Organization goals of the company.Thus it is hard to achieve the objective of goal congruence.
3. It may lead to reduction in the company's overall total profits.
4. The cost of activities which are common to all divisions may be greater for decentralized structure than for centralized structure. It may thus result in duplication of staff activities.
5. Top management delegates decision making to divisional mangers. There are risks of mistakes committed by the divisional managers which the top management, may avoid.
6. Series of control reports prepared for several departments may not be effective from the point of view of top management.
7. It may under utilize corporate competence.
8. It leads to complications associated with transfer pricing problems.
9. It becomes difficult to identify and define precisely suitable profit centers.
10. It confuses division's result with manager's performance.

CASE STUDY 20

What is Opportunity Cost? Give Examples.

Answer: Opportunity cost is defined as the cost of the alternative foregone. It is theprospective change in cost following the adoption of an alternative machine, process, raw materials, specification or operations.

It is the cost of opportunity lost by diversion of an input factor from one use to another. Where alternative are compared. When a number of alternative are available, the highest of the opportunity cost will be considered for decision-making. For example, a firm could either sell a dead stock item for Rs 4 or substitute it for another component costing Rs 5. The opportunity cost of using this item in a specific contract will be Rs 5, since the firm would otherwise have opted for substitution (and not sale).

Some examples of opportunity cost:

(a) A Firm operates at full capacity, The opportunity cost of making a component (earlier / bought outside) will equivalent to contribution forgone on sales the main product.
(b) The opportunity cost of funds invested in a project is the interest that could have been earned by investing the funds in bank deposit or other – risk free modes.

CASE STUDY 21

Explain concept of Shadow Price?

Answer: Shadow Price:- It refers to the opportunity cost of one unit of resource for the organization. The concept is of particular relevance in a situation of scarce resources. For instance, if machine hours are a scare resource and the firm could have increased its contribution margin by Rs. 10 by having additional production is one machine hour, the shadow price of one hour's production is Rs. 10. In other words, the shadow price quantities benefit a firm can expect through increasing its capacity.

CASE STUDY 22

How can margin of safety be improved?

Measures for improving margin of safety Margin of safety can be improved by taking the following measures:

1. Increasing the selling price provided the demand is inelastic so as to absorb the increased prices.
2. Increasing the selling price, provided ht demand is inelastic so as to absorb the increased prices.
3. Reduction in fixed expenses.
4. Increasing the sales volume provided capacity is available.
5. Substitution or introduction of a product mixes such that more profitable lines are introduced.

CASE STUDY 23

What is JIT? What are the steps involved in JIT?

Answer: Operation of JIT (Just-in-time) concept:

A JIT approach is a collection of ideas and philosophy that streamline a company's production process activities to such an extent that waste of all kinds viz. material and labour is systematically driven out of the process.

Just in Time Technique enables a company to ensure that it receives products/spare parts / material from its suppliers on the exact date and at the exact time when they are needed. JIT refers to a system in which materials arrive exactly as they needed.

With a JIT system a company must ensure that it receives materials from its supplier on the exact date and at the exact time when they are needed. For this reason the purchasing staff must investigate and evaluate every supplier, eliminate those thatcould not keep up with the delivery dates.

The steps are involved are;

Supplier Evaluation: The Purchasing Department must evaluate and investigate every supplier and eliminate those who could not keep with the delivery dates.

Supplier Assistance: The engineering staff must visit supplier sites and examine their processes. Not only to see if they can reliably ship high-quality parts but also to provide them with engineering assistance to bring them up to a higher standard of product.

Supplier Information System: The firm must install a system, which is as simple as a fax machine or as advanced as an electronic data interchange system or linked computer systematic that communicates with suppliers as to exactly how much of specified parts are to be sent to the company.

Direct Delivery: Deliveries should be sent straight to the production floor for immediate use in manufactured products, so that no time spent in inspecting the parts for defects. Drivers, who bring supplies of materials, drop them off at the specific machines that will use the material first.

This can be illustrated with the example of three machines. Parts are first processed by machine, A which feed to machine B. The B processes these parts and then C. Kanbans are located between the machines. As long kanban containers are not full the workers at machine A continues to produce parts placing them in Kanban container. When the Kanban container is full, the worker stops producing and recommences when a part has been removed. A similar process applies between the operation of machine B and C. This process can result in idle time to a certain extent within the ceil, but the JIT philosophy is based on the thinking that it is more beneficial to absorb short run idle time then adding inventory during these periods. During idle time workers perform preventive maintenance on their machine.

CASE STUDY 24

How does JIT help in shortening set-up and operation times?

Answer: Outline the JIT approach for shortening set-up and operation times.
Long set-ups and operation time involve indirect costs like product obsolescence. Inventory carrying costs, and many defective products (because problems may not be discovered until a large number of items have already have completed). This problem will be resolved under JIT by adopting the following steps.
Test data: A of a typical set is prepared for analysis purpose. A team of industrial engineers and machine users examine this type; spotting and gradually that contribute to a lengthy set-up.
Motion and time Study: By eliminating unnecessary production steps and improving other after a number of iterations, it is possible to achieve substantially lower set-up times than before.
Effects: Reaction in set-up time has the following effects:
Reduction in the amount of work-in-process,
Reduction in the number of product that can be produced before, defects are identified and fixed, thereby reducing scarp costs.

CASE STUDY 25

Explain in brief the JIT approach for reducing WIP inventory.

Answer: JIT approach for reducing WIP inventory:
At times, there may be huge difference between the operating speeds of different machines. This affects cost in following manner:

- Work-in-process inventory builds up in front of the slowest machines.
- Defective parts produced by an upstream machine may not be discovered until the next downstream machine that feeds it with parts, authorizing the production of just enough components to fulfill the production requirements. This is also known as “pull” system, since these cards are iritiated at the end of the production process pulling work authorization through the production system. WIP cannot pile ip since it can be created only with kanban authorization.

2. Working Cells: A Working cell is a small cluster of machines, which can be run by a single machine operator. The establishment of working cells has the following advantages.

- ❖ The individual machine operator takes each output part from machine to machine to machine within the cell, thus there is no way for WIP to build up between machines.

- The operator can immediately identify defective output part from machine to machine of the cell. The smaller machines used in a machine cell are generally much simpler than the large automated machinery they replace. Hence maintenance costs are reduced.
- It is much easier to reconfigure the production facility when it is necessary to produce different products, avoiding the large expenses of carefully repositioning and aligning equipment.

CASE STUDY 26

"Employee Training and Development is a pre-requisite for JIT implementation" Explain.

Employee Training and Development is a pre-requisite for JIT implementation:
JIT focuses on waste reduction, inventory management and product quality. The focus of attention shift away performance based to high production volumes and quality. In order to make JIT effective, employee participation and co-operation is a must. For this purpose, the HR department must prepare and organize training classes to teach to employees:
How to operate a multitude of different machines?
How to perform limited maintenance on the machines without having to call in the maintenance staff?
How to spot product errors?
Hoe to relate one's role in the entire system flows? And
When to halt the production process to fix problems?
The effects of proper training of employees will be: Versatility in handling operations. Reduction in maintenance staff Reduction in time and increase in quality output.

CASE STUDY 27

State in brief the Benefits associated with JIT system.

Answer: Benefits associated with JIT system.
1. Reduction in Inventory levels: Unnecessary piling up of Raw Materials, WIP and finished goods are avoided. The focus is on production and purchasers per the firm's requirements.
2. Reduction in Wastage of Time: Wastage of time in various ways like inspection time, machinery set-up time, storage time, queue time, defectives rework time etc., are reduced.

3. Reduction in Scrap Rates: There will be sharp reductions in the rates of defectives or scrapped units. The workers themselves identify defects and take prompt action to avoid their recurrence.

4. Reduction in Overhead Costs: By reducing unnecessary (non value-added) activities and the associated time and cost-drivers, overheads can be greatly reduced e.g. material handling costs, rework costs, facility costs etc.

CASE STUDY 28

Explain in brief the role of JIT in time reduction.

Answer: Role of JIT in time reduction:
The key focus of ay JIT system is on reducing various kinds of wastage of time, so that the entire production process is concentrated on the spent in actually producing products. By reducing wastage of time, the firm of time, the firm effectively eliminates activities with them. Time reduction can be achieved in the following manager.

1. Inspection Time: All inspection time is eliminated from the system as operates conduct their own quality cheeks. Supplier's assistance and quality checks at supplier's factory eliminate the need for separate inspection or QC department in the firm.

2. Handling Time: All movement, which involves shifting inventory and work in process throughout the various parts of the plant, can be eliminated by clustering machines together logical groupings called Working Cells.
3. Queue Time: Queue time is eliminated by not allowing inventory to build up in a front of machines. Kanban cards serve this purpose.

CASE STUDY 29

EXPLAIN IN BRIEF THE EFFECT ON JIT ON OVERHEAD COSTS.

Answer: JIT effect on Overhead Costs
Overhead Costs are greatly reduced with JIT operation. This is because of the following reasons:
Elimination of non value –added activities and Improvement in value-added activities
Reduction Time

Reduction in Inventory levels and associated costs
Reduction / Elimination of unnecessary cost drivers
Introduction of "Machines Cells" to identify direct costs than overhead expenses.
The effect of JIT philosophy on Overhead is three-fold:

1.Though reduction in Overheads Costs
2.Shift between Overhead Costs and Direct Costs, due to introduction of Machine Cells
3.Scientific Allocation of common overhead based on Machine Cells and Cost Drivers
Examples
The costs of material handling, facilities, and quality inspection decline when a JIT system is installed. The reduction of all types of inventory results in a massive reduction in the amount space required for warehouse facility. Hence costs associated with warehousing are reduced when the costs of staff equipment, fixed assets, facilities, and rent associated with the warehouse and sharply cut back.
A machine ceil generally produces only a small range of products, hence it is easy to assign the entire cost of each machine ceil to these items. This means that the depreciation, maintenance, labour and utility costs of each cell can be charged straight to a product, which is preferable than traditional absorption costing.

CASE STUDY 30

Explain the Impact of JIT on Product Prices.

Answer: Impact of JIT on Product Prices:
When a company achieves a higher level of a product quality, along with to deliver products on the dates required, customer may be willing to pay a premium. If customers are highly sensitive-to quality or delivery reliability (which are the benefits of JIT), it may be possible to increase price substantially.

If customers place a higher degree of importance on other factors, then there will be no opportunity for a price increase.

In case all firms in an industry adopt JIT, they offer the same level of quality and service JIT philosophy, in such cases, just keeps a company from losing sales o its competitors. The impact of a JIT system on product pricing is primarily driven by customer'sperceived need for higher product quality and liable delivery times, as well as the presence of competitors with JIT system, the same installation, and operational base.
Identification of Machine Cells under JIT for systematic OH Cost Allocation

a. A working Cell or machine Cell is a small cluster of machines, which can be run by a single machine operator.

b. It designed to produce either a single product or a single component that goes into a similar product line. Therefore all costs generated by the machines cell can be charged directly to the only product it produces.
c. When a company completely changes over to the use of machine cells in all locations, the cost related to all the cells can now be changed directly to products. The balance costs left may be assigned to the Overhead Cost Pool and identified with the products through Activity Based Costing. This result is more accurate product costs.

Some examples of shift from Overheads to Direct Machine Cells Costs are:

a. Depreciation: Depreciation of each machine in a cell can be changed directly to a product. It may be possible to depreciate a machine based on its actual use, rather than charging off as specific amount per month.
b. Electricity: Power used by a machine in a cell can be separately metered and charged directly to the products that pass through the cell. Excess electricity cost charged to the facility as whole has to be charged to an overhead cost pool for allocation.
c. Material handling: In a JIT systems, most material handling cost are limited since machine operators move parts around within their machine cells. Only costs for materials handling between cells and charged to an overhead cost pools for allocation.
d. Operating Suppliers: Suppliers are used mostly with the machine cells to the majority of items in this expenses category can be separately tracked by individual cell and charged to product. Maintenance work on the facility will be charged to an Overhead cost pool.
e. Repairs and Maintenance: All maintenance costs incurred for machinery can be grouped into machine cells. By having the maintenance staff, charge their time and materials to these cells, these costs can be charged straight to products. Maintenance work on the facility will be charged to an Overhead Cost Pool.
f. Supervision: If supervision is by machine cell, the cost of the supervisor can be split among the cells supervised. However the cost of general activity management as well as of any supports staff still be charged to an overhead cost pool. With such a higher proportion of direct costs associated with each product managers have much more relevant information about the true cost of each product manufactured?

CASE STUDY 31

What is Back Flush Accounting? Characteristic & Criticism of Back flush Costing? What are Difficulties of Back flush Costing?

Answer: Back flush Accounting (Back flush Costing)

1. Companies may have some inventory despite using Just-in-time (JIT) production method Companies that record costs directly in cost of goods sold can be used a method called back flush costing to transfer any costs back to inventory accounts, if necessary.
2. Back flush Costing is a method that works backward from the output to assign manufacturing costs to work-in-progress inventories.
3. The term 'back flush' is used because costs are flushed back through the production process to the points at which inventories remain.
4. Back flush costing avoids details accounting transaction.
5. In convention product costing system costs are assigned with the movement of the products from direct materials to work-in-progress to finished goods. However, in back flush costing, we focus first, on the output of the organization and work backwards to allocate costs between costs of goods sold and inventories. No separate accounts are maintained for work-in-progress in back flush accounting.

6. CMA defines it as "Cost Accounting system. which focuses on the output of an organization and then works back to attribute costs to stock and cost of sales.
7. Traditional casting system use sequential tracking i.e. costing methods are synchronized, with physical sequence of purchases and production. Back flush costing which is also referred to as delayed costing or post deduct costing focuses on output and then works back to apply manufacturing costs to units sold and to inventories.

There are two basic justification for the system:
(i) To remove then incentive for managers to produce for inventory. In conventional system mangers try to add to operating income by producing units not sol. In absorption costing, fixed cost which otherwise be expenses for the period, get inventories.
(ii) To increase the focus of the managers on plant-wide goal together rather than on individual sun--units goals. For example, a production manager may be interested in increasing machine utilization at an individual work center and this steps may not be compatible to overall organization objective.

Criticism of Back flush Costing

Costing System does not strictly adhere to generally accepted principles of external reporting. The advocates of back flush costing cite the materiality concept to counter argue these charges. They claim, that if inventories are low or not differ materially from results of the system that adhere to generally accepted accounting principles.

Characteristic of companies adopting Back Flush Costing
The companies adopting back flush costing often meet the following three conditions:
1. Management wants a simple accounting system and no detailed tracking of direct material and direct labour through a series of operations is required.
2. Each product has a set of standard cost.
3. Material inventory levels are either low or constant.
If inventories are low the bulk of manufacturing costs will flow into costs of goods sold and it is not deferred as inventory cost. Back flush costing is especially attractive in companies that have low inventories resulting from JIT.

Difficulties of back flush costing
1. Back flush costing does not strictly adhere to generally accepted accounting Principles of external reporting.
2. The critics of bask flush costing Primarily emphasis o the absence of audit Tralls.
3. It does not pinpoint the use of resource at each step of the production process.
4. Back flush costing is suitable only for JIT Production system will virtually no direct material inventory and minimum work-in-process inventories. It is less feasible Otherwise.

Back Flushing in a JIT System: Back flushing requires no data entry of any kind until a finished product is completed. At that time total amount of information of finished product is entered this computer. Information is also fed based on bill of materials, which shows list of beginning inventory balance to arriving at the amount of inventory that should have been left now in hand. Back flushing is good because data entry occurs once in the entire production process. However there are some serious limitations of back flushing that must be corrected before it will work properly.

1. Production reporting: The total production figure entered must be correct or otherwise wrong component types and quantities will be subtracted from stock.

This is a particular problem when there is high turnover or a low level of training to the production staff that records that information, which leads to errors.

2. Scrap reporting: All abnormal scarp must be diligently tracked and will not be charged to inventory. Since scarp can occur anywhere in production process, a lack of attention by any of the production staff can result in an inaccurate inventory. Once again, high production turnover or a low level of employee training increase this problem.

3. Lot tracing: Lot tracing is almost very difficult in back flushing system. It is required when a manufacturer needs to keep records of which production lots were used to create a product in case all items in a lot must be recalled. Only a picking system can adequately record this information. Some computer system allows picking and back flushing system to coexist, so that picks transactions for lot tracing purpose can still be entered in the computer. Lot tracing may then still be possible if the right software is available; however this feature is generally present only on high-end systems.

4. Inventory accuracy: It becomes difficult to know accurately the inventory balance, as is a back flushing system; data is fed into the system only once day. This makes it difficult to maintain an accurate set of inventory records in the warehouse.

Back Flushing costing eliminates separate raw materials and work-in--progress account. There is cost of raw materials. Under JIT system, materials are immediately placed into process. For this reasons there is no need to record it under separate inventory account. Combining direct labour and overhead into one category is a second feature of back flush costing. Back Flush costing combines labour costs with overhead costs in a temporary account called conversion cost on debit side and applied conversion cost on the credit side.

CASE STUDY 32

Define Material Requirement Planning (MRP).

Answer:

1. Material Requirement Planning is computerized Production Scheduling System providing a basis of production decisions.
2. It progressively translates the forward schedule of final product requirement (the master production schedule) into the numbers of sub assemblies, components and raw materials required at each stage of the manufacturing cycle.
3. In the other words, MRP involves input planning based on output budget.

CASE STUDY 33

List the aims and benefits (objectives) of Material Requirement Planning.

Answer:

1. To determine quantity and timing of finished goods production as per the master production schedule.
2. To ascertain quantity of raw materials, sub-assemblies and components required for budgeted production, based on bill of materials.
3. To compute the inventories, work-in-progress, batch sizes and manufacturing and packing lead items.
4. To control inventory by ordering bought- in components and raw materials in relation to the order received or forecast.
5. To forecast inventory position period-by-period for a future time period of a manufacturing operation.
6. To serve as an inventory information system helpful in planning for raw materials and components parts.
7. To generate purchase requisition notes and purchase orders through computer system automatically.

CASE STUDY 34

List the data input required operating a MRP System.

Answer: The Prominent data requirements for a MRP system are:

1. Master Production Schedule: The specifies the quantity of each finished product to be produced, thee time at which such items will be required for dispatch to customers.
2. Bill of materials (BOM: The specifies the consumption requirements of sun-assembly. components and materials required for each finished good.
3. Inventory file / Stores Ledger: This contains the inventory details of each sub-assembly. components and materials required for each finished goods.
4. Routine File: This provides details on the sequence of operations required to manufacture components, sub-assemblies and finished goods.
5. Master Parts File: This contains information on the production time of sub-assemblies and components production internally and lead times for externally acquired items.

MRP presupposes the use of computers and hence the above information will be required as system data files.

CASE STUDY 35

What are the benefits of ERP?

Answer: The benefits arising from ERP are:

- Product Costing: ERP system supports advances costing methods like Standard Costing Actual Costing. Activity Based costing thereby help in determination of cost of products accurately.
- Cost Monitoring and Control: ERP can integrate all costing methods and information with finance. This provides the company with essential financial information for monitoring and controlling costs.
- Planning and Managing: The ERP system simplifies complicated logistics and helps in planning for and managing different divisions in different locations as a single unit.
- Information Flow: The advanced utility of the ERP system helps in processing the flow a product and financial information in several different ways.
- Efficient Database Management: The ERP system aids in the efficient managing of all data on warehouses, suppliers, customers etc. required to run an organization effectively and profitably.
- Inventory Management: Inventory reporting supports all reporting of specific and general types off stock transactions, like stock transfers, re-classifications, ID changes and physical inventory results. Also ERP can manage stock and purchase requisition, selection of appropriate locations for receipts, inventory valuation, warehouse management and cost accounting.
- Customer Satisfaction: ERP system defines the logistic processes flexibly and efficiently to deliver the right product from the right warehouse to the right customer at the right time--every time, thereby satisfying the customers. It also support planning, transportation, confirmation, dispatch, and proof of delivery processing. Additionally, it ensures better after sales service.
- Competitive Edge: ERP system helps a company to gain the competitive edge by (a) Enabling the company to respond quickly and accurately too change in market conditions; (b) improving business process; (c) ensuring quality control; (d) improved and objective production planning and (e) Offering internet Extranet Solutions.

CASE STUDY 36

TOTAL QUALITY MANAGEMENT

Define the terms (a) Quality Management. (OR) Define Total Quality Management (TQM) what are the core concepts of TQM?
Answer: Total Quality Management

1. (TQM) is defined as a set of concepts and tools for getting all employees focused on continuous improvements in the eyes of the customer. Since TQM focuses the attention of an organization on quality, thus it helps to provide the customer with mush higher quality.
2. Prudent expenditure on cost of preventing errors can often lead too larger reduction in cost of failure and consequently with lead to reduce the total cost. The organization strives for improvement so that more and more value can be added through improved quality of product at lower cost.
3. Many companies have adopted a term used to describe a situation which all business functions are involved in a process of continuous quality improvement.
4. The TQM approach highlights the need for a customer oriented approach to management reporting, eliminating some or more of traditional reporting practices.
5. TQM seeks to increase customer satisfaction by finding the factors that limit current performance.
6. The emphasis of TQM is to design and build quality in the product rather than allow defectives and then inspects and rectify them. The focus is on the cause's than the symptoms of poor quality.

The three core concepts of TQM are:

1. Quality Control (QL): It is concerned with the past, and deals with data obtained from previous production, which allows action to be taken to stop the production of defective units.
2. Quality Assurance (QA): It deals with the present and concerns the putting in place of systems to prevent from occurring.
3. Quality Management(QM): It is concerned with the figure, and manages people in a process of continuous improvement and service offered by the organization.

CASE STUDY 37

What are the various stages / steps to be taken in the implementation of TQM?

Stages	**Description**
1	Identification of customers / customers groups
2	Identifying customer expectation
3	Identifying customer decision-making requirements and product utilities;
4	Identifying perceived problems in Decision making process and product utility
5	Comparison with other organization and benchmarking
6	Customer feed-back
7	Identification of improvement opportunity
8	Quality Improvement process through (a) New strategies; (b) Elimination of deficiencies and (c) identifying solutions

Stage 1: Identification of customers / customers groups: Through a team approach (a technique called Multi voting), the firm should identify major customer groups. This helps in generating priorities in the identification of customers and critical issues in the provision of decision-support information.

Stage 2: Identifying customer expectations: Once the major customer groups are identified , their expectations are listed. The question to be answered is what does the customer expect from the firm?

Stage 3: Identifying customer decision-making requirements and product utilities: Where the focus is on quality improvement, the overriding need is to stay close to the customers and Follow their suggestions. In this way, a decision support system can be developed, incorporating both financial and non-financial information, which seeks to satisfy user requirements and product utilities? The answer is sought by listing out managerial perceptions and not by actual interaction with the customers.

Stage 4: Identifying perceived problems in decision-making process and product utilities: Using participative processes such as brainstorming and multi voting the firms seeks to list out areas of weakness where the greatest impact could be achieved through the implementation of improvements. The firm identifies the answer to the questions. What problems areas to we perceive in the decision-making process?

Stage 5: Comparison with other organization and benchmarking: Detailed and systematic internal deliberations allow the firm to develop a clear idea of their own strengths and weakness and of the areas of most significant deficiency. The benchmarking exercise allows the firm to see how other companies are coping and with similar problems and opportunities.

Stage 6: Customers Feedback: Stages 1 to 5 provide an information base development without reference to the customer. This is rectified at Stage 6 with a survey of representative customers, which embraces their view on perceived problem areas, interaction with the customers and obtaining their view help the firm in correcting its own perception and refining its processes.

Stage 7 and 8: The identification of improvement opportunities and implementation of Quality Improvement Process: The outcomes of the customer survey, benchmarking and internal analysis, provides the input for stages and * i.e. identification of improvement opportunities and the implementation of a formal improvement process. This is done through a six-step process called PRAISE, for short.

CASE STUDY 38

Explain in brief the fundamental requirements (Critical Success factor) for the implementation of the TQM process.

Answer: In the opinion of Sri C.K. Prahlad the Strategic guru.

TQM is a continuing process to ensure that an enterprises is constantly creating new paths to improve its product processes, people by embedding quality consciousness within the organization.

The essential requirements of successful implementation are described as the six C' of TQM.

There are:-

1. **Commitment:** If a TQM culture is to be developed, total commitment must come from top management. It is not sufficient to delegate 'quality' issues to a single person. Quality expectations must be made clear by the top management, together with the support and training required for its achievement.

2. **Culture:** Training lies at the center off effecting a change in culture and attitudes. Negative perceptions must be changed to encourage individual contribution and make 'quality' a normal part of everyone's job.

3. **Continuous Improvement:** TQM should be recognized as a continuous process. It is not a "one-time programme". There will always be room for improvement, however small.

4. **Co-operation:** TQM visualizes Total Employee Involvement (TEI). Employee involvement and cooperation should be sought in the development of improvement strategies and associated performance measure.

5. **Customer Focus**: The needs of external customer (in receipt of the final product or service) and also the internal customers (Colleagues who receive and supply goods, services or information's) should be the price focus.

6**. Control:** Documentation, procedure and awareness of current best practice are essential if TQM implementation are to function appropriately. Unless control procedures are in place, improvements cannot be monitored and measured nor deficiencies corrected.

CASE STUDY 39

What is Pareto Analysis? Outline its use.

Answer:

1. PARETO ANALYSIS is a rule that recommends focus on te most important aspects of decision making in order to simplify the process of decision making.
2. It is based on the 80:20 or approximation like 70:30 can be observed in many different business situation.
3. Main point is that a very small proportion of items usually accounts for majority of value. By concentrating on small proportion of stock items, which jointly account for 80% of the total value, a firm may be able to control most of its monetary investment in stocks.
4. This phenomenon can be observed in many business situations, The management can use this analysis in a number of different circumstances to attract management attention to the key control mechanism.
5. The analysis of the company's estimated total sales revenue might indicate that approximately 80% of its total sales revenue is earned from about 20% of its product.
6. This analysis is based on observation by Pareto that a small proportion of items usually account for fee majority of value.
7. The management can use it in a number of different circumstances to direct management attention to the key control mechanism or planning aspects. It helps clearly establish top priorities and to identify both profitable and unprofitable targets.

A.

- 80% of Result generated from 20% of Act.
- 80% of Revenue generated from 20% of products.
- 80% of cost of stock generated from 20% of cost of inventory.
- 80% of total cost generated from 20% of cost Drives.
- 80% of Reported problem are generated by 20% of underlying causes.

B. Usefulness of Pareto Analysis: Pareto analysis is useful to.

- ✓ Prioritize problems, goals and objective
- ✓ Identify root causes.
- ✓ Select and define key quality improvement programs.
- ✓ Select key customer relations and service programs.
- ✓ Select and define key performance improvements programs.
- ✓ Maximize research and product development time.
- ✓ Verify operating procedures and manufacturing processes.
- ✓ Sales/distribution of products or services.
- ✓ Allocate physical, financial and human resources.

CASE STUDY 40

Briefly describe some business situations where Pareto Analysis can be applied.

Answer: Pareto analysis is applicable in the presentation of performance Indicators data through selection of representative process characteristics that truly determine or directly or indirectly influence or confirm the desired quality or performance result or outcome. It is generally applicable to the following business situation:

1. Product Pricing: Where a firm sells a number of products, it may not be possible to analyze cost-volume-price--profit relationship for all products.

HOW PARETO ANAYLSIS IS HELPFUL IN PRICING OF PRODUCT IN THE CASE OF FIRM DEALING WIH MULTI PRODUCTS?

Pareto Analysis is used for analyzing the firm estimated sales revenue from various products, and it might indicate that approximately 80% of its total sales revenue iis earned from about 20% of its products.

This helps to management to delegate the pricing decision for approximately 80% of its products to lower managerial levels. Top management can concentrate on pricing decision for the important 20% products, which are essential for the company's survival.

Sophisticated pricing method can be adopted for the important products while for other products, cost based pricing methods may be used.

2. Customers Profitability Analysis: The modern business thinking is to recognize the customer and satisfy hiss requirements. Hence instead of analyzing products, customer can be analyzed for their relative profitability to the organization.

It is found that approximately 20% of customers generates 80% of the profit.

Such analysis is useful for evaluation to the portfolio of customer profile and decision-making such as whether to continue serving a customer group. What is extent of promotion expenses to be incurred etc.

3. ABC Analysis-Stock Control: In Raw Material stock control, it is found that only a few of the goods in stock make up most of the value.

About 80% of the materials value is due to high priced materials, which constitute only 20% of the quantity. These materials are classified into A, B and c Categories based on their importance. Control is directed primarily over "A" Category items by setting EOQ< Stock Levels, Surprise stock Verification procedure etc. The outcome of such analysis is that by concentrating on small proportion of stock items that jointly account for 80% of the total value, a firm will be able to control most of the monetary investment in stocks.

4. Activity Based Costing: Activity Based Costing involves the identification of cost drives for various items of Overhead expenses.

Generally 20% of the firm's cost drivers are responsible for 80% of the total cost.
By analyzing, monitoring and controlling those cost drivers that attribute to high costs, a better control and understanding of overheads will be obtained.
5. Quality Control: Pareto analysis can be extended to discover from an analysis of defect report or customer complaints which "Vital Few" causes are responsible for most of the reported problems. Generally, 80% of reported problems are traceable to 20% of the underlying causes. By concentrating one's efforts on rectifying the vital 20% one can have the greatest immediate impact on product quality. Pareto Analysis indicates how frequently each type of failure (defect) occurs. The purpose of the analysis is to direct management attention to the area where the best returns can be achieved by solving most of quality problems. perhaps just with a single action.

CASE STUDY 41

What is Penetration pricing? What are the circumstances in which this policy can be adopted?
Answer: Penetration Pricing:-

1. This pricing policy is in favor of using a low prices as the principal instrument for penetrating mass markets early.
2. It is opposite to skimming pricing.
3. The low pricing policy is introduced for the sake of long-term survival and profitability and hence it has to receive carefully consideration before implementation.
4. It needs an analysis of the scope for market expansion and hence considerable amount of research and forecasting are necessary before determining the price.
5. Penetration pricing means a price suitable for penetrating mass market as quickly as possible through lower prices offers.
6. This method is also used for pricing a new product. In order to popularize a new product penetrating pricing policy is used initially.
7. The company may not earn profit by resorting to this policy during the initial stage. Later on, the price may be increased as and when the demand picks up.
8. Penetrating Policy can be adopted at any stage of the product life cycle for products whose market is approached with low initial price.
9. The use of this policy by the existing concerns will discourage the new concerns to enter to the market. This pricing policy is also known as ."stay-out-pricing".

Circumstances for adoption:-
The three circumstances in which penetrating pricing can be adopted are as under:-

1. When demand of the product is elastic to price. In other words, the demand of the product increases price is low.
2. When there are substantial savings on large-scale production, here Increases in demand is sustained by the adoption of low pricing policy.
3. When there is threat of competition. The prices fixed at a low level act as an entry barrier to the prospective competitors.

CASE STUDY 42

What is Skimming pricing policy?
Answer: Skimming Pricing:- This term is used in pricing a new product. Basically there are two alternatives in pricing a new product. One, which calls for a relatively high price, is called "Skimming Price". and other, which calls for relatively low price, is called "Penetration Price". The product should have some special features involving drastic departure from accepted ways, of performing the service. For example, Prestige Cooker was priced very high when it was first introduced in the country. The

product is introduced with high price coupled with large promotional expenses in the early stages and lower prices at large stages. Skimming Pricing provides funds for financing expansion scheme. Early higher prices may safeguard profits at early stages, but it may prevent quick sales to many potential buyers on whom company's future depends. A policy of skimming pricing is adopted under condition such as
(a) a new product is introduced in the market;
(b) there are a few producers;
(c) demand is inelastic and
(d) A sophisticated product for use of rich and affluent customers.

CASE STUDY 43

Define Price Discrimination?

Answer: Price discrimination means charging different prices and it takes various forms according whether the basis is customer, product, place or time.
Conditions: Price discrimination is possible if the following conditions are satisfied:

1. Segment able Market: The Market must be capable of being segmented for price discrimination.
2. No resale: The customers should not be able to resell the product of the segment paying higher prices should not be possible
   - The competitors underselling is not possible

3. Forms of Price Discrimination

   a. Based on Customers: The same product is charged at different prices to different customers. It is however potentially disruptive of customer relations.
   b. Based on product version: A slightly different product is charged at different price regardless of its cost. Price relationship, e.g. a table with wooden top is sold at Rs. 4,000, whereas a table with sun mica top is sold at Rs. 6,000. The higher premium for improved products may not be only due to higher production cost.
   c. Based on Place: An example of this method is the practice of giving. off-season concession in sale of fans or refrigerators just after the summer season. The higher prices charged during the season periods are called Peak load Prices.

CASE STUDY 43

Explain the term "Life-cycle" costing?

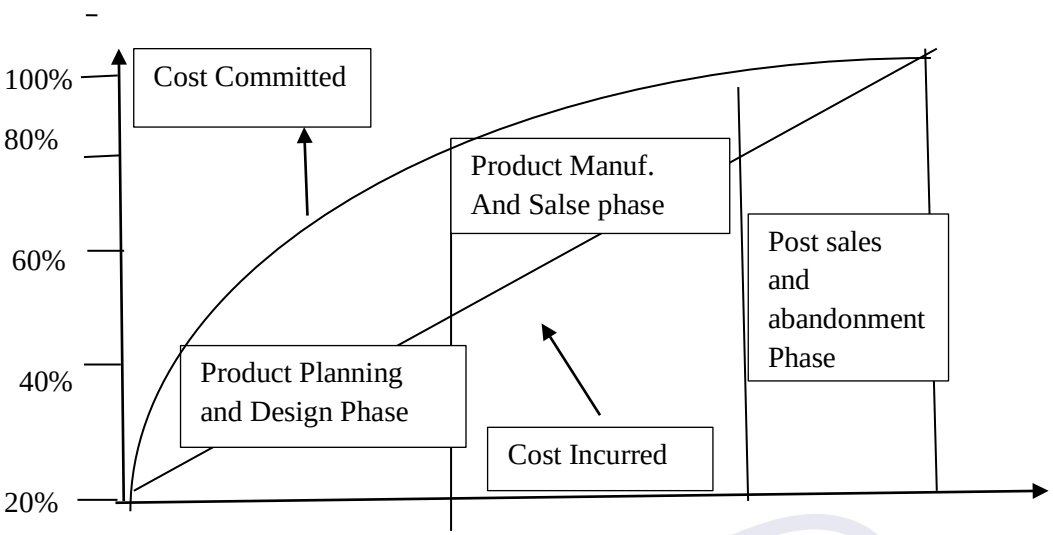
Answer: It focuses on total cost (capital cost + revenue cost) over the products life including design.
CIMA define life cycle costing as the practice of obtaining over their life time, the best use of physical asset at the lowest cost of entity.

"The term 'Life Cycle Cost" has been defined as follows," It includes the costs associates with acquiring, using, caring for the disposing of physical asset including the feasibility studies, research, design, development, production, maintenance, replacement and disposal as well as Support, training and operating costs, generated by the acquisition use, maintenance and replacement of permanent physical assets".

1. Life cycle costing estimates and accumulates cost over a products entire life cycle.
2. The objective is to determine whether costs incurred at different stages of development, (planning, designing, & testing) manufacturing (conversion activities) and marketing (advertising distribution, & warranty) of the product will be recovered by revenue to be generated by the product over its life cycle.

3. Life cycle costing provides an insight, useful for understanding and managing costs over the life cycle of the product.
4. In particular it helps to evaluate the viability of the product, decides on pricing of the product at different stages of product life cycle and often helps to estimate the value of the product to its users.
5. When used in conjunction with target costing, life cycle costing becomes a important tool for cost management.
6. Life cycle costing estimates and accumulates costs over a products entire life cycle in order to determine whether the profits earned during the manufacturing phase will cover the costs incurred during the pre and post manufacturing stages.
7. Identifying the costs incurred during the different stages of product's life cycle provides an insight into understanding and managing the total costs incurred throughout in life cycle. In particular, life cycle costing helps management to understand the cost consequences of developing and making a product and to identify areas in which cost reduction efforts are likely to be most effective.
8. Most accounting systems on a period-by-period basis, and product are not monitored over their life cycles. In contrast product life cycle reporting involves tracing costs and revenues on a product-by-product basis over several calendar periods throughout their life cycle.
9. A typical pattern of cost commitment and cost incurrence during the three stages of product's life cycle-the planning and design, the manufacturing stage and the services and abandonment stage.
10. Committed or locked in cost are those cost that have not been incurred but that will be incurred in the future on the basis of decisions that have already been made. Costs are incurred when a resource is used or sacrificed.
11. Costing systems record costs-only when they have been incurred. It is difficult to significantly alter costs become committed. For example the product design specifications determine a product's material and labour inputs and the production process. At this stage costs become committed and broadly determine the future costs that will be incurred during the manufacturing stage.
12. That approximately 80% of a product's costs are committed during the planning and design and the production process. In contrast the majority of costs are incurred at the manufacturing stage, but they have already become locked in at the planning and design stage and are difficult to alter.

Cost Management can be most effectively exercised during the planning and design stage and not at the manufacturing stage when the product design and processes have already been determined and costs been committed.



Product life-cycle phase

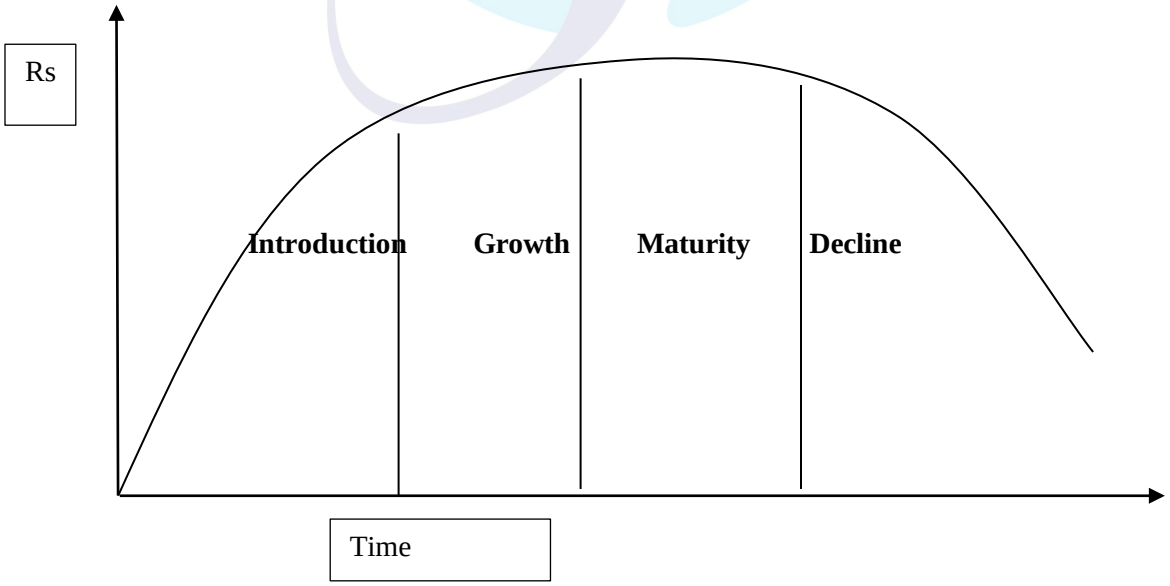
Stages of Product life Cycle:-

1. Market Research: It identifies the products which customers wants, how much they are prepared to pay for it and how much quantity they intend to buy.
2. Specification: It provides details such as required life, maximum permissible maintenance costs, manufacturing, units required delivery dates expected performance of the product.
3. Design: Proper Drawing and process schedules are defined.
4. Prototype manufacture: Prototype may be used to develop the product and eventually to demonstrate that it meets the requirements of the specifications.
5. Development: testing and changing to meet the requirements after the initial run as a product when first made rarely meets the specification.
6. Tooling: Tooling up for production means building a production line, building expenses jigs, buying the necessary tool and equipments.
7. Manufacture: It involves the purchase of raw material and components use of labor to make and assemble the product.
8. Selling: Stimulating and creating demand for the product when the product is available for sale.
9. Distribution: The product should be distributed to the sales outlets and to the customers.
10. Product support: The manufacturer or supplier should make sure that spares and expert servicing facilities are available for the entire life of the product.
11. Decommissioning: When a manufacturer product comes to an end, the plant used to build the product must be sold or scrapped. The four identifies phase in the Product Life Cycle are (a) Introduction (b) Growth (c) Maturity and (d) Decline.

A comparative analysis of these phases in given below:

Particular	**Introduction**	**Growth**	**Maturity**	**Decline**
Phase	I	II	III	IV
Sales Volumes	Initial stages, hence low	Rise in sales levels at increasing rate	Rise in sales levels at decorates	Sales level off and then start decreasing.
Prices of Products	High level of cover initial costs and promotional exps.	Retention of high-level prices except in certain cases.	Prices fall closer to cost, due to effect of competition.	Gap between price and cost is further reduced.
Ration of Promotion expenses to sales	Highest due to effort needed to inform potential customers, Launch products, distribute to customers etc.	Total exp. Remain the same while ratio of S&D OH to sales is reduced due to increase in sales.	Ratio reaches normal % of Sales. Such normal % becomes industry standard.	Reduced sales promotional efforts as the product is no longer in demand.
Competition	Negligible and insignificant	Entry of a large number of competition	Fierce Competition	Starts disappearing due to withdrawal products.
Profits	Nil, due to heavy initial costs.	Increase at a rapid pace.	Normal rate profits since costs and prices are normalized.	Declining profits due to price competition, entry of new products etc.

In the growth stage, the firm will maintain the prices at high levels, in order to realize maximum profits. Price reduction will not be undertaken unless (a) the low prices will lead to market penetration, (b) the firm has sufficient production capacity to absorb the increased sales volume and (c) competitors enter the market.



LIFE CYCLE COSTING: LIFE CYCLE COSTS ARE INCURRED FOR BOTH:

1. Product arid series from design stage through development to market launch, production and sale and their eventual withdrawal from market.
2. Product life cycle is a pattern of expenditure, sale level, revenue and profit over the period from new idea generation to the deletion of product from product range.
3. Product life cycle spans the time from initial. R&D on a product a when customer servicing and support is no longer offered for the product. For products like motor vehicles this time span may range from 5 to 7 years. For some basic pharmaceuticals, the time span may be 7 to 10 years.

CASE STUDY 45

What is Activity Based Cost Management (ABM) & Describe its Stages?

Answer: ABC Supplies the information while ABM uses the information in various analysis designs to yield continuous improvement.

1. The use of ABC as a costing tool to manage costs at activity level is known as Activity based Cost Management (ABM).
2. Through various analysis, ABM manages activities rather than resources. It determines what drives the activities of the organization and how these activities can be improves to increase the profitability.
3. ABM utilizes cost information gathered through ABC.
4. ABM is discipline that focuses on the management of activities as the route to improving the value received by the customer and the profit achieved by providing his value. This discipline includes (a) Cost Driver analysis; (b) Activity analysis and (c) Performance measurement.

Stages	Activities
1	**Identification of the activities that have taken place in the organization.**
2	**Assigning costs to cost pool of or each activity.**
3	**Spreading of support activities across the primary activities.**
4	**Determining cost driver for each activity.**
5	**Managing the costs of activities.**

CASE STUDY 46

What are the customer needs that ABM seeks to satisfy?

Answer: The goal of ABM is to satisfy customer needs while making fewer demands for resources, ABM seeks to satisfy the following needs of customers:--

1. Lower costs
2. Higher quality
3. faster response time
4. Greater innovation

CASE STUDY 47

Explain the concept of Activity Based Costing?

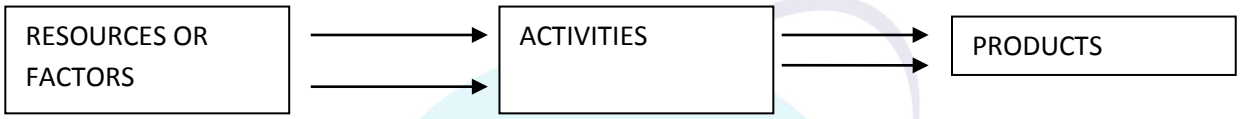
Answer: Activity Based Costing (ABC)

The Activity Based Costing (ABC) is a costing system, which focuses on activities performed to produce products. ABC is that costing in which costs are first traced to activities and then too products. This costing system assumes that activities are responsible for the incurrence of costs and

create the demands for activities. Costs are charged to products based on individual product's of each activity. In traditional product costing system, costs are first traced not to activities but to an organizational unit, such as departments or plant and then to products. It means under both, ABC and traditional costing system the second and final stage consists of tracing costs to the product.

ABC aims at identifying as many costs as possible to be subsequently accounted as direct costs of production. Any cost that is traced to particular via its consumption of activity becomes direct of the product. For instance, in conventional costing system, cost of setup and adjustment time is considered as factory overhead and subsequently assigned to different products on the basis of direct labour hours. But in ABC, setup and adjustment time is determined for each product and its costs are directly charged to each product. Thus, by emplacing activities.

ABC tries IS ascertain the factors that cause each major activity, cost 0 such activities and the relationship between activities and products produced. The relationship between activities and products has been show in figure:-



As stated earlier, there are two primary stages in ABC - first tracing to activities; second tracing activities to product.

The different Steps in the two stages of ABC are explained below;

Step 1: Identify the main activities in the organization . Example Include: materials handling, purchasing, receipts,, dispatch, machining, assembly and so on.
Step 2: Identify the factors, which determine the costs of an activity: There are known as cost drivers. Example includes, number of purchase orders, number of order delivered, number of set-ups and so on.
Step 3: Collect the costs of each activity. These are known as cost Pools and are directly equivalents and conventional cost centers.
Step 4: Charge support overheads to products on the basis of their usage of the activity, expressed in terms of the chosen cost driver(s). For example, if the total costs of purchasing were Rs 2,00,000 and there were 1,000 purchase orders (the chosen cost driver. products would be charged Rs. 200 or purchase order. Thus a batch generating 3 purchase orders would be charged 3 X Rs. 200 = Rs. 600 for purchasing overheads.
To arrive at more accurate cost more mainly for decision-making purpose. It is based on two principles:

i. Activities consume resources.
ii. These resources are also consumed by product services.
Activity cost is the ratio of resources consumed by an activity to the output resulting in the activity. The goal of ABC is to trace costs to products/services instead of arbitrary allocating them. ABC may be used with ton both job order costing the process costing. Activity-analysis and selection of cost driver for each activity are t he prerequisites.

CASE STUDY 48

What are the purposes and benefits of ABC?

Answer: The Purposes and benefits of ABC are as under:

1. To link the cost to its causal factor - i.e. the cost Driver.
2. To identify costs of activities rather than cost centers.
3. To ascertain products costs which greater accuracy by relating overheads to activities.
4. To overcome the inherent limitations absorption costing & use of blanked overheads rates.

CASE STUDY 49

State the need for emergence of ABC

Answer: The need for emergence of ABC:-

A. Traditional product costing systems were designed when company's manufactured arrow range of defects.
B. Direct material and direct labour were dominant factors at production then.
C. Companies were in seller's Market.
D. Overheads were relatively small and distortion due to inappropriate treatment were not significant.
E. Cost of processing information was high.
F. Today companies produce a wide range of product.
G. Overheads are significant in value. Simple methods of apportioning overheads on direct labour or machine hours basis is not justified.
H. Companies are in buyer's market.
I. Non volume related activities like material handling, set up et. are important and their costs cannot be apportioned on volume basis.
J. Cost of processing information is low.

CASE STUDY 50

What are the areas in which activity based information is used for decision making?

Answer: The areas in which activity based information is used for decision making are as under:-

PRICING
Market segmentation and distribution channels.
Make or buy decision and outsourcing.
Transfer Pricing.
Pant closed down decisions.
Evaluation of offshore production.
Product line profitability.

CASE STUDY 51

Distinguish between ABC and ABM.

ABC	ABM
ABC refers to the techniques of determining the test of activities and the cost of output that those activities produce.	It refers to the management philosophy that focuses on the planning, execution and measurement of activities as the key to competitive advantage.
The aim of ABC is to generate improved cost data for use in managing a company's activities.	The ABM is a much broader concept. Its aim is to use information generated by ABC, for effective business processes and profitability.

ABC is logical distribution of overhead should be distributed on the consumption of resources consumed by producer & services.

CASE STUDY 52

What do you understand by Benchmarking?

What are the suggested Benchmarking codes of Conduct?

Answer:

1. Benchmarking is the process of identifying and learning from the best practices anywhere in the world.
2. It is a powerful for continuous improvement in performance.
3. It involves comparing firm's products, service or activities against other best performing organizations, either internal or external to the firm. The objective is to find out how the product, service or activity can be improved and ensures that the improvements are implemented.
4. It attempts to identify an activity that needs to be improved and finding a non-rival organization that is considered to represent world-class best practice and studying how it performs the activity. Suggested Benchmarking Codes of Conduct:

1. Principle of Legality
2. Principles of Exchange
3. Principle of Confidentially
4. Principle of Use
5. Principle of first part Content
6. Principle of Third part Content
7. principle of Preparation

CASE STUDY 53

What are the stages in the process of Benchmarking?
Answer: The process of benchmarking involves the following stages:

Stage	Description
1	Planning: • Determination of benchmarking goal statement • Identification of best performance • Establishment of the benchmarking of process improvement team • Defining the relevant benchmarking measurement
2	Collection of Data and information
3	Analysis of the findings based on the data collected in Stage 2
4	Formulation and implementation of recommendations
5	Constant monitoring and reviewing

CASE STUDY 54

What are the types of Benchmarking?

Answer: Types of Benchmarking:- The benchmarking is a versatile tool that can be applied in variety of ways to meet a range of requirements. The distinct type of benchmarks have been over a period of time. Each has its own benefits and shortcomings, and therefore, each is appropriate in certain circumstances then others. The Benchmarking is of following:

1. Competitive benchmarking
2. Strategic benchmarking
3. Global Benchmarking
4. Process Benchmarking
5. Functional Benchmarking or Generic Benchmarking
6. Internal Benchmarking
7. External Benchmarking

1. **Competitive Benchmarking**: It involves the comparison of competitors products, process and business result with own. Benchmarking partners are drawn from the same sector. However to protect confidentially it is common for the companies to undertake this type of benchmarking through trade associations or third parties.
2. **Strategic Benchmarking**: It is similar to the process benchmarking in nature but differed in its scope and depth. It involves a systematic process by which a company seeks to improve their overall performance by examining the long-term strategies. It involves comparing high-level aspects such as developing new products and services core competencies etc.
3. **Global Benchmarking**: It is a benchmarking through which distinction in international culture. business processes and trade practices across companies are bridged and their ramification for business process improvement are understood and utilized. Globalization and advances in information technology leads to use this type of benchmarking.
4. **Process Benchmarking**: It involves the comparison of an organizational critical business processes and operations against best practice organization that performs similar work or deliver similar services. For example how do best practice organization process customer orders.
5. **Functional Benchmarking**: This type of benchmarking is used when organization look to benchmark with partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes. This sort of benchmarking can lead to innovation and dramatic improvements.

6. **Internal Benchmarking**: Internal benchmarking involves seeking partners from within the same organization. For example, form business units located in different areas. The main advantages of internal benchmarking are that access to sensitive data and information are easier; standardized data is often readily available; and usually less time and resources are needed. There may be fewer barriers to implementation as practices may be relatively easy to transfer across the same organization. However real innovation may be lacking and best in class performance is more likely to be found through external benchmarking.
7. **External Benchmarking**: External Benchmarking involves seeking help of outside organizations that are known to be best in class; External benchmarking opportunities of learning from those who are at the leading edge. although it must be remembered that not every best practice solution can be transferred o others. In addition, this type of benchmarking may take up more time and resources to ensure that comparability of data and information, the credibility of the findings and the development of sound recommendations.

The benchmarking can be categorized into:-

1. **Intra-group Benchmarking**: In Intro group benchmarking the groups of companies in the same industry agree that similar units within the cooperating companies will pool data on their process. The processes are benchmarked against each other at or operational level." Improvement task forces" are established to identify and transfer best practices to all members of the group.
2. **Inter-industry Benchmarking**: In inter-industry benchmarking a non-competing business with similar process is identified and asked to participate in a benchmarking books to establish a benchmarking relationship. Although two publishers are not in a direct competition but there are obviously many similarities in their business with respect to sources of supply, distribution channels. Each will be able benefit from the experience of other and establish 'best practices' in their common business processes.

CASE STUDY 55

Discuss. What is ZERO BASE BUDGETING?
Answer:

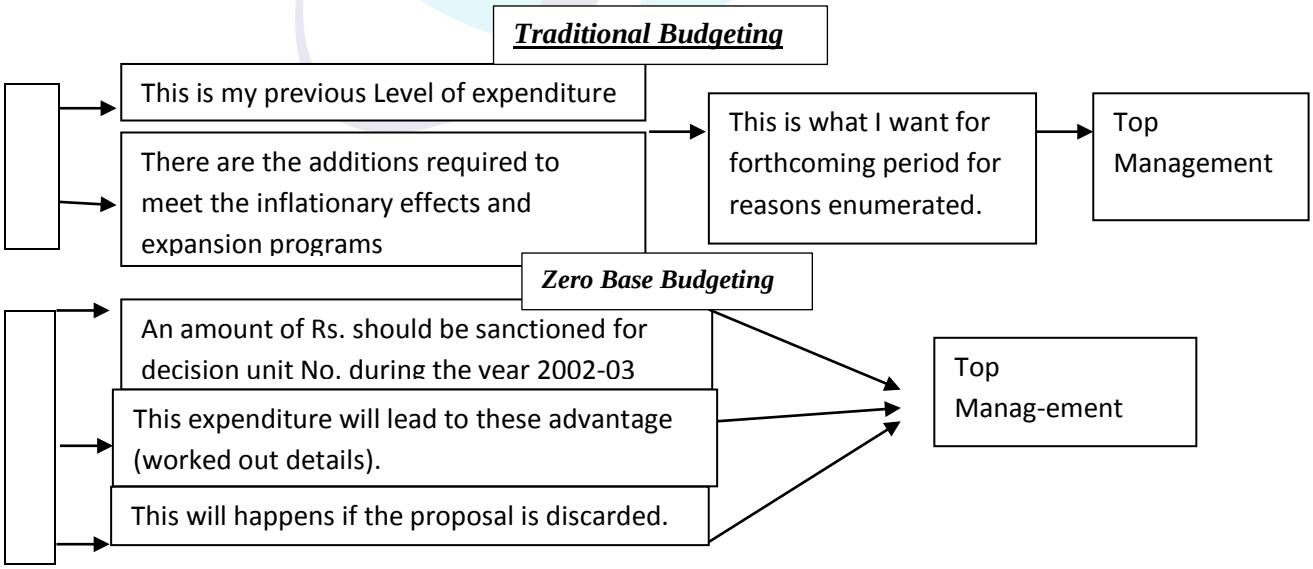
1. Zero-base budgeting reverse the working process of traditional budgeting. Traditional budgeting starts with previous year expenditure level as a base and then discussion is focused to determine the "cuts" and "additions" to be made in previous year spending. The top management finally accords it verdict after going into the argument for and against the "additional" or "cuts".
2. In Zero-base budgeting no reference is made to previous level of expenditure.
3. A convincing case is made for each decisions unit it justify the budget allotment for that unit during that period. Each decisions unit is subjected to though analysis to determine the relative priorities between different items included in it.
4. Zero-base budgeting is a technique, by which manager of each decisions unit is to justify his entire budget request in complete detail with a Zero-base.
5. The manger of the decision unit has to isolate each item of his budget in order to analyze it in separate decisions packages, which are ranked in order of importance.
6. Zero-base budgeting is completely indifferent to whether total budget is increasing or decreasing. What it does is to indentify alternatives, so that if more money is required to be spent in one department, it can be saved in another area.
7. CIMA has defined it "as a method of budgeting whereby all activities are Re-evaluated each time a budget is set. Discrete levels have each activities are valued and a combination chosen to match funds available." Following are the main features of Zero base budgeting:

1. Manager of a decision unit has to completely justify why there should be at all any budget allotment for his decision unit. The justification is to be made a fresh without making reference to previous level of spending in his department.
2. Activities are identified in decision packages.
3. Decision packages are ranked in order of priority.
4. Packages are evaluated by systematic analysis.
5. Under this approach there exists a frank relationship between superior and subordinates. Management aggress to fund for a specified service and manager of the decision unit clearly accepts to deliver the service.
6. Decision packages are linked with corporate objectives, which are clearly laid down.
7. Available resources are directed towards alternative in order of priority to ensure optimum results.

Traditional Budgeting vs. Zero-Base budgeting:-

Following are the points of difference between traditional budgeting and Zero-base budgeting.

1. Traditional budgeting is accounting--oriented. Main stress happens to be previous level of expenditure. Zero-base budgeting makes a decision oriented approach. It is very rational in nature and requires all Programmes, old and new to compete for scarce resources.
2. In traditional budgeting first reference is made to past level of spending and then demands is made for inflation and new programmes. In Zero base budgeting a decision unit is broken into understandable decision packages, which are ranked according to importance to enable top management to focus attention only on decision packages, which enjoy priority to others.
3. In traditional budgeting, some managers deliberately inflate their budget request so that after the cuts they still get what they want. In Zero-base budgeting a rational analysis of budget proposals is attempted. The managers, who unnecessarily try to inflate the budget requests, are likely to be caught and exposed. Management accords its approval only to a carefully devised result, oriented package.
4. In traditional budgeting, It is for top management to decide why a particular amount should be spent on a particular decision unit. In Zero-base budgeting, this responsibility is shifted from top management to the manager of decision unit.
5. Traditional budgeting is not as clear and as responsive as Zero-base budgeting is.
6. Traditional budgeting makes a routine approach. Zero-base budgeting spotlights the decision packages enjoying priority over others.



Advantages of zero-base budgeting;-

Or

Zero base budgeting is superior to traditional budgeting in the following Manner:-

1. It provides a systematic approach for the evaluation of different activities and ranks them in order of preference for the allocation of scare resources.
2. It ensures that the various functions undertaken by the organization are critical for the achievement of its objective and are being performed in the Best possible way.
3. It provides an Opportunity to the management to allocate resources for various activities only after having a through cost-benefits analysis. The chances of arbitrary cuts and enhancement are the avoided.
4. The areas of wasteful expenditure can be easily identified and eliminated.
5. Departmental budgets are closely linked with corporate objectives.
6. The technique can also be used for the introduction and implementation of the system of management by objective.' Thus, it cannot only be used for fulfillment of the objectives of traditional budgeting but it can also be used for a variety of other purposes.
7. It helps in the introduction of a system of management by objectives.

Even though ZBB is very beneficial and effectiveness of the organization, it suffers from the following limitations:

Limitations of Zero-Base budgeting: The limitations of Zero-base budgeting are as follows:-

1. Various operational problems are likely to be faced in implementing the technique of ZBB. It requires the wholehearted support from the top management.
2. It is time consuming as well as costly. It needs properly trained managerial personnel to do the required job.
3. In spite of the above limitations, the importance of ZBB technique is not diluted and it is considered to be an effective tool / technique for improving managerial efficiency.

CASE STUDY 56

What is Strategy?
Answer:

1. Strategy specifies how an organization matches its own capabilities with the opportunities in the market place to accomplish its objectives.
2. In Formulating its strategy an organization must thoroughly understand the industry in which it operates.
   Industry analysis focuses on Five forces:
   - Competitors
   - Potential entrants into the market.
   - Equivalent products.
   - Bargaining power of customers, and
   - Bargaining power of input suppliers.
3. The corrective effect of these forces shapes an organization's profit potential. In general, Profit potential decreases with greater competition, stronger potential entrants products that are similar, and more demanding customers suppliers.
4. Strategy drives the operations of a company and guides managers short-run and long run decisions. We will describe the balanced scorecard approach to implementing strategy and how to analyze operating income for purposes of evaluating strategy.

CASE STUDY 57

Define Balance Score Cards & What are the four perspective of Balance Score card?
Answer: A Scorecard the management accountant designs reports to help managers track progress in implementing strategy. Many organizations have introduced balanced score card approach to manage the implementation of their strategies.
The Balanced Scorecard:
The balanced scorecard translates an organization mission and strategy into a set of performance measure that provides the framework for implementing the strategy. The balanced scorecard does not focus solely on achieving financial objectives. It also highlights the non-financial objectives that an organization must achieve to meet its financial objectives. The Scorecard measures an organization performance from four perspectives:

- Financial
- Customers
- Internal business processes and
- Learning and growth

A Company's strategy influence the measures it uses to track performance in each of this perspective.It's called the balanced scorecard because it balances the use of financial and non-financial performance measures to evaluate short-run performance in a single report. The balanced scorecard reduces managers emphasis on short-run and long-run performance such as quarterly earnings. That's because the non-financial and operational indicators, such as product quality and customer satisfaction measures changes that a company is making for the long run. The financial benefits of these long-run changes may not appear immediately in short-run earnings, but strong improvement in non-financial measures is an indicator of economic value creation in the future. For example an increase in customer in customer satisfaction, as measured by customer surveys and repeat Purchases, is a single of higher sales and income in the future. By balancing the mix of financial and non-financial measures, the balanced scorecard broadners management's attention to short run and long run performance.

The four perspectives of the Balanced Scorecard:-

1. **Financial Perspective**: This perspective evaluates the Profitability of the strategy. Because cast reduction relative to competitors coast and sales growth are chipset's key strategic initiatives, the financial perspectives focuses on how much of operating income and return on capital results from reducing coast and selling more units of CXI.
2. **Customers Perspective:** This perspective identifies the targeted market segments and measures the company's success in these segments. To monitor its growth objectives, number of new customers and customers satisfaction.
3. **Internal business process Perspective:** This perspective focuses on internal operations that further the customer's perspective by creating value for customers and further the financial perspective by increasing shareholder value. Chipset determines internal business process improvement targets after benchmarking against its main competitors.

   The internal business process perspective comprises three sub processes:-
   1. **The innovation process:** Creating products, services and processes that will meet the needs of customers. Chipset is aiming at lowering costs and promote growth by improving the technology of its I manufacturing.
   2. **The operations process:** Producing and delivering existing products and services that will meet the needs of customers. Chipset's strategic initiatives are (a) improving manufacturing quality. Reducing delivery time to customers and (c) Meeting specified delivery dates.

3. **Post sales Service:** providing service and support to the customer after the sale of a product of service. Although customers do not require mush post sales service. CXI monitors how quickly and accurately CXI is responding to customer's service requests.
   Learning and Growth perspectives: This perspective identifies the capabilities the organization must excel at to achieve superior internal processes that create value for customers and shareholders. Chipset's learning and growth perspectives emphasizes three capabilities.
   1. Employee Capabilities measured using employee education and skill levels.
   2. Information system capabilities, measured by percentage of manufacturing processes with real-time feedback and
   3. Motivation measured by employee satisfaction and percentage of manufacturing and sales employees (line employees) empowered to manage processes.

CASE STUDY 58

What is the feature of good Balanced Scorecard?

Answer: A good balanced scorecard design has several features:

1. It tells the story of a company's strategy by articulating a sequence of cause-and-effect relationships.
2. It helps to communicate the strategy to all members of the organization by translating the strategy into a coherent and linked set of understandable and measurable operational targets.
3. It place strong emphasis on financial objectives and measures in for-profit companies. Non-financial measures are regarded as part of a program to achieve future financial performance.
4. It limits the number of measures to only those that are critical to the implementation of strategy.
5. It highlights sub optimal tradeoffs that managers may make when they fail to consider operational and financial measures together.

CASE STUDY 59

Define target costing?

Answer: Target costing is defined as "a structure approach to determining the cost at which a proposed product with specified functionality and quality must be produced. to generate a desired level of profitability at its anticipated selling pries".

Target Costing V/S Traditional Costing:

Target Costing	Traditional Costing
Production Specification ⇩ Target Price and volume ⇩ Traget profit ⇩ Traget cost ⇩ Product design	Production Specification ⇩ Product design ⇩ Estimated cost ⇩ Target cost ⇩ Target price

Target costing is a systematic approach to establish product cost goals based on market driven standards. It is a strategic management process for reducing coast at early stages of product planning and design. Target costing begins with identifying customer needs and calculating an acceptable target sales for the product. Working backward from the sales price. Companies establish an acceptable target profit and calculate the target cost as follows:-

Target Cost = Target Price – Target profit

Target costing is different from standard costing. While target costs are determined by market driven standards (target sales pries – target profit= Target cost). Standard costs are determined by design driven standards with less emphasis on what the market will pay (engineered costs + desired markup = desired sales price)

Target costing is a common practice in Japan where markets are extremely competitive. The market determines the price of products and there is a little opportunity for the individual organizations to set prices. Therefore, controlling cost is extremely important.

There are three cost reduction methods generally used in target costing:

(i) reverse engineering (ii) value analysis and (iii) process improvement. Reverse engineering tears down the competitors products with the objective of discovering more design features that create cost reductions. Value analysis attempts to assess the value placed on various placed on various product functions by customers. If the price customers are willing to pay for a particular function is less than its cost, the function is a candidate for elimination. Another possibility is to find ways to reduse cost of providing the function, e.g. using common components. Both reverse engineering and value analysis focus on product to achieve cost reductions. The processes used to produce and market the product are also source of potential cost reduction. Thus, redesigning processes to improve their efficiency can also contribute to the achieving the needed cost reductions.

CASE STUDY 60

The main features of Target Costing System.

Answer: The basic idea beneath target costing is that all product are pre-determined before a product even reaches the production floor. For example, types of materials to be used in production method, etc. can be determined before actual production.

In these types of situation cost reduction focus of any company should be to review the costs of products, while they are still in the design stage. Every effort at the design stage is done to keep these costs to a minimum.

Target costing has been described as a process that occurs in a competitive environment. In which cost minimization is an important component of profitability? It is based on the promise that cost planning. Cost management and cost reduction must necessarily occur in the design development process of the product to minimize the total life cycle cost of the product. All acceptable definition of target costing not exist: following important definitions have been given:

Sakurai says. “Target costing can be defined as a cost management tool for reducing the overall of a product over its entire life cycle with the help of production engineering, research and design, marketing and accounting departments”.

The main Features practices followed in Target Costing are:

Step	Description
1	Develop a product that statistics the needs of potential customers.
2	Choose a target price based on customer’s perceived value for the product and the prices competitors charge.
3	Derive a target cost by subtracting the desired profit margin from the target price.
4	Estimate the actual cost of the product.
5	If estimated actual cost exceeds the target cost, investigate ways of driving down the actual cost to the target cost.

CASE STUDY 61

Customer, Market and profit consideration dominate the first stage in Target Costing. Discuss, OR Explain the first four steps in target costing Procedure.

Answer: Target costing is viewed as an integral part of the design and introduction of new products. It is part of an overall profit management process, rather than simply a tool for cost reduction and cost management.

The first stage of the target costing process is driven by customer, market and profitability considerations.

STEP1:- CUSTOMER – Product Design Specification:-

The customer's requirements as to the functionality and quality of the product are of prime importance. The design specification of the new product is based on customer's tastes, expectation and requirements: The offerings of competitors and the need to have extra features over competitor's product are also recognized. But at the same time, the need to provide improved products, without significant increases in' price, should be considered, as charging a price premium may not be sustainable in view of competitive conditions.

STEP 2 & 3:- Market – Target Selling price and Production Volume:

The target-selling price is determined using various sales forecasting techniques, The Price is also influenced by the offers of competitors, product utility, prices volumes and margins.

In view of competition and elasticity of demand, the firm has to forecast the price-volume relationship reasonable certainty. Hence the target-selling price is market driven and should encompass a realistic reflection of the competitive environment. Establishment of target production volumes is closely related to target selling price, given the relationship between price and volume.

Target volumes are also significant in computation of unit costs, particularly capacity related costs and fixed costs. Product costs are dependent upon the production levels over the life cycle of the product.

Step 4:- Profitability- Traget Profit Margin:

Since profitability is critical for survival, a target profit margin is established for all new products. The target profit margin is derived from the company's long-term business plan, objectives and strategies. Each product or product line is required to earn at least the target profit margin.

Cast accountant's role in a Target casting Environment:-

1. The cast accountant should be able to provide for the other members of the design team a running series of cost estimates based on initial design sketches and activity-based costing reviews.
1. The cost accountant helps the project team in capital budgeting decisions.
2. The cost accountant work with the design team to help it understand cost-benefit-trade offs of using different design or cost option in the new product.
3. The cost accountant continues to compare a product's actual cost to the4 target cost even after the design is completed.

Advantages of Target costing:-

Following advantages ensue. When a company follows target costing:

1. **Forced planning:** Target costing ensures proper planning well ahead of actual production and marketing.
2. **Competitive atmosphere:** Target costing starts with customer's study or market study. It cannot work properly till a company has got a charged competitive atmosphere. Ways and means are found out to succeed in competition.

3. **Cohesive team spirit:** For success of target costing, a interfunction team is essential. Therefore! It promotes cohesive team spirit in the organization. This spirit implies the team members to attempt higher-level performance.

CASE STUDY 62

Define Value Engineering?
Answer:

1. Value engineering aims to reduce non-value- added costs by reducing the quantity of cost drivers of non-value – added activities. For example to reduce rework costs. The Company must reduce rework-hours.
2. Value engineering also seeks to reduce value – added costs by achieving greater efficiency in value – added activities. For example to reduce direct manufacturing labor costs.
3. A Value – added cost is a cost that if eliminated would reduce the actual or perceived value or utility (usefulness) customers obtain from using the product or service.
4. A Non-value added cost is a cost that, if eliminated would not reduce the actual or perceived value or utility (usefulness) customers obtain from using the product or service. It is a cost that customer is unwilling to pay for Examples of non-value – added costs are costs are costs of reworking and repaying products.
5. Value engineering is a systematic evaluation of all aspects of the cost structure of a product or service, including research and development, design of product and processes, production, marketing, distribution and customer service with the objective of reducing costs while satisfying customer needs.
6. It differs from traditional approaches to cost reduction and cost control in that its focus is on the elimination of non-value-added activities (e.g. waste) from the processor-
7. Value engineering focuses on improving those qualities that the customer desired while reducing or eliminating unnecessary moves, queses setup and other actuates that the customer will not pay for.
8. The process is re-engineered to eliminate non-value added work and thereby enhance the value of the process to the customer.

CASE STUDY 63

Briefly discuss on curvilinear CVP analysis.
Answer: In CVP analysis, the usual assumption is that the total sales line and variable cost line will have linear relationship, that is, these will be straight lines. However, in actual particle it is unlikely to have a linear relationship for two reasons namely:
- After the saturation point of the exiting demand the sales value may show a downward trend.
- The average unit variable cost declines initially. Reflecting the fact that, as output increase the firm will be able to obtain bulk discounts on the purchase of raw materials and can also benefit from division of labour. When the plant is operated at further higher levels of output, due to bottlenecks and variable cost per unit will tend to increase. Thus the law of increase costs may operate and the variable cost per unit may increase after reaching a particular level of output.

In such cases, the contribution will not increase in linear proportion i.e. based on the phenomenon of diminishing marginal productivity; the total cost line will no be straight, points as assumed but will be of curvilinear shape. This optimum profit is earned at the point where the distance between sales and total cost is the greatest.

CASE STUDY 64

What do you understand by CVP analysis.
Discuss briefly the assumptions underlying concept?

Answer: As the name suggests cost volume profit (CVP) analysis is the analysis of three variables cost, volume and profit. Such an analysis explores the relationship between costs, revenue, activity levels and the resulting profit. It aims at measuring variations in cost and volume. CVP analysis is based on the following assumptions:

1. Changes in the levels of revenuse and costs aries only because of changes in the number of product (or service) units produced and old-for example, the number of television sets produced and sold by SONY corporation or the number of packages delivered by overnight Express. The number of output units is the only revenue driver and the inly cost driver just as a cost driver is any factor that affects costs, a revenue driver is a variable such as volume that casually affects revenues.
2. Total costs can be separated into two components; a fixed component that does not vary with output level and a variable component that changes with respect to output level. Furthermore, variable costs include both direct variable costs and indirect variable costs of a product. Similarly, fixed costs include both direct fixed costs and indirect fixed costs of a product.
3. When represented graphically the behaviors of total costs are linear (meaning they can be represented as a straight line) in relation to output level within a relevant range (and time period).
4. Selling price, variable cost per unit and total fixed cost (within s relevant range and time period) are known and constant.
5. The analysis either covers a single product or assumes that the production of different products when multiple products are sold will remain constant as the level of total units sold changes.
6. All revenues and costs can be added, subtracted and compared without taking into account the time value of money.

Assumptions of cost-volume – profit analysis.

The Assumptions of cost-volume-profit are as follows:-

1. All variables remain constant per unit.
2. A single product or constant sales mix.
3. Fixed costs do not change.
4. Profits are calculated on variable cost basis.
5. Total costs and total revenues are linear functions of output.
6. The analysis applies applies to relevant range only.
7. Costs can be accurately divided into fixed and variable components.
8. The analysis applies only to short-term horizon.

CASE STUDY 65

What are the preliminary steps prior to the installation of a standard costing system?

Answer: Installation of a Standard costing system involves the following preliminary steps.

1. **Establishment of Responsibility Centers:** The key areas of operation in the enterprise should be indentified into responsibility centers with clearly, defined roles, e.g. cost control, Revenue maximization etc. such responsibility center may be identified either through (1) Departmentation or (2) Activity based costing.
2. **Classification of Accounts:** The various heads of expense account should be classified and codified for collection and comparison of actual costs with standard costs. This will also help the process of mechanized computerized accounting.

3. **Selection of a suitable type of standard:** For operational requirement, a suitable type of standard should be selected.
4. **Length of the period of use:** The duration, for which the standards are to be used, should be determined.

CASE STUDY 66

Cost in not criterion for deciding in favor of shut down –

Briefly explain write a brief note on shut Down Point.

Answer: Cost is not only criterion for deciding in the favour of shut down. Non cost factor worthy of consideration in this regard are as follows.

(i) Interest of workers, if the workers are discharged, it may become difficult to get skilled workers latter on reopening of the factory. Also shutdown may create problems.

(ii) In the face of the competition it may be difficult to re establish the market for the product. Plant may obsolete or depreciate at a faster rate or get rusted. Thus heavy capital expenditure may to be incurred on re-opening.

Shut Down Point indicates the level of operations (sales), below it is not justifiable to pursue production. For this purpose, fixed costs a business are classified into (a) Avoidable or Discretionary fixed costs and (b) Unavoidable or committed Fixed Costs. A firm has to close down if its contribution is insufficient to recover the avoidable fixed cost.

The focus of shutdown point is to recover the avoidable fixed costs in the first place4. By suspending the operations, the firm may save as also incur some additional expenditure. The decision is based on whether contribution is more than the difference between the fixed expenses incurred in normal operation and fixed expenses incurred when plant is shut down.

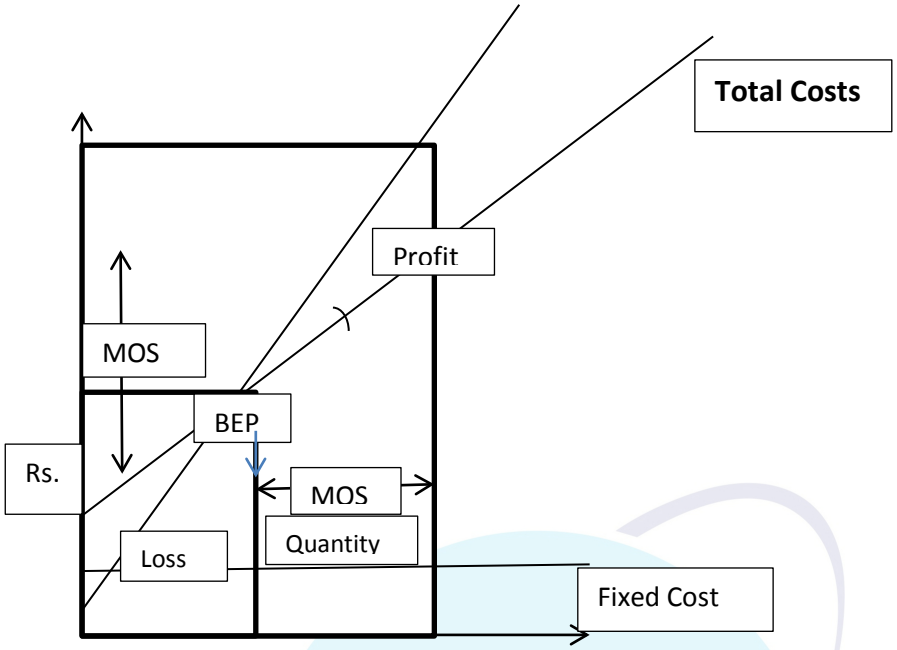
when plant is shut down.

Formula:

$$\text{Shut Down Point (in Rs.)} = \frac{\text{Avoidable Fixed Costs} - \text{Extra fixed cost}}{\text{pv Ratio}}$$

$$\text{Shut Down Point (quantity)} = \frac{\text{Avoidable Fixed Casts} - \text{Extra fixed Cast}}{\text{Contribution per unit}}$$

Where Avoidable Fixed Casts = Total Fixed Costs Less Minimum/ Unavoidable Fixed Casts.



Significance of BEP:-

BEP represents the Cut- Off point for profit or loss of the business. At the BEP, the profit or loss equals Zero.

The significance of shut Down Point and consequent decisions can be understood from the following:

LEVEL OF SALES	DECISON	REASON
Below Shut Down Point	Close Down Operations	Avoidable fixed Costs are not fully recovered. It is better to close down and save additional expenditure.
At Shut Down Point	Continue Operations	Avoidable Fixed costs are To recovered
Above Shut Down Point	Continue Operations	Avoidable Fixed Costs are recovered. Further contribution leads to recovery of balance fixed costs.

CASE STUDY 67

What is the meaning of Master Budget?

Answer: Master Budget is the ―summary Budget, incorporating its component functional budgets, which is finally approved, adopted and employed‖. Master budget gathers together all the budget gathers together all the budgets all the budgets of various departments and makes a Summary of them. Master budget is prepared in two parts; Forecast income statement and Forecast Balance Sheet. In the former part, the principal items of revenue, expenses, losses and profit are shown. In the Forecast Balance Sheet

the items of Balance sheet i.e., fixed assets, current assets, total capital employed and liabilities are shown. Master Budget is an outlay showing the proposed activity and the anticipated financial results during the coming year or budgeted year. It is presented before the Board of Directors for adoption and approval. After approval of the Master Budget, various functional budgets are sent to the concerned departments, so that, they can plan their working according to their budgets.

CASE STUDY 68

Write the Difference between Fixed & Flexible Budget?

Particulars	**Fixed Budget**	**Flexible Budget**
1. Definition	It is a Budget designed to remain unchanged irrespective of the level of activity actually attained.	It is a Budget, which is by recognizing the difference between fixed, semi-variable and variable costs is designed to change in relation to level of activity attained.
2. Rigidity	It does not change with actual volume of activity achieved. Thus it is known as rigid or inflexible budget.	It can be re-casted on the basis of activity level to be achieved. Thus, it is not rigid.
3. Level of Activity	It operates on one level of activity and under on set of conditions. It assumes that there will be no change in the prevailing conditions, which is unrealistic.	It consists of various budgets for different levels of activity.
4. Effect of variance analysis.	Variance Analysis does not give useful information as all Costs (fixed, variable and semi-variable) are related to only one level of activity.	Variance Analysis provides useful information as each cost is analysed according to its behavour.
5. Use for Decision making	If the budgeted and actual activity levels differ significantly, then aspects like cost ascertainment and price fixation do not give a correct picture.	It facilitates the ascertainment of cost, fixation of Selling Price and submission of quotations.
6. Performance Evaluation	Comparison of actual performance with budgeted targets will be meaningless especially when there is a difference between two activity levels.	It provides a meaningful basis of comparison of the actual performance with the budgeted targets.

CASE STUDY 69

What is the Meaning of Angle of Incidence?

Answer: ANGLE OF INCIDENCE: Angle of incidence is formed at the inter-section of total cost tine and total sales line. As a matter of fact there are two angles of incidence.

(i) The angle formed on the right side of the break-even point.

(ii) The angle formed on the left side of the break-even point

The angle formed on the right side of the break-even point indicates the profit area white that formed on the left side indicates the loss area. The size of the angle of incidence is indication of the quantum of profit or loss made by the firm at different output/sales levels. For example, if this angle of incidence is narrow to the right side of the BEP it indicates that the quantum of profits made by the firm is also low. Similarly, if it is narrow to the left side of the BEP it indicates that the quantum of loss made by the firm is also low. In other words, a narrow angle of incidence shows a slow rate of profit earning while a wider angle of incidence indicates a swift rate of profit earning capacity of the firm. A narrow angle also indicates that the variable cost as a proportion to sales is quite high, and therefore, very little has been left by way of contribution.

A study of angle of incidence, break-eyen point and margin of safety can help the management in having a better understanding about profitability, stability and incidence of fixed and variable costs on the performance of the firm. This can be understood by taking the following four different situations:

(i) HIGH MARGIN OF SAFETY, LARGE ANGLE OF INCIDNECE AND LOW BREAK-EVEN POINT:-This is the most favorable condition of the business. It indicates that the business is fairly sound and steady in financial terms. It also shows that the firm is making high profits over a large range of output

(ii) HIGH MARGIN OF SAFETY, SMALL ANGLE OF INCIDENCE AND LOW BREAK-EVEN POINT:- This situation is similar to the first except that indicates that the firm is making a low rate of profit over large range of output.

(i) LOW MARGIN OF SAFETY LARGE ANGLE OF INCIDENCE AND HIGH BREAK-EVEN POINT. Such a situation shows that the business has heavy losses with a small decline in output of sales.

(ii) LOW MARGIN OF SAFETY, SMALL ANGLE OF INCIDNECE AND HIGH BREAK-EVEN POINT: This is the worst situation. This shows that the business has high fixed costs and it is financially unsound.

CASE STUDY 70

Discuss the role of costs in product-mix decisions?

Answer: Role of costs in Product mix decisions: All types of cost involved in cost accounting system are useful in decision-making. The cost which plays a major role in product mix decision is the relevant cost. Costs to be relevant should meet the following criteria:

1. The costs should be expected as future costs.

2. The costs differ among the alternatives courses of action. While making decision about product mix using the facilities and other available resources, the end results should always aim at profit minimization. Variable costs are relevant costs in product mix decisions and consequently contribution plays a major role in minimizing the profit. In addition to the relevancy of costs, the other factors and costs that should be taken into account at the time of deciding the products mix are:-

1. The available production capacity.

2. The limiting factor (s).

3. Contribution per unit of the limiting factor.

4. Market demand for the products.

5. Opportunity costs.

CASE STUDY 71

What do you mean by philosophy of continuous process improvement? What are its challenges?

Answer: Philosophy of Continuous process improvement: In a process industry production of a product moves from one process (or department) to the next till it is completed. Each, production department performs some part of the total operation on the product and transfers its completed production to the next process department, where it becomes the input for further processing. The completed production of the last department is transferred to the finished goods stock.

Philosophy of continuous process improvement believes in encouraging every member of the organisation to continuously strive to serve their customers more efficiently. The customers may be either external e.g. major purchases of the product or internal, such as next operator on the assembly line. The objective of continuous process improvement is to sustain the improvement moments within an organization one time and to align improvement activities in support of strategic objectives.

Challenges of continuous process improvement. - The challenges of continuous process improvement are to promote activities that continuously modify processes, procedures, task, content and process interfaces to achieve complete customer satisfaction as well as to reduce costs and to increase product quality.

CASE STUDY 72

Differentiate between "Cost-indifference-point" and "Break-even point"?

Answer: Distinction between Cost indifference point and Break-even point:

Cost indifference point: It is the point at which total cost lines under the two alternatives intersect each other.

Cost indifference point is calculated as under: Difference in fixed costs/ Difference in PV ratio.

Break-even point: It is the point where the total cost line and total revenue lines for a particular alternative interest each other. Break-even point is calculated as under: Fixed costs / Contribution per unit or the fixed costs/ PV ratio. The following are the main points of distinction between cost indifference point and break-even point.

1. The cost indifference point is the activity level at which total cost under two alternatives are equal. Whereas break-even point is the activity level at which the total revenue from a product or product mix is equal to its total cost.

2. Cost indifference point is used to choose between two alternative processes for achieving the same objective. The choice depends on the estimated activity level. Break-even point is used for profit planning.

CASE STUDY 73

Distinguish between "Cost reduction" and "Cost management"?

Answer: Distinction between Cost reduction and Cost management: Cost reduction is the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product. It uses the techniques like value analysis, work-study, standardization, simplification etc. It is a continuous process of critical cost examination, analysis and challenges of established standards. Each aspect of the business namely a product, processes, methods, procedures is critically examined and reviewed with a view to improving the efficiency and effectiveness so that costs are reduced. It presumes the existence of concealed potential savings in norms or standards. It is a corrective action.

Cost management is a broader concept. It aims at optimal utilisation of resources to enhance the operating income of the firm. It does not consider product attributes as given. It does not focus oh costs

independent of revenue. Cost management systems establish linkage between costs and revenues. It relates costs and revenues with product attributes to have an insight into how various attributes generate revenue and creates demand on resources. It provides information to manage product attributes to optimize resource utilization.

Traditional cost reduction system focus on products, while cost management systems focus on products, markets and customers.

CASE STUDY 74

How are variances disposed off in a standard costing system? Explain.

Answer: There is no unanimity of opinion among cost accountants regarding the disposition of variances. The following are commonly used methods for their disposition.

1. Transfer all variances to Profit and loss account. Under this method, stock of work-in-progress, finished stock and cost of sales are maintained at standard cost and variances arising are transferred to profit and loss account.
2. Distributing variances on Pro-data basis over the cost of sales, work in progress and finished goods, stocks by using suitable basis.
3. Write off quantity variance to profit and loss account and spread price variance over to cost of sales, work in progress and finished goods. The reason behind apportioning price variance to inventories and cost of sales, is that they represent costs although they are derived as variances.

CASE STUDY 75

State the Features of Partial plan of Standard cost accounting procedure.

Answer: Features of Partial Plan of Standard cost accounting procedure: Standard cost operations can be recorded in the books of account by using partial plan. Features Of partial plan of standard costing procedure are as follows:

(i) Partial plan system uses current standards in which the inventory will be valued at current standard cost figure.

(ii) Under this method WIP account is charged at the actual cost of production for the month and is credited with the standard cost of the month production of finished product.

(iii) The closing balance of WIP is also shown at standard cost. The balances after making the credit entries represent the variance from standard for the month.

CASE STUDY 76

Write a brief note on Theory of Price & factors influencing pricing Decision?

Answer: In micro-economic theory the term optimum price refers to the price, which yields the maximum profits (excess of total revenues over total costs). The basic assumption of the pricing Theory is that firm's main objective is to maximise its profits. It also assumes that the firm takes into consideration the position of demand and cost function and that the firm produces one product. The economic theory of price can be analyses under two different assumptions:

1. Sale of unlimited quantities at an uniform selling price per unit.
2. Sale of additional quantities at reduced prices.

FACTORS INFLUENCING PRICING DECISIONS

Pricing of a product or service refers the fixation of a selling price to a product or service provided by the firm. Selling price is the amount for which customers are charged for some product manufactures or for a service provided by the firm. The pricing decisions are influenced by both internal and external factors. Some such factors (determinants) are as follows: -

1. Cost data of the product, which may be actual, replacement, standard or any other cost base.
2. Firm's profit and other objectives.
3. Demand for the product or service and its elasticity.
4. Nature of product and its life expectancy.
5. Pricing decision as a long-run decision or short- term decision or a one-time spare capacity decision.
6. Type of competition for the product or service and availability of close substitutes.
7. Number of suppliers in the market.
8. Economic and political climate and trends and likely changes in them in future.
9. Type of industry to which the product belongs and future outlook of the industry.
10. Governmental guidelines, if any.

CASE STUDY 77

What is Transfer Pricing? Define the concept of Transfer Pricing.

Answer: 1. A Transfer price is that notional value at which goods and services are to be transferred by the supply division to the Receiving division. The goods that are produced by the buying division and sold to the outside world are known as final products.

2. The Department that supplies the goods is called Supply Division. The Department that receives the goods is called Receiving Division.

3. Transfer Price becomes Revenue for Supply Division Transfer Price becomes Cost for the Revenue Division.

General Rule is that:

TRANSFER PRICE: VARAIBLE COST+ CONTRIBUTION LOST

4. Goods and services, which are the outputs of the one division, would be transferred to another division as inputs. It may be: -

(i) From one factory to another under the same company or

(ii) From one division to another division.

(iii) From a subsidiary to holding company and vice versa, In such cases, there is a need to set "Price" for the goods or services sold/transferred. Such a price, which applies within an organisation, is called Transfer Price.

5. Transfer Price becomes cost to the unit receiving the goods/services and revenue to the unit providing the goods/ services. It is therefore, obvious that the profitability of the two units involved would be dependent upon the transfer Price.

6. Transfer Price is different from sale price as in transfer price goods are to be transfer from one department to another but remain within in Company But in sale Goods are to be sold to outside customer.

7. Transfer Price: Goods are not sold but called change of location of goods within the same company.

8. Transfer price is a Notional Price.

9. Fixation of Transfer Price are to be in such a manner that the overall profit of the Company should not be reduced.
10. Transfer pricing it the pricing of internal transfer of goods or services between profit centers of an organisation.
11. It can be said that the problem of suitable transfer prices arises only when division do business with one another.
12. Ideally the transfer prices should promote goal congruence (i.e. a profit canter's goal should be consistent with the corporate objective), enable effective performance appraisal and maintain divisional autonomy.
13. It should also motivate internal transfers rather than buying from outside.
14. Transfer prices should always be based on the outlay costs of the supplying division plus an opportunity cost to the organization as a whole.
15. Typically Transfer prices are market based, cost based or negotiated.
16. For some transferred goods there may not be any market or the market may be imperfect on the prices considered unrepresentative. If cost based systems are used, then it is preferable to use standard costs to avoid transfer division's inefficiency.
17. Full cost or cost plus transfer pricing may be equally inefficient: Negotiated transfer prices will only be appropriate if there is equal bargaining power and if negotiations are not protracted. Imposed transfer prices and/ or lack of buying and selling options (lack of motivation) severally limit the significance of any form of divisional performance appraisal.

CASE STUDY 78
What are the methods of Transfer Pricing?

Answer: There are three bases available for determining transfer prices, but many options are also available within each base. These methods are:
1. Market Prices.
2. Cost-based Prices
(a) Variable cost
(b) Actual full cost
(c) Full cost plus profit margin
(d) Standard full cost
(e) Opportunity cost
3. Negotiated Prices
4. Dual Prices.

1. **Market-Based Prices:-** Under this method the transfer prices are based on market prices. The major merits of this method are: -
a. **Maximum Prices:** In a competitive market, goods/services cannot be transferred to its users at a higher price, Hence market prices constitute the basis for efficient production.

b. **Demand and Supply Forces:** Market prices take into account the forces of demand and supply intermediate products are freely saleable, in the long run, market prices will provide a good indicator of the overall efficiency of the various divisions.
c. **Opportunity Cost Recovery:** Opportunity costs of transferring divisions are fully recovered. Hence there is sufficient incentive for internal transfer for transferring divisions operating at full capacity.

d. **Objective:** Market prices provide reliable measures of divisional income because there processes are established independently rather than by individuals who have an interest in the results.

CASE STUDY 79

What transfer price should be used if the market for the product to be transferred is perfectly competitive?

In perfectly competitive markets, there is no idle capacity and division managers can buy and sell as much as they want at the market price. Setting the transfer price at the market price motivates division managers to transact internally and to take exactly the same actions as they would if they were transacting in the external market.

Describe three criteria you would use to evaluate whether a management control system is effective. To be effective, management control systems should be

(a) Closely aligned to an organization's strategies and goals,
(b) Designed to fit the organization's structure and the decision-making responsibility of individual managers, and
(c) Able to motivate managers and employees to put in effort to attain Selected goals desired by top management.

2. Cost Based prices:- When external markets do not exist or are not available to the company or when information about external market prices is not readily available, companies may decide to use some forms of cost-based transfer pricing system.

As stated earlier, cost-based transfer prices may be in different forms such as variable cost, actual full cost, full cost plus profit margin, standard full cost, opportunity cost.

A: Variable Cost:- 1. Variable cost-based pricing approach is useful when the selling division is operating below capacity.
2. Variable cost method does not provide any profit to the supply division.
3. Variable cost = Direct Material + Direct Labour + Variable Fixed Overhead.
4. It does not consider opportunity cost
5. Not suitable for transferring division which operates at full capacity.

B: Actual Full cost:-

1. In actual full cost approach, transfer price is based on the total product cost per unit which will include direct materials, direct labour and factory overhead.
2. When full cost is used for transfer pricing, the selling division cannot realize a profit on the goods transferred. This may be disincentive to the selling division.
3. Further, full cost transfer pricing can provide perverse incentives and distort performance measures.
4. A full cost transfer price would have shutdown the chances of any negotiation between divisions about selling at transfer prices.

C: Full cost plus profit Margin:-

1. Full cost plus mark up (or profit margin)overcomes the weaknesses of full cost basis transfer pricing system.
2. The full cost plus price include the allowed cost of the item plus a mark up or other profit allowance.
3. With such a system, the selling division obtains a profit contribution on units transferred
4. The basic question in full cost plus mark up is what should be the percentage of mark-up. It can be

suggested that the mark up percentage should cover operating expenses and provide a target return on sales or assets.

FULL COST = TOTAL COST + RETURN

D: Standard Costs:- Under this method transfer price will be fixed based on standard cost which is predetermined based on scientific analysis:-

1. Simple and easy to operate when compared to actual cost based method.
2. Inventories are carried at Standard costs in transferring & receiving Division.
3. Does not consider opportunity cost.
4. This encourages efficiency in the selling division because inefficiencies are not passed onto the buying division. Otherwise the selling division can transfer cost inefficiencies to the buying division.
5. Use of standard cost reduces risk to the buyer. The buyer knows that standard Costs will be transferred and avoids being charged with supplier's cost overruns.

E: Opportunity cost: The transfer pricing based on opportunity cost identifies the minimum price that a selling division would be willing to accept and the maximum price that the buying division will be willing to pay. These minimum and maximum prices correspond to the opportunity costs of transferring internally. The opportunity cost approach is used in situations where the market is imperfect. Also, this transfer price is suitable when selling and buying divisions cannot sell and buy all they want in perfectly competitive markets. The opportunity cost based transfer Prices for each division are as follows:-

• Selling Division: - For the selling division, the opportunity cost of transferring is the greater of

(a) The outside sales value of the transferred product.
(b) Differential production cost for the transferred product.

• Buying Division: - For the buying division the opportunity cost of transfer is the lesser of;
A: - The price that would be required to purchase from the outside.
B: - The profit that would be lost from product the final product if the transferred unit could not be obtained at an economic price.

A transfer is in the best economic interest of the company if the opportunity cost for the selling division is less than the opportunity cost for the buying division. As long as the transfer price is greater than the opportunity cost of the selling division and less than the opportunity cost of the buying division, a transfer will be encouraged."

3. Negotiated Prices:- Under this method both the division will negotiate for determination of transfer prices so that these will not be any undue advantages over the other division & in addition to that the overall profitability will be kept in mind.

• Negotiated Transfer Pricing refers to the determination of transfer prices based on active participation, involvement, co- ordination and agreement of the managers of the transferring and recipient divisions.
• In this method, each decentralised unit is considered as an independent unit. Such units decide the transfer price by negotiations or bargaining.
• Divisional Managers have full freedom to purchase their requirement from outside if the prices quoted by the transferring division are not acceptable to them.

Advantage:-

1. **Proper Decision-Making:-** Negotiated prices lead to business like attitude amongst divisions of the company. The buying division may purchase from outside sources if the outside prices are lower than the

internal division's price.
2. **Autonomy and Motivation Value:-** Each sub-unit is considered as an independent unit. Buyers and sellers are completely free to deal outside the company. This promotes sub- unit autonomy and motivates managers.
3. **Overall Company Profitability:-** Through properly directed negotiations, managers will be able to determine the appropriate transfer prices that satisfy the requirements of the divisions and is in the best interest of the Company as a whole.

LIMITATIONS:-

1. **Sub-optimal:-** The agreed transfer price may depend on the negotiating skills and bargaining powers of the managers involved. The final result may not always be optimal
2. **Conflicts:-** Rather than agreement on transfer prices, negotiations can lead to conflict between divisions and may require top-management mediation.
3. **Defeat of Performance evaluation criteria:-** Transfer prices dependent on Manager's negotiations skill will defeat the very purpose of performance evaluation,
4. **Time and Cost:-** Negotiations are time consuming for the managers involved, particularly when the number of transactions and interdependencies are large.

In order to have an effective system of transfers pricing; the following points should be kept in view: -

1. Prices of all transfers in.and out of a profit centra should be determined by negotiation between the buyer and the seller.
2. Negotiations should have access to full data on alternative sources and markets and to public and private information about market prices.
3. Buyers and sellers should be completely free to deal outside the company.

CASE STUDY 80

What are the benefits of Transfer Pricing Policy?

Answer: An ideal transfer pricing policy will benefit the organisation in the following ways:- • Divisional performance evaluation is made easier.

• It will develop healthy inter- divisional competitive spirit.
• Management by exception is possible.
• It helps in co-ordination of divisional objectives in achieving organisational goals.
• It provides useful information to the top management in making policy decisions like expansion, sub-contracting closing down of a division make or buy decisions etc.
• Transfer price will act as a check on supplier's prices.
• It fosters economic entity and free enterprise system.
• It helps in self - advancement and generates high productivity and encouragement to meet the competitive economy.
• It optimises the allocation of company's financial resources based of the relations performance of various profit center which in turn are influenced by transfer pricing policies.

CASE STUDY 81

What are Requisites of a sound Transfer Pricing System?

Answer: The requisites of a sound transfer pricing system are as follows:

1. It should be simple to understand and easy to operate.
2. It should enable fixation of Fair transfer prices for the output transferred or service rendered. A divisional manager who considers the transfer price to be unfair to the division would be de-motivated.
3. Ideally, the business unit divisional manager must be given autonomy and freedom to sell in the open market. This does not, however mean that without complete autonomy, a system of transfer pricing and evaluation of division on the basis of profits contributed by them cannot exist. Frequently divisional mangers will have restrictions in this regard. Even when there is compulsion to sell the products or provide services to an internal division, it is profitable to allow the divisional managers to sell a small quantity (5-10 percent) to customers outside the organizations or to buy small quantities from sources outside it.
4. The business unit / division should have free access to various sources of market information.

5. There should be a negotiation for transfer prices between the business unit/ divisional managers of the selling business unit/division and the buying unit/ division. Negotiated transfer prices are far more motivating than the prices imposed by the top management or determined by the finance department.
6. Sound transfer pricing ground rules must be framed to guide negotiations between business unit/division managers. These rules would not only promote consistency in transfer pricing decision, but also minimize interdivisional conflicts. For instance, if transfer prices have been arrived at through negotiations, divisional managers cannot blame the system or each other if one of them later finds the prices unfavorable to the unit.
7. A system of arbitration with ground rules must also be established. In case of failures relating to transfer pricing these should be resolved through arbitration by a higher level executive-vice-president or director, fiancé. The decisions should be timely as well as consistent across cases as far as possible.
8. Top management should discourage prolonged arguments between business unit/divisional managers.
9. Transfer prices can be reviewed annually or as dictated by the demand and supply conditions in the market. Transfer pricing guidelines must state the circumstances under which a revision of transfer prices can be made during the year.
10. When transfer prices are based on market price, long-term competitive/ normal prices must be considered.
11. Transfer pricing and arbitration ground rules can be reviewed once in four years or earlier if there is a major change in business conditions.

Fox, Kennedy and Sugden suggest that ideally a transfer price should be:

A. Simple to calculate.
B. Robust (not requiring frequent adjustment);
C. Fair (hence motivating to both parties);
D. Profit maximizing (for the company as a whole)

CASE STUDY 82

Outline the limitations of negotiated method of transfer pricing.

Answer: Limitations of negotiated method of transfer pricing are as follows:

1. A system of negotiated prices develops business like attitude amongst divisions of a company. This attitude may tempt the managers to purchase their requirements from outside sources, even by, ignoring

the overall Interest of the company.
2. Agreed transfer price between divisions of a company, will depend on the negotiating skills and bargaining power of the managers involved and the final outcome may not be close to optimal level.
3. Conflict between divisions of a company may arise while negotiating about transfer price and the resolution of such conflicts may require sufficient management time.
4. Measurement of divisional profitability may depend on the negotiating skills of the managers who have unequal bargaining power.
5. Deciding about negotiated transfer price between the divisions of a company, is tjme-consuming exercise for the managers involved.

CASE STUDY 83

What should be the basis of transfer price, if unit variable cost and unit selling price are constant?
Answer: If unit variable cost and unit selling price are constant then the main problem that would arise while fixing the transfer price of a product would be as follows:

There is an optimum level of output for a firm as a whole. This is so because there is a certain level of output beyond which Its net revenue will not rise, The Ideal transfer price under these circumstances will be that which will motivate these managers to produce at this level of output.

Essentially it means that some divisions in a business house might have to produce its output at a level less than its full capacity and in all such cases a transfer price may be imposed centrally.

CASE STUDY 84

How will you resolve Transfer Pricing conflicts between division and company as a whole?
Answer:

1. **Objectives and conflicts:-**

The criteria for fixing transfer prices are (a) Goal congruence in decision-making, (b) Management Efforts (c) Segment Performance Evaluation, and (d) Sub-unit autonomy and motivation value. However no, single transfer price can serve all of these criteria. They often conflict and managers are forced to make trade-offs.

Some situations of conflicts between objectives are:

□**Goal Congruence v/s. Performance Evaluation:** The transfer price that leads to the short-run optimal economic decision is relevant cost. If the transferring division has excess capacity, this cost will be equal to variable cost only (since opportunity costs are Nil). The transferring division will not recover any of its fixed costs when transfers are made at variable costs and will therefore report a loss.

□**Goal Congruence v/s„ Divisional Autonomy:** In case of failure of a division to achieve the objective of goal congruence the management of the company may dictate their 'transfer price', if a transfer price is imposed on the manager of the supplying division, the concept of divisional autonomy and decentralization is undermined.

□**Performance Evaluation v/s. Profitability:** A transfer price that may be satisfactory for evaluating divisional performance may overhead divisions to make sub-optimal decisions when viewed from the overall company perspective.

2. **Conflicts between Divisions and Company as a whole: -** If divisional managers are given —absolute free hand" in decision making on transfer prices, there is a possibility that divisional goals may be pursued, ignoring overall company interests. This may force the top management to interface in

decision making. However interference of top management and "dictating a transfer price" on the divisions is usually the main basis of conflicts between a division and the company as a whole.

3. **Proposals for resolving transfer pricing conflicts: -** To resolve the transfer pricing conflicts the followings transfer-pricing methods can be suggested:
1. Dual-rate transfer pricing system.
2. Two-part transfer pricing system.

CASE STUDY 85

Write a note on pricing by service sector.

Answer: PRICING BY SERVICE SECTOR

1. The service sector follows a different approach for pricing their service. Although a service has no physical existence it must be priced and billed to customers.
2. Most service organizations use a form consisting of time and material pricing to arrive at the price of a service.
3. Service companies such as appliance repair shops, automobile repair business calculate their prices by using two computations one for labour and other for materials and parts.
4. A mark up percentage is used to add the cost of overhead to the direct cost of labour, materials and parts. If materials and parts are not part of service being performed, then only direct labour costs are used as basis for determining price.
5. For professionals such as accountant and consultants direct labour costs and apportioned overhead and indirect costs are considered for pricing.

CASE STUDY 86

Explain four P's of quality improvement principles.

The Four P's quality improvement principles are as below:
1. People: It will quickly become apparent that some individuals are not ideally suited to the participatory process. Lack of enthusiasm will be apparent from a generally negative approach and a tendency to have prearranged meeting which coincide with the meetings of TOM teams.
2. Process: The rhetoric and inflexibility of a strict Deming approach will often have a demotivating effect on group activity.
3. Problem: Experience suggests that the least successful groups are those approaching problems that are deemed to be too large provide meaningful solutions within a finite time period.
4. Preparation: A training in the workings of Deming- like processes is an inadequate preparation for the efficient implementation of a quality improvement process.

CASE STUDY 87

"Cost can be managed only at the point of commitment and not at the point of incidence. Therefore, it is necessary to manage cost drivers to manage cost." Explain the statement with reference to structural and executional cost drivers.

A firm commits costs at the time of designing the product and deciding the method of production. It also commits cost at the time of deciding the delivery channel (e.g. delivery through dealers or own retail stores). Costs are incurred at the time of actual production and delivery. Therefore, no significant cost

reduction can be achieved at the time when the costs are incurred. Therefore, it is said that costs can be managed at the point of commitment. Cost drivers are factors that drive consumption of resources. Therefore, management of cost drivers is essential to manage costs. Structural cost drivers are those which can be managed by effecting structural changes. Examples of structural cost drivers are scale of operation, scope of operation (i.e. degree of vertical integration), complexity, technology and experience or learning. Thus, structural cost drivers arise from the business model adopted by the company. Executional cost drivers can be managed by executive decisions, examples of executional cost drivers are capacity utilization, plant layout efficiency, product configuration and linkages with suppliers and customers. It is obvious that cost drivers can be managed only at the point of structural and operating decisions, which commit resources to various activities.

CASE STUDY 88

What is the fundamental difference between Activity Based Costing System (ABC) and Traditional Costing System? Why more and more organisations in both the manufacturing and non-manufacturing industries are adopting ABC?

In the traditional system of assigning manufacturing overheads, overheads are first allocated and apportioned to cost centres (production and support service cost centres) and then absorbed to cost objects (e.g. products). Under ABC, overheads are first assigned to activities or activity pools (group of activities) and then they are assigned to cost objects. Thus, ABC is a refinement over the traditional costing system. Usually cost centres include a series of different activities. If different products create different demands on those activities, the traditional costing system fails to determine the product cost accurately. In that situation, it becomes necessary to use different rates for different activities or activity pools.

The following are the reasons for adoption of ABC by manufacturing and non-manufacturing industries:

(i) Fierce competitive pressure has resulted in shrinking profit margin. ABC helps to estimate cost of individual product or service more accurately. This helps to formulate appropriate marketing / corporate strategy.

(ii) There is product and customer proliferation. Demand on resources by products / customers differ among product / customers. Therefore, product / customer profitability can be measured reasonably accurately, only if consumption of resources can be traced to each individual product / customer.

(iii) New production techniques have resulted in the increase of the proportion of support service costs in the total cost of delivering value to customers. ABC improves the accuracy of accounting for support service costs.

(iv) The costs associated with bad decisions have increased substantially.

(v) Reduction in the cost of data processing has reduced the cost of tracking resources consumption to large number of activities of customers and not individual customers.

CASE STUDY 89

Classify the following items under the three measures used in the theory of constraints

		Solution
(i)	Research and Development Cost	Investment
(ii)	Rent/Utilities	Operating Costs
(iii)	Raw materials used for production	Contribution
(iv)	Depreciation	Operating Costs
(v)	Labour Cost	Operating Costs
(vi)	Stock of raw materials	Investment
(vii)	Sales	Contribution
(viii)	Cost of equipments and buildings	Investment

The 3 key measures are:
Contribution, Operating Costs, Investments

CASE STUDY 90
Explain briefly the concepts of Opportunity costs and Relevant costs.

Opportunity cost is a measure of the benefit of opportunity forgone when various alternatives are considered. In other words, it is the cost of sacrifice made by alternative action chosen. For example, opportunity cost of funds invested in business is the interest that could have been earned by investing the funds in bank deposit.

Relevant Cost: Expected future costs which differ for alternative course. It is not essential that all variable costs are relevant and all fixed costs are irrelevant. Fixed or variable costs that differ for various alternatives are relevant costs. Relevant costs draw our alternation to those elements of cost which are relevant for the decision.

E.g. Direct labour under alternative I – ` 10/ hour
Direct labour under alternative II – ` 20/hour
Then, direct labour is relevant cost.

CASE STUDY 91
Why is meant by incremental Revenue?

Incremental Revenue: It is the additional revenue that arises from the production or sale of a group of additional units. It is one of the two basic concepts the other being incremental cost which go together with differential cost analysis. Incremental cost in fact is the added cost due to change either in the level of activity of in the nature of activity.

CASE STUDY 92

Distinguish between "Marginal cost" and "Differential Cost".

Marginal cost represents the increase or decrease in total cost which occurs with a small change in output say, a unit of output. In Cost Accounting variable costs represent marginal cost.

Differential cost is the change (increase or decrease) in the total cost (variable as well as fixed) due to change in the level of activity, technology or production process or method of production.

In other words, it can be defined as the cost of one unit of product or service which would be avoided if that unit was not produced or provided.

The main point which distinguishes marginal cost and differential as that change in fixed cost when volume of production increases or decreases by a unit of production. In the case of differential cost variable as well as fixed cost. i.e. both costs change due to change in the level of activity, whereas under marginal costing only variable cost changes due to change in the level of activity.

CASE STUDY 93

What are the applications of incremental cost techniques in making managerial decisions?

Incremental cost technique: It is a technique used in the preparation of ad-hoc information in which only cost and income differences between alternative courses of action are taken into consideration. This technique is applicable to situations where fixed costs alter.

The essential pre-requisite for making managerial decisions by using incremental cost technique, is to compare the incremental costs with incremental revenues. So long as the incremental revenue is greater than incremental costs, the decision should be in favour of the proposal.

Applications of incremental cost techniques in making managerial decisions

The important areas in which incremental cost analysis could be used for managerial decision making are as under:

(i) Introduction of a new product
(ii) Discontinuing a product, suspending or closing down a segment of the business
(iii) Whether to process a product further or not
(iv) Acceptance of an additional order form a special customer at lower than existing price.
(v) Opening of new sales territory and branch.
(vi) Optimizing investment plan out of multiple alternatives.
(vii) Make or buy decisions.
(viii) Submitting tenders.
(ix) Lease or buy decisions.
(x) Equipment replacement decisions.

CASE STUDY 94

Comment on the use of opportunity cost for the purpose of decision-making

Decision making: Opportunity costs apply to the use of scarce resources, where resources are not secure; there is no sacrifice from the use of these resources.

Where a course of action requires the use of scarce resources, it is necessary to incorporate the lost profit which will be foregone from using scarce resources.

If resources have no alternative use only the additional cash flow resulting from the course of action should be included in decision making as relevant cost.

CASE STUDY 95

Explain with one example each that sunk cost is irrelevant in making decisions, but irrelevant costs are not sunk costs.

Sunk cost is a historical cost incurred in the past. In other words it is a cost of a resource already acquired. Future decisions in respect of this resource will not be affected by it. For example, book value of machinery. Hence sunk costs are irrelevant in decision making. Irrelevant costs are not necessary sunk costs. For example, when a comparison of two alternative production methods using the same material quantity is made, then direct material cost is not affected by the decision but this material cost is not sunk cost.

CASE STUDY 96

“Sunk cost is irrelevant in decision-making, but irrelevant costs are not sunk costs". Explain with example.

Sunk costs are costs that have been created by a decision made in the past and that cannot be changed by any decision that will be made in the future. For example, the written down value of assets previously purchased are sunk costs. Sunk costs are not relevant for decision making because they are past costs.

But not all irrelevant costs are sunk costs. For example, a comparison of two alternative production methods may result in identical direct material costs for both the alternatives. In this case, the direct material cost will remain the same whichever alternative is chosen. In this situation, though direct material cost is the future cost to be incurred in accordance with the production, it is irrelevant, but, it is not a sunk cost.

CASE STUDY 97

Explain the concept of relevancy of cost by citing three examples each of relevant costs and non-relevant costs.

Relevant costs are those costs which are pertinent to a decision. In other words, these are the costs which are influenced by a decision. Those costs which are not affected by the decision are not relevant costs.

Examples of relevant costs are:

(1) All variable costs are relevant costs.
(2) Fixed costs which vary with the decision are relevant costs.
(3) Incremental costs are relevant costs.

Examples of non-relevant costs are:
(1) All fixed costs are generally non-relevant.
(2) Variable costs which do not vary with the decision are not relevant costs.
(3) Book value of the asset is not relevant.

CASE STUDY 98
What are the applications of incremental /differential costs?

Applications of Incremental/Differential Cost:
1. Whether to process a product further or not.
2. Dropping or adding a product line.
3. Optimizing investment plan.
4. accepting an additional order from a special customer at lower than existing price.
5. Make or buy decision.
6. Opening a new sales territory or branch.
7. Optimizing investment plan out of multiple alternatives.
8. Submitting tenders.
9. Lease or buy decisions.
10. Equipment replacement decisions.

CASE STUDY 99
"Use of absorption costing method for the valuation of finished goods inventory provides incentive for over-production." Elucidate the statement.

When absorption costing method is used, production fixed overheads are charged to products and are included in product costs. Consequently, the closing stocks are valued on total cost (including fixed overheads) basis. The net effect is that the charge of fixed overheads to P/L account gets reduced, if the closing stock is greater than the opening stock. This situation has the effect of inflating the profit for the period.

Where stock levels are likely to fluctuate significantly, profits may be distorted if calculated on absorption costing basis. If marginal costing is used, since the fixed costs are charged off to P/L account as period cost, such a situation will not arise. The impact of using absorption costing on profits can be summarized as under:

☐ When sales are equal to production, profits will be the same under absorption costing and marginal costing.
☐If production is higher than sales, the absorption costing will post higher profits that marginal costing.
☐ If sales are in excess of production, absorption costing will show lower profits than marginal costing.

Since profit calculation in absorption costing can produce strange result, the managers may deliberately alter the stock levels to influence the profits if absorption costing is used. Hence, it is true to say that if absorption costing method is used managers have the incentive to over produce to show better result.

CASE STUDY 100

What is Pareto Analysis? Name some applications.

Vilfredo Pareto, an Italian economist, observed that about 70 – 80% of value was represented by 30 – 20% of volume. This observation was found to exist in many business solutions.

Analyzing and focusing on the 80% value relating to 20% volume helps business in the following areas.
(i) Pricing of a product (in a multi-product company)
(ii) Customer profitability.
(iii) Stock control.
(iv) Activity Based Costing (20% cost drivers are responsible for 80% of total cost)
(v) Quality Control.

CASE STUDY 101

State the general guidelines to be used in adopting a pricing policy in a manufacturing organization.

The general guidelines to be used in adopting a pricing policy are as under:
(i) The pricing policy should encourage optimum utilization of resources.
(ii) The pricing policy should work towards a better balance between demand and supply.
(iii) The pricing policy should promote exports.
(iv) The pricing policy should serve as an incentive to the manufacturers to maximize production by adopting improved technology.
(v) The pricing policy should avoid adverse effects on the rest of the economy.

CASE STUDY 102

Enumerate the uses of Pareto Analysis.

Pareto analysis is useful to:
(i) Prioritize problems, goals and objectives.
(ii) Identify the root causes.
(iii) Select and define the key quality improvement programs, key employee relations improvement programs etc.
(iv) Verify the operating procedures and manufacturing processes.
(v) Allocate physical, financial and human resources effectively.
(vi) Maximize research and product development time.

CASE STUDY 103

Briefly explain skimming pricing and penetration pricing policies.

Skimming prices: Policy of highly pricing a product at the entry level into the market and reducing it later.
For example: Electronic goods, mobile phone, Flat, TVs, etc.
It is used when market is price insensitive, demand inelastic or to recover high promotional costs.

Penetration Pricing: Policy of entering the market with a low price, then establishing the product and then increasing the price.

This is also used by companies with established markets, when products are in any stage of their life cycle, to avoid competition. This is also known as "stay-out pricing‖. .

For example, entry of a new model small segment car into the market.

CASE STUDY 104

What are the disadvantages of Cost Plus Pricing?

Disadvantages of cost plus pricing:
(i) If ignores demand, facts to take into account buyers' needs and willingness to pay.
(ii) Fails to reflect competition adequately.
(iii) Assumes correct cost estimation, whereas in multi-product firm, costs may be arbitrarily allocated.
(iv) In many decision, incremental costs are more relevant than full cost. This is ignored.
(v) Fixed Overheads depends on volume if volume is more cost is less, and vice-versa. Increase decrease in sales volume depends on price. Thus it is a vicious circle — cost plus markup is a price based on sales volume & sales volume is based on price.

CASE STUDY 105

"Overhead variances should be viewed as interdependent rather than independent'. Explain.

The operations of a firm are so inter linked that the level of performance in one area of operation will affect the performance in other areas. Improvements in one area may lead to improvements in other areas. A sub-standard performance in one area may be compensated by a favourable performance in another area. Because of such interdependency among activities in the firm, the managers should not jump to conclusions merely based on the label of variances namely favourable or unfavourable. They should remember that there is a room for trade off amongst variances. Hence, variances need to be viewed as `attention directors' rather than problem solvers. Thus, a better picture will be captured when overhead variance are not viewed in isolation but in an integrated manner.

CASE STUDY 106

Under the single plan, record the journal entries giving appropriate narration, with indication of amounts of debits or credits alongside the entries, for the following transactions using the respective control A/c.
(i) Material price variance (on purchase of materials)

(ii) Material usage variance (on consumption)
(iii) Labour rate variance.

(i) Dr. Material Control A/c
Dr. or Cr. Material Price Variance A/c
Cr. Creditors A/c
(Being price variance during purchase of materials)

(ii) Dr. WIP Control A/c
Dr. or Cr. Material Usage Variance A/c
Cr. Material Control A/c
(Being recording of usage variance at Standard cost of excess/under utilized quantity)

(iii) Dr. Wages Control A/c
Dr. or Cr. Labour Rate Variance A/c
Cr. Cash
(Being entry to record wages at standard rate)

CASE STUDY 107

How are cost variances disposed off in a standard costing system? Explain.

There is no unanimity of opinion among Cost Accountants regarding the disposition of variances. The following are commonly used methods for their disposition.

1. Transfer all variances to Profit and Loss Account. Under this method, stock of work-in-progress, finished stock and cost of sales are maintained at standard cost and variances arising are transferred to profit and loss account.

2. Distributing variances on pro-rata basis over the cost of sales, work-in-progress and finished goods stocks by using suitable basis.

3. Write off quantity variance to profit and loss account and spread price variance over to cost of sales, work in progress and finished goods. The reason behind apportioning variance to inventories and cost of sales is that they represent costs although they are derived as variances.

CASE STUDY 108

"Calculation of variances in standard costing is not an end in itself, but a means to an end." Discuss.

The crux of standard costing lies in variance analysis. Standard costing is the technique whereby standard costs are predetermined and subsequently compared with the recorded actual costs. It is a technique of cost ascertainment and cost control. It establishes predetermined estimates of the cost of products and services based on management's standards of efficient operation. It thus lays emphasis on "what the cost should be". These should be costs are when compared with the actual costs. The difference between standard cost and actual cost of actual output is defined as the variance.

The variance in other words in the difference between the actual performance and the standard performance. The calculations of variances are simple. A variance may be favourable or unfavourable. If the actual cost is less than the standard cost, the variance is favourable but if the actual cost is more than the standard cost, the variance will be unfavourable. They are easily expressible and do not provide detailed analysis to enable management of exercise control over them. It is not enough to know the figures of these variances from month to month. We infact are required to trace their origin and causes of occurrence for taking necessary remedial steps to reduce / eliminate them.
A detailed probe into the variance particularly the controllable variances help the management to ascertain:
(i) The amount of variance
(ii) The factors or causes of their occurrence
(iii) The responsibility to be laid on executives and departments and
(iv) Corrective actions which should be taken to obviate or reduce the variances.

Mere calculation and analysis of variances is of no use. The success of variance analysis depends upon how quickly and effectively the corrective actions can be taken on the analysed variances. In fact variance gives information. The manager needs to act on the information provided for taking corrective action. Information is the means and action taken on it is the end. In other words, the calculation of variances in standard costing is not an end in itself, but a means to an end.

CASE STUDY 109

Describe three distinct groups of variances that arise in standard costing.

The three distinct groups of variances that arise in standard costing are:
(i) Variances of efficiency. These are the variance, which arise due to efficiency or inefficiency in use of material, labour etc.
(ii) Variances of prices and rates: These are the variances, which arise due to changes in procurement price and standard price.
(iii) Variances due to volume: These represent the effect of difference between actual activity and standard level of activity. These can be summarized as under:

Element of cost	*Variance of Efficiency*	*Variance of Price*	*Variance of volume*
Material	Usage, Mixture, Yield	Price	Revision
Labour	Efficiency, idle time	Rate of pay	--
- Variable	Efficiency	Expenditure	Revision
- Fixed	Efficiency	Expenditure	Revision
			Capacity
			Calendar

CASE STUDY 110

Discuss with examples, the basic costing methods to assign costs to services.

(i) **Job Costing method**: The cost of a particular service is obtained by assigning costs to a distinct identifiable service. e.g. Job Costing method is used in service sectors - like Accounting Firm, Advertisement campaign.

(ii) **Process Costing method:** Cost of a service is obtained by assigning costs to masses of similar unit and then computing cost / unit on an average basis. e.g. Retail banking, postal livery, credit card etc.

(iii) **Hybrid method:** Combination of both (i) & (ii) above.

CASE STUDY 111

Explain the main characteristics of Service sector costing.

Main characteristics of service sector are as below:
(a) **Activities are labour intensive:** The activities of service sector generally are labour intensive. The direct material cost is either small or non-existent.
(b) **Cost-unit is usually difficult to define:** The selection of cost units usually, for service sector is difficult to ascertain as compared to the selection of cost unit for manufacturing sector. The following table provides some examples of the cost units for service sector

- Hospital — Patient per day, Room per day
- Accounting firm — Charged out client hours
- Transport — passenger km., quintal km.
- Machine maintenance — Maintenance hours provided to user department
- Computer department — Computer time provided to user department.

(c) **Product costs in service sector:** Costs are classified as product or period costs in manufacturing sector for various reasons.

CASE STUDY 112

Give an appropriate cost unit for each of the following service sectors:
(i) Hotel
(ii) School
(iii) Hospital
(iv) Accounting firm
(v) Transport
(vi) Staff Canteen
(vii) Machine maintenance
(viii) Computer Department

Service Sector	Cost Unit
(i) Hotel	Bednights available or occupied
(ii) School	Student hours or no. of full time students
(iii) Hospital	Patient-day / Room-day
(iv) Accounting firm	Client hours
(v) Transport	Passenger-kms,, or Quintal km or tonne-km
(vi) Staff Canteen	No. of meals provided or no. of staff
(vii) Machine maintenance	Maintenance hours to user departments
(viii) Computer Department	Computer time to user department

CASE STUDY 113

"Customer profile is important in charging cost." Explain this statement in the light of customer costing in service sector.

Customer costing in the service sector: The customer costing is a new approach to management. The central theme of this approach is customer satisfaction. In some service industries, such as public relations, the specific output of industry may be difficult to identify and even more difficult to quantify. Further there are multiple customers, identifying support activities i.e. common costs with particular customer may be more problematic. In such cases it is important to cost customer. An ABC analysis of customers profitability provides valuable information to help management in pricing customer .Consider a banking sector. A banks activity for customer will include the following types of activities. These are:

i. Stopping a cheque
ii. Withdrawal of cash
iii. Updation of pass book
iv. Issue of duplicate pass book
v. Returning a cheque because of insufficient funds
vi. Clearing of a customer cheque.

Different customers or categories of customers use different amount of these activities and so customer profiles can be built up and customer can be charged according to the cost to serve them.

Customer profile is important in analyzing cost under the following categories

1. **Customer Specific costs:** These are the direct and indirect cost of providing service to customer plus customer related cost assigned to each customer. For example: cost of express courier service to a client who requests over-night delivery of some agreement.

2. **Customer – line categories:** These are the costs which are broken into broad categories of customers and not individual customers.

CASE STUDY 114

"Hard Rock Coconut" is an exclusive resort located in a famous Island of Pacific Ocean that vows to isolate its guests from the hustle and bustle of everyday life. Its leading principle is "all contemporary amenity wrapped in old-world charisma". Each of the resort's 18 villas has a separate theme like Castle, Majestic, Ambassador, Royal Chateau, Coconut, Lemon, Balinese etc and guests often ask for a specific villa when they make reservations. Villas are Ideal for families or friends travelling together and these villas feature luxurious accommodation spanning two

floors. Since it is located within a 300-acre estate on white sand beach, the resort offers its guests a wide variety of outdoor activities such as horseback riding, hiking, diving, snorkelling, sailing, golf and so on. Guests could also while away the day relaxing in the pool and availing themselves of the resort's world-famous spa "Hard Coco Spa". The dining room, which only has three tables for the public, is acceptable proud of its 4-star rating. You are required to develop a balanced scorecard for "Hard Rock Coconut". It is sufficient to give two measures in each of the four perspectives.
The following is a possible scorecard for "Hard Rock Coconut"

Financial Perspective	Economic Value Added Revenue per villa
Customer Perspective	% repeat customers Number of customer complaints
Internal Business	Service rating of spa Staff hours per guest % cost spent for maintenance Travel guide rank for restaurant
Innovation and Learning	Employee retention Number of new services offered

CASE STUDY 115

Global Multinational Ltd. (GML) has two Divisions 'Dx' and 'Dz' with full profit responsibility. The Division 'Dx' produces Component 'X' which it sells to `outside' customers only. The Division Dz' produces a product called the `Z' which incorporates Component 'X' in its design. 'Dz' Division is currently purchasing required units of Component 'X' per year from an outside supplier at market price. New CEO for Indian Operations has explored that 'Dx' Division has enough capacity to meet entire requirements of Division 'Dz' and accordingly he requires internal transfer between the divisions at marginal cost from the overall company's perspective. Manager of Division 'Dx' claims that transfer at marginal cost are unsuitable for performance evaluation since they don't provide an incentive to the division to transfer goods internally. He stressed that transfer price should be 'Cost plus a Mark-Up'. New CEO worries that transfer price suggested by the manager of Division `Dx' will not induce managers of both Divisions to make optimum decisions. You are requested to help him out of the problem.

To overcome the optimum decision making and performance evaluation conflicts that can occur with marginal cost-based transfer pricing following s has been proposed:

Dual Rate Transfer Pricing System

"With a `Dual Rate Transfer Pricing System' the 'Receiving Division' is charged with marginal cost of the intermediate product and 'Supplying Division' is credited with full cost per unit plus a profit margin".

Accordingly Division 'Dx' should be allowed to record the transactions at full cost per unit plus a profit margin. On the other hand Division Dz' may be charged only marginal cost. Any inter divisional profits can be eliminated by accounting adjustment.

Impact:

— Division 'Dx' will earn a profit on inter Division transfers.
— Division 'Dz' can chose the output level at which the marginal cost of the product 'X' is equal to the net marginal revenue of the product 'Z'.

Two Part Transfer Pricing System:
The ‗Two Part Transfer Pricing System' involves transfers being made at the marginal cost per unit of output of the supplying Division plus a lump-sum fixed fee charged by the supplying Division to the receiving Division for the use of the capacity allocated to the intermediate product."
Accordingly Division `Dx' can transfer its products to Division 'Dz' at marginal cost per unit and a lump-sum fixed fee.
— 'Two Part Transfer Pricing System' will inspire the Division 'Dz' to choose the optimal output level.
— This pricing system also enable the Division 'Dx' to obtain a profit on inter Division transfer.

CASE STUDY 116
"Target costing is less useful in situations where the majority of costs are not locked in during the design phase" – Explain with example.

Target costing is most useful in situations where the majority of product costs are locked in during the product design phase. This is the case for most manufactured products, but only for few services. In the services area, such as consulting, the bulk of all activities can be reconfigured for cost reduction during the "production" phase, which is when services are being provided directly to the customer. In the services environment the "design team" is still present but is more commonly concerned with streamlining the activities conducted by the employees providing the service, which can continue to be enhanced at any time, not just when the initial services process is being laid out. For example, Design team can lay out the floor plan of a fast-food restaurant, with the objective of creating an arrangement that allows employees to cover the shortest possible distances while preparing food and serving customers; this is similar to the design of a new product. However, unlike a product design, this layout can be readily altered at any time if the design team can arrive at a better layout, so that the restaurant staff can continue to experience high levels of productivity improvement even after the initial design and layout of the facility. In this situation costs are not locked in during the design phase, so there is less need for target costing.

CASE STUDY 117
X Ltd. wants to enter in the market with a new product 'Gamma'. You are required to help management of X Ltd. in deciding pricing strategy if
- Demand of the 'Gamma' is elastic,
- Good possibility of substantial savings on large scale production and
- There is threat of competition.

While preparing to enter the market with anew product, X Ltd. has to adopt a skimming or penetration pricing strategy.

Skimming Pricing: It is a policy of high prices during the early period of a product's existence. This can be synchronised with high promotional expenditure and in the later years the prices can be gradually reduced.

Penetration Pricing: Penetrating pricing, means a pricing suitable for penetrating mass market as quickly as possible through lower price offers. The company may not earn profit by resorting to this policy during the initial stage. Later on, the price may be increased as and when the demand picks up.

X Ltd. should follow '**Penetration Pricing**' as –
(a) Demand of product 'Gamma' can be increase by lowering the price as it has elastic demand.

(b) There is also scope of substantial savings on large scale production and increase in demand is sustained by the adoption of low pricing policy.

(c) The prices fixed at a low level act as an entry barrier to the prospective competitors.

CASE STUDY 118
Write a short note on Six Sigma

Six Sigma: Continuous improvement can be brought into the organisational culture by introducing continuously changing planned targets. One such target can be six-sigma accuracy. The sigma accuracy means the process is 99.999998% accurate. That is the process will/can produce only 0.002 defects per million. This is the structural meaning of six-sigma. In quality practice, six-sigma means 3.4 parts per million.

Six sigma is the statistical measure used to ensure quality of products and services. The six sigma academy has developed a break through strategy consisting of measure, analyze, improve and control, that allows companies to make exceptional bottom-line improvements.

In addition to the material and labour savings, which flow directly to the bottom line, a company engaged in six sigma can expect to see:

☐ Improved customer satisfaction
☐ Reduction cycle time
☐ Increased productivity
☐ Reduction in total defect
☐ Improved process flow

Six Sigma Capability Chart

Sigma	Parts per million
Six sigma	3.4 defects per million
Five sigma	233 defects per million
Four sigma	6,120 defects per million
Three sigma	66,807 defects per million
Two sigma	3,08,537 defects per million
One sigma	6,90,000 defects per million

CASE STUDY 119
Explain briefly the Cost Accountant's role in a. Target Costing Environment.

The role of a Cost Accountant in a Target Costing Team consists of the following activities–

1. **Cost Estimation:** To provide other members of the design team a running series of cost estimates based on initial designs sketch, activity-based costing reviews of production processes, and "best guess"

costing information from suppliers based on estimated production volumes.
2. **Permissible Cost Ranges:** To provide estimates within a high-low range cost, since preliminary data may be vague. But, the estimated cost range should be modified as more information becomes available.

3. **Capital Budgeting Analysis:** To cater to capital budgeting requests generated by the Design Team, based on types of equipment needed for the anticipated product design, product revenues and costs, rates of return, etc. and to answer questions regarding uncertainties and risk analysis.

4. **Cost Principles Explanation:** To work with the Design Team to help it understand the nature of various costs (such as cost allocations based on an Activity-Based Costing system), as well as the cost-benefit trade-offs of using different design or cost operations in the new product.

5. **Review of Cost Reduction Targets:** To track the gap between the Current Cost and the Target Cost (Le. the Design Team's goal), providing an itemization of where cost savings have already been achieved, and where there has not been a sufficient degree of progress.

6. **Final Review and Feedback:** To compare a products Actual Cost to the Target Cost after the design is completed, and for as long as the Company sells the product. This is necessary since Management must know immediately if costs are increasing beyond budgeted levels and why these increases are occurring.
Note: Since the role of the Cost Accountant in a Target Costing Team is very significant, he should have the following qualifications - (only illustrative and not exhaustive)

☐ Good Knowledge of Company's products as well as their features and components.
☐Knowledge of how to create an Activity Based Costing system to evaluate related production costs, or at least interpret such costing data developed by someone else.
☐ Skills to work well in a team environment, proactively assisting other members of the team in constantly evaluating the costs of new design concepts.
☐ Good analytical and presentation skills, since the ongoing costing results must be continually presented not only to other members of the team and to top management.

CASE STUDY 120
What do you mean by Kaizen Costing?

1. Meaning: Kaizen Costing refers to the ongoing continuous improvement program that focusses on the reduction of waste in the production process, thereby further lowering costs below the initial targets specified during the design phase. It is a Japanese term for a number of cost reduction steps that can be used, subsequent to issuing a new product design to the factory floor.
2. **Need:** The need for continuous cost reduction, i.e. Kaizen Costing, is brought out as below –

(a) At the time of implementation of Cost Reduction Methods, there may be further chances of waste reduction, cost and time reduction and product improvement, which were not visualized or identified in earlier review.
(b) There are always opportunities to control costs, after the Design Phase on a new product is completed, though these opportunities are fewer than during the Design Phase.
(c) The Firm can obtain further unplanned cost reductions at the implementation stage, on account of workers' feedback and newer shop floor techniques.
3. **Kaizen Costing Process:** Activities in Kaizen Costing include elimination of waste in production, assembly, and distribution processes, as well as the elimination of unnecessary work steps in any of

these areas. Thus, Kaizen Costing is intended to, repeat many of the Value Engineering steps, continuously and constantly refining the process, ther

4.**Savings from Kaizen Costing:** Cost reductions resulting from Kaizen Costing are much smaller than those achieved with Value Engineering. But, these are significant, since competitive pressures are likely to force down the price of a product over time, and any possible cost savings allow a Company to still attain its targeted profit margins.

5. **Multiple Versions of Products, i.e. Continuous Kaizen Costing:** Multiple improved versions of products can be introduced to meet the challenge of gradually reducing costs and prices. The market price of products continues to drop over time, which forces a Company to use both Target Costing and Kaizen Costing to reduce costs and retain its profit margin.

However, prices eventually drop to the point where margins are reduced, which forces the Firm to develop a new product with lower initial costs, and for which Kaizen Costing can again be used to further reduce costs. This pattern may be repeated many times as the Firm forces its costs down through successive generations of products.
The exact timing of a switch to a new product is easy to determine well in advance since the returns from Kaizen Costing follow a trend line of gradually shrinking savings. Since prices also follow a predictable downward track, plotting these two trend lines into the future reveals when a new product version must be ready for production.

CASE STUDY 121

Classify the following items under appropriate categories of equably costs viz. Prevention Costs, appraisal Cost, Internal Failure Costs and External Failure costs:

	Particulars of Items	**Solution**
(i)	Rework	Internal Failure
(ii)	Disposal of Scrap	Internal Failure
(iii)	Warranty Repairs	External Failure
(iv)	Revenue Loss	External Failure
(v)	Repair to manufacturing equipments.	Internal Failure
(vi)	Discount on defective sale	External Failure
(vii)	Raw material inspection	Prevention cost
(viii)	Finished product inspection	Appraisal Cost
(ix)	Establishment of quality circles	Prevention cost
(x)	Packaging inspection	Appraisal Cost

CASE STUDY 122

Write short notes on Participative Budgeting.

1. Participative Budgeting is a budgeting system in which all Budget Committee Members are given the opportunity to apply their own budgets in practice.
2. Inter-relationship between different functional budgets (viz. Sales, Production, Purchase, etc.) means that one budget cannot be completed without reference to several others. Hence, there is an immense need for co-ordination among all Department Heads, by having a Budget Committee.

3. Participative Budgeting (using Budget Committees) is also called "bottom-up budgeting". It is different from imposed or "top-down budgets" where the ultimate budget holder does not have

any say / participation in the budgeting process.
4. Advantages of Participative Budgeting include -
(a) improved quality of forecasts to use as the basis for the budget,
(b) higher levels of motivation for the participating Managers,
(c) better results since the applicant and executor of the Budget are the same person.

CASE STUDY 123

Outline the relationship between Standard Costing and Budgetary Costing.

Distinction between Standard Costing and Budgetary Control

Particulars	**Standard Costing**	**Budgetary Control**
1. Meaning	Standards Costs are pre-determined. costs representing what the costs should be, at the level of efficient conditions of production and operation.	Budgets are financial and/or quantitative statements, prepared and approved prior to a defined period of time, of the policy to be pursued during that period for achieving that objective.
2. Coverage	They are generally restricted to Costs.	They include estimates of income, costs and employment of capital
3. Basis	These are determined by the collection of technical data related to production and applying costs to each element of production.	These are determined based on management's plans of what should be done to achieve a certain objective and how to actually achieve it.
4. Effect of temporary conditions	If, in a particular year, Costs are likely to be high due to certain factors, Standard Costs are not changed unless the factors are permanent changes nature. Effect of short-run temporary changes will not be reflected in Standard Costs.	Budgeted Costs are estimated keeping in view actual conditions and attainable targets of a period under review, in view of the conditions that are likely to be prevalent in that year. The effect of short-term changes in cost structure, etc, will be fully reflected in Budgeted Costs.
5. Permanence	Standard Costs are usually semi-permanent in nature, and may not be changed unless and until there are changes in the basic price structure or in the methods of operations.	They are estimated usually for one year and take into account the practical problems of operations and are kept at a level, which the Firm hopes to achieve in the year for which the budget is being prepared.

CASE STUDY 124

Compare between Traditional Budgeting and Zero-Based Budgeting.

	Traditional Budgeting	**Zero-Based Budgeting**
1.	It is accounting-oriented, with stress laid on the previous years' level of expenditure.	It is decision-oriented, in a rational manner, for allocation of resources for both old and new programmes & activities.
2.	Here, reference is made to the past period levels of Revenues and Costs, and then adjustments are made to recognize factors like inflation trends, market demand situations, etc.	Here, a decision unit is broken into understandable Decision Packages, which are ranked according to importance, enabling Top Management to focus their attention on top priority Decision Packages.
3.	It is a routine and direct approach, treating each Division / Decision Unit equally.	It is an analytical approach, and immediately highlights the Decision Packages enjoying priority over others.
4.	It is for Top Management to decide why a particular amount should be spent on a particular decision unit.	Here, Manager of each Division should completely justify why there should be a budget allocation for his Division.
5.	It is comparatively rigid, and not dearly responsive to environmental changes.	This is very flexible and responsive to environmental changes.
6.	Managers may deliberately inflate their Budget Cost Request, so that they may still get the required amount, after cost "cuts" from Top Management.	Managers cannot have an adhoc approach for Cost Budgets. Top Management accords its approval only to a carefully devised, result-oriented Decision Package.

CASE STUDY 125
What is DPP and Category of Indirect Cost for DPP.

Direct Product Profitability, it is a new way of spreading overheads in retail organisations, which is used in the grocery trade in particular. DPP has become much more sophisticated and is now very similar to activity based costing.

Categorisation of Indirect Costs for DPP:
i. Overhead cost
ii. Volume related cost
iii. Product batch cost
iv. Inventory financing cost.

CASE STUDY 126

List a few industrial /manufacturing applications or used of the Learning Curve.
Mention some important applications of Learning Curve in Cost and Management Accounting.

1. **CVP Analysis:** Learning Curve helps to analyse CVP relationship during familiarization phase of product or process and thus it is very useful for cost estimates. Learning Curve also assists in forecasting.
2. **Budgeting and Profit Planning:** Learning Curve provides scientific ideas and sophistication for budgeting and profit planning. The Budget Team selects the costs that reflect Learning Effect, and incorporates it while developing budgets or when planning projects.
3. **Pricing Decisions:** Cost data adjusted for Learning Effect helps in proper pricing decisions.
4. **Product Design:** It helps Design Engineers in decision making based upon expected (predictable from past experience) rates of improvement.
5. **Contract Negotiations:** It helps the Government to negotiate Contracts. The Government receives full advantage of the decreasing unit cost in establishing the Contract Price.
6. **Setting Standards:** The Learning Curve provides the base to set standards for the Learning Phase.

CASE STUDY 127

Explain Float and Types of Float.

Float: Float is the flexibility available in any activity which can be absorbed either by delaying that activity or by enlarging its duration.
There is no difference between Float and Slack. FLOAT refers to an activity and SLACK refers to an event.

1. **Total Float:** The total float of an activity represents the amount of time by which an activity can be delayed without delaying the project completion date.
Total float=EF – LF
Or = Es – Ls
2. **Free Float:** Free float is that portion of the total float within an activity can be manipulated without affecting the float of subsequent activities.
Free float = Total float - Head slack
3. **Independence Float:** This is the amount of time an activities are completed as late as possible and all succeeding activities are completed as late as possible and all succeeding activities started as early as possible.
Independence float = Free float - Tail slack
4. **Interfering Float:** Interfering float is that part of the total float which causes a reduction in the float of the successor activities.
Interfering float = LF – Es

CASE STUDY 128

Explain Concept of Learning Curve?

Answer: In case of a job which is repetitive in nature and the working time is not scheduled by the speed of machinery, an individual is likely to become more confident and knowledgeable about his work as he gains more experience. As a consequence of his learning effect he can do the job in less time than when he initially commenced the first job. Ultimately when he has acquired more experience the learning process will lend to stop. The speeding up of a job with repeated performance is known as learning effect or learning curve effect. The reduction in the required labour time thus can be quantified.

Learning, curve theory was first developed in the United States aircraft industry. It has been extended to other labour-oriented industries and has been extended to no production activities such as

marketing efforts. Learning curve effect is not only restricted to individual but it also applies to a group of workers. However the learning effect is not an automatic natural phenomenon. All production process win not show rate of increased efficiency and there may be cases where the differences in the learning rates will be substantial.
The quantitative average time per unit produced is normally considered to be reduced by a constant percentage every time total output of the product is doubled. The following table the working of which is based on 80% learning effect can exemplify this.

Number of Units (Cumulative)	Cumulative average time per unit in hours	Total Time	Incremental time Time for additional units.
1	100	100	--
2	80	160	60
4	64	256	96
8	51.2	409.6	1536

Thus Learning curve can be expressed as y = a x5
Learning curve theory can be used:-
A. To calculate the incremental cost of making extra units of a particular products.
B. To set standards for labour,
C. To prepare realistic production budgets and to report labour cost variances.
D. To quote contact price.
Direct labour cost and time as well as variable overhead costs, which vary with direct labour hours are affected by learning curve. On the other hand material cost will not be affected. In case where absorption costing system in vogue, the fixed overhead application rate may be affected due to higher production or use of capacity. Besides the above cases where learning curve will have effect directly a management accountant should bear in some other considerations, such as: -
1. Sales promotion and advertising expenditure.
2. delivery date commitments.
3. budgeting and standard cost.
4. Cash budget,
5. Work scheduling and overtime decisions, and
6. Economics of scale.

CASE STUDY 129
What are the Limitations of Learning Curve?

Answer: Which there are certain distinct advantages of incorporating; earning curve theory in practice, It suffers from certain limitations, which must be kept in view: -

1. Learning curve phenomenon is not always present Before it is assumed, there should be evidence/precedence to prove that this assumption will hold good in estimating production times and costs for new items of production.
2. One glaring shortcoming of this theory is that it assumes stable conditions at work. In daily life, it is not always practicable especially due to labour turnover.

3. Time-break between repeating production should not be too long or the workers will forget and learning process will have to begin all over again.

4. It is not always possible to get enough accurate data to decide what the learning curve is.

5. The theory also provides that constant stage follows the learning stage. At what point of time, "constant stage" precisely begins, is not easy to ascertain.

6. Normally, the trade unions will not accept gradual reduction in production time per unit. In this type of situation, management may try to establish a low standard time per unit from the onset. This will lead to adverse efficiency variances, until learning effect has taken place.

7 if there is productivity bonus incorporation of learning effect may frustrate worers in learning stage, as it may appear as a threat to the size of bonus, that they may earn.

8. Production techniques production design, etc., almost always continuously change. This may lead to a situation, where it will take a long time for a "standard" production method to emerge; to which learning effect will apply.

CASE STUDY 130

What is the meaning of Linear Programming?

Answer: The method of maximizing (or minimizing) a linear function of several variables (called objective function) subject to the condition that the variables are non-negative and satisfy a set of linear equations and/or in equations (called Linear Constraints) is given the name LINEAR PROGRAMMING. The term linear implies that all the mathematical relations used in the problem are linear relations, while the term programming refers to the method of determining a particular programme or plan of action. The two together have the technical meaning stated above.

Thus linear programming is a mathematical way of planning, which involves three steps:
1. To identify the objective function as a linear function of its variables and state all the limitations on resources as linear equation and/or in equations (constraints).
2. To Use mathematical techniques to find all possible sets of values of the variables (unknowns), satisfying the constraints.
3. To Select the particular set of values of the variables obtained in (2) that lead to our objective-maximum profit, least cost, etc.
The result at step (1) above is called a Linear programming problem. The set of solutions obtained in (2) is called the set of feasible solutions and the solution finally selected in step. (3) is known as the optimum (best or optimal) solution of the Linear Programming problems.

BASIC REQUIREMENTS: -
Regardless of the way one defines linear programming certain basic requirement are necessary before this technique can be employed to optimization problems.

These are:

1. **Decision variables and their relationship.** The decision variable refers to any activity (product, project, etc) that is competing with either activity for limited resources. The relationship among these variable should be linear.

2. **Well-defined objective function.** A clearly defined objective must be stated which may be either to maximize contribution by utilizing the available resources, or it may be to produce at the lowest possible cost by using a limited amount of productive factors.

3. **Presence of constraints or restriction:** There must be limitations on resources (like production, capacity, manpower, time, machines, markets etc. that are to allocate among various competing activities.

4. **Quantitative measurement of problem element:** It is essential that each element of the problem is capable of being quantified. Numerical data must depict the problem in terms of relationship involved as well as among the elements considered. Thus, accurate means of measurement, such as rupees, acres, hours, kilogram must be brought into computation.

1. **Alternative courses of action.** There must be alternative courses of action to choose from e.g. it must be possible to make a selection between various combinations of the productive factors such as men, machines, materials, markets, etc.

2. **Non-negative restrictions.** All decision variables must assume non-negative values, as negative value of physical quantities is an impossible situation.

3. **Linearity.** The basic requirements of a linear programming problem are that both the objective and constraints must be expressed in terms of linear equations or inequalities. It is well known that if the number of machines in a plant is increased, the production in the plant also proportionately increases. Such a relationship, giving corresponding increment in one variable for every increment in the other, is called linear and can be graphically represented in the form of a straight line.

BASIC ASSUMPTIONS: -

1. **Proportionality.** We assume the proportionality exists in the objective and constraints, i.e. the measure of effectiveness profit or loss) in the objective function and amount of each resource used must be proportional to the value of each decision variable considered individually. For example if we want to double the output we simply double the required resources.

2. **Additives.** It means that sum of the resources used by different activities must be equal to the total quantity of resources used by each activity for all the resources individually and collectively. In other words interaction among the activities of the resources does not exist.

3. **Divisibility.** This assumption implies that solutions need not be in whole numbers (integers). Instead they are divisible and may take any fractional value. If a fraction of a product cannot be produced (like one-fourth of a bus), an integer-programming problem exists.

4. **Certainty.** We assume that conditions of certainty exist, i.e. the coefficients in the objective function and constraints are completely known (deterministic) and do not change during the period being studied, e.g. profit per unit of each product, amount of resources available are fixed during the planning period.

5. **Finiteness**. An optimum solution cannot be computed in the situations where there are an infinite number of alternative activities and resource restrictions.

6. **Optimality** in Linear programming problem, the maximum profit solution or the minimum cost solution always occurs at a corner point of the set of feasibte solutions.

APPLICATIONS OF LINEAR PROGRAMMING

The use of LP is made in regard to the problems of allocations, assignment transportations etc. But the most important of these is that of allocation of scare resources on which we shall concentrate. Some allocation problems are as follows: -

1. Devising of a production schedule that could satisfy future Demands (seasonal or otherwise) for the firm's product and at the same time minimize production (including inventory) costs.

2. Choice of investment from a variety of shares and debentures so as to maximize return on investment.

3. Allocation of a limited publicity budget on various heads in order to Maximize its effectiveness.

4. Selection of the product-mix to make the best use of available Resources like machine man-hours etc, with a view to maximize Profits.

5. Selecting the advertisement mix that will maximize the benefit Subject to the total advertising budget, Linear Programming can be Effectively applied.
6. Determination of the distribution system that will minimize Transportation costs from several warehouses to various markets.
7. Designing routing and assignment problems.
8. Manufacturing problems. To find the number of items of each type that should be manufactured so as to maximize the profit subject to production restrictions imposed by limitations on the use of machinery and labour.
9. Transportation problems. To find the least expensive way of transporting shipments from the warehouses to customers.
10. Diet Problems. To determine the minimum requirement of nutrients subject to availability of foods and their prices.
11. Blending Problems. To determine the optimum amount of several constituents to be used in producing a set of products while determining the optimum quantity of each product to produce.
12. Assembling Problems. To have the best combination of basic components to produce goods according to certain specifications.
13. Production problems. To decide the production schedule to satisfy demand and minimize cost in face of fluctuating rates and storage expenses.
14. Job assigning problems. To assign job to workers for maximum effectiveness and optimum results subject to restrictions of wages and other costs.
15. Trim-Loss problems. To determine the best way to obtain a variety of smaller rolls of paper from a standard width of roll that is kept in stock and at the same time, minimize wastage.

ADVANTAGES AND LIMITATIONS OF LINEAR PROGRAMMING:-

Main advantages of L.P. are as follows:

1. Linear Programming helps in attaining the optimum use of productive factors. It also indicates how a decision maker can employ his productive factors effectively by selecting and distributing these elements.
2. Linear programming technique improves the quality of decisions. Users of this technique become more objective and less subjective
3. Highlighting of bottlenecks in the production processes is one of the most significant advantages of this technique. For example, when bottlenecks occur, some production factors (say machines) cannot meet demand while other remains idle for some of the time.
4. Linear programming provides possible and practical solutions since there might be other constraints operations outside of the problems, which must be taken into account.

Linear programming suffers from certain limitations which are given below: -

1. In reality, objectives functions and constraints cannot be expresses in linear form.
2. In linear Programming problem, fractional values are permitted for the decision variables. However many decision problems require that the decision variables should be obtained in non-fractional values.
3. The co-efficient of basic variables cannot be determined with certainty however; they can be stated only with probability.
4. Where a problem consists of inflicting multiple objectives, this technique cannot provide a solution.
5. The linear programming does not take into consideration the effect of time and uncertainty.
6. Parameters appearing in the LP model are assumed to be constant but in real life situations they are frequently neither known nor constant.
7. In case of large, complex and constrained problems, computational problems are enormous.

CHAPTER -16

INTRODUCTION TO STRATEGIC COST MANAGEMENT

SUMMARY

- The basic aim of Strategic Cost Management is to help the organization to achieve the cost leadership to get the sustainable competitive advantage. A well-conceived cost reduction strategy enables the managers to capture maximum value in the form of direct savings. It is an effective way of reducing cost, increasing revenue and facilitating survival in the competitive world.

- Strategic cost management should be inherent to each stage of a product's life cycle, i.e. during the development, manufacturing, distribution and during the service lifetime of a product.

- Strategic cost management can be referred to as "the managerial use of cost information explicitly directed at one or more of the four stages of strategic management" viz. Formulating strategies, communicating those strategies throughout the organization, Implementation the strategies, and implementing controls to monitor the success of objectives.

- Composition of Strategic Cost Management – Cost Driver Analysis, Strategic Positioning Analysis and Value Chain Analysis.

- The Strategic Positioning of an organization includes the devising of the desired future position of the organization on the basis of present and foreseeable developments, and the making of plans to realize that positioning.

- Value Chain Analysis is a strategic tool used to analyze internal firm activities. Its goal is to recognize, which activities are the most valuable (i.e. are the source of cost or differentiation advantage) to the firm and which ones could be improved to provide competitive advantage. Cost leadership can be achieved through techniques like target costing. Product differentiation is directly proportional to market movements and changing business requirements.

- Benefits of Strategic Cost Management – Strategic elements become more explicit, cost data is used to develop alternate measures to gaining sustainable competitive Advantages, clear understanding of the company's cost structure, managerial use of cost information explicitly directed to the four stages of strategic management – formulation, communication, implementation and control, overall recognition of cost relationships among the activities in the value chain.

- Porter describes the value chain as "internal processes or activities a company performs to design, produce, market, deliver and support its product." He further stated that "a firm's value chain and the way it performs individual activities are a reflection of its history, its strategy, its approach of implementing its strategy, and the underlying economics of the activities themselves."

- **Classification of Business Activities for Value Chain Analysis –**

  Primary Activities: Primary activities are directly involved in transforming inputs into outputs and delivery and after-sales support to output. They include Inbound Logistics, Operations, Outbound Logistics, Marketing & Sales and Post-Purchase Service.

Support Activities: Support Activities are the activities which support primary activities. They are handled by the organization's staff functions and include Procurement, Technology Development, Human Resource Management, Firm Infrastructure.

- **Differentiation Advantage**- It occurs when customers perceive that a business unit's product offering (defined to include all attributes relevant to the buying decision) is of higher quality, involves fewer risks and/or outperforms competing product offerings.

- **Low-Cost Advantage**- A firm enjoys a relative cost Advantages if its total costs are lower than the market average. This relative cost advantage enables a business to do one of the two things; price its product or services lower than its competitors in order to gain market share and still maintain current profitability; or match with the price of competing products or services and increase its profitability.

- **The Value Chain Approach for Assessing Competitive Advantage**-
  Internal Cost Analysis- to determine the sources of profitability and the relative cost positions of internal value-creating processes.
  Internal Differentiation Analysis- to understand the sources of differentiation (including the cost) within internal value-creating processes; and
  Vertical Linkage Analysis- to understand the relationships and associated costs among external suppliers and customers in order to maximize the value delivered to customers and to minimize cost.

- **Strategic Frameworks for Value Chain Analysis-** Value chain analysis requires a strategic framework or focus for organizing internal and external information, for analyzing information, and for summarizing findings and recommendations. Three useful strategic frameworks for value chain analysis are,

  Industry Structure Analysis, Core Competencies, and Segmentation Analysis.

- **Porter's Five Forces Model**- Under this model, the profitability of an industry or market measured by the long-term return on investment of the average firm depends largely on five factors that influence profitability. These are:
  Bargaining power of buyers; Bargaining power of suppliers; Threat of substitute products or services; Threat of new entrants; and Intensity of competition/Degree of rivalry.

- **Value Shop Model**- This approach is designed to solve customer problems rather than creating value by producing output from an input or raw materials. Value shops mobilizes resources (say: people, knowledge or money) to solve specific problems such as curing an illness or delivering a solution to a business problem.
  The model has the same support activities as Porter's Value Chain but the primary activities are described differently as Problem finding and acquisition, Problem solving, Choosing among solutions, Execution and control/evaluation.
  The management in a value shop focuses on areas like problem and opportunity assessment, resource mobilization, Project management, Solutions delivery, outcome measurement, and learning.

CHAPTER - 2

MODERN BUSINESS ENVIRONMENT

- **SUMMARY**

- **Cost of Quality** – It is the sum of the costs related to prevention and detection of defects and the costs incurred due to occurrences of defects. Cost of quality consists of the Prevention Cost, Appraisal Cost, Internal Failure Cost and External Failure Cost.

- **Total Quality Management** – TQM aims at improving the quality of organizations outputs, including goods and services, through continual improvement of internal practices.
  The plan – do -check – art (PDCA) cycle describes the activities a company needs to perform in order to incorporate continuous improvement in its operation.
  6C's –Commitment, Culture, Continuous Improvement, Co-operation, Customer Requirements and control.
- **Business Excellence Model** – The EFQM Excellence Model provides an all-round view of the organization and it can be used to determine how these different methods fit together and complement each other. Based on the needs of the organization, this model can be used with other tools of improvement to attain sustainable excellence.

- **Theory of Constraints** – The theory of constraints focuses on revenue and cost management when faced with bottlenecks. It advocates the use of three key measures – Throughput, Investments and Operating expenses. The objectives of management can be expressed as increasing throughput, minimizing investment and decreasing operating expenses.

  (a) Throughput = (Sales Revenue – Unit Level Variable Expenses)/ Time
  (b) Investment is money associated with turning materials into Throughput and do not have to be immediately expensed.
  (c) Operating expense is the money spent in turning Investment into Throughput and therefore, represents all other money that an organization spends.
  (d) Five step method of improving performance – Identify System Bottlenecks, Exploit the Constraint, Subordinate and Synchronize to the Constraint, Increase Bottleneck efficiency and Capacity, Repeat the process as and when a new constraint arises.

- **Throughput Accounting Ratio = $\frac{\text{Throughput per bottleneck minute}}{\text{Factory cost per bottleneck minute}}$**

- **Supply Chain Management** – The term supply chain can be referred to as the entire network of organizations working together to design, produce, deliver and service products.

(a) Types of Supply Chain based on forecasted demand and actual demand are push and pull supply chain.

(b) Key to Supply Chain Processes –

- Customer Relationship Management – Understanding customer needs and providing them with the best possible solution to assist in customer retention and driving sales growth.

- **Customer Service Management** – Better customer service gives higher customer retention. Customer Service is the source of customer information.

- **Demand Management Style** – Flexibility in manufacturing process to react to changing market is a must. Orders processed under JIT with minimum lot sizes have shorter cycle time and thus increases efficiency in meeting customer demands.

- **Order Fulfillment** – Timely fulfillment of customer demands.

- **Manufacturing Flow Management** – This process manages activities related to planning, scheduling, and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites, etc.

- **Supplier Relationship Management** – When selecting the key suppliers, weightage should be given to Supplier capabilities of innovation, quality, reliability and costs/price reductions and agility to reduce risk factors

- **Product Development and Commercialization** – Customers and suppliers must be integrated into the product development process in order to reduce the time to market. For the firms to have a competitive edge, as product life cycles get shorter, the appropriate products and services should be developed and successfully launched at even shorter time schedules.

- **Returns Management** – Returns management is necessary in case of both upstream and downstream supply chain flow for optimum utilization of resources and reduction in cost of repairs and renewal.

- **Customer Account Profitability** – Profitability associated with each customer. What companies fail to do is measure profit at the most meaningful and controllable level, the customer level. Understanding the underlying components of cost and addressing specific causes of poor profitability will significantly improve bottom-line performance.

- **Customer Life Time Value** - It is the net present value of the projected future cash flows from a lifetime of customer relationship.

(c) **Benefits of Supply Chain Management** – Tangible benefits such as inventory reduction, personnel reduction, productivity improvement; order management improvement, financial cycle improvement etc. Further it results in information visibility, new/ improved processes, customer responsiveness, standardization-flexibility & globalization of business performance.

- **Gain Sharing Arrangements** – Gain sharing is an approach to the review and adjustment of an existing contract, or series of contracts, where the adjustment provides benefits to both parties.

- **Outsourcing** – Outsourcing (also sometimes referred to as "contracting out") is a business practice used by companies to reduce costs or improve efficiency by shifting tasks, operations, jobs or processes to another party for a span of time.

CHAPTER - 3
LEAN SYSTEM AND INNOVATION

- **SUMMARY**

- Lean System is an organized method for waste minimization without sacrificing productivity within a manufacturing system. Lean implementation emphasizes the importance of optimizing work flow through strategic operational procedures while minimizing waste and being adaptable.

- **Just in Time** – System whose objective is to produce or to procure products or components as they are required by a customer or for use, rather than for stock. just-in-time system Pull system, which responds to demand, in contrast to a push system, in which stocks act as buffers between the different elements of the system such as purchasing, production and sales.

Features of JIT
Material – handling cost are reduced.
Labour idle time gets reduced.
JIT creates urgency for eliminating defects as quickly as possible.
The company can respond to customer demand faster.
Carefully selected suppliers capable of delivering high quality materials in a timely manner directly at the shop – floor, reducing the material receipt time.
Pre- requisites of JIT – Low variety of goods, Vendor reliability, Good communication, Demand stability, TQM, Defect free materials, Preventive maintenance.
Impact of JIT System –Wastes costs like unnecessary levels of obsolete inventory, defective products, rework, etc, overhead costs like material handling, facilities, and quality inspection costs of staff, equipment, fixed assets, facilities, and rent associated with the warehouse etc. get eliminated and When a company achieves a higher level of product quality, along with ability to deliver products on the dates required, customers may be willing to pay a premium.

Performance Measurement in JIT –

a) Machine utilization measurements can be discarded under JIT environment.
b) No piece rate tracking for each employee.
c) No direct labour efficiency tracking.
d) Set up time reduction.
e) Customer complaints should be investigated immediately.
f) Scrap generation is reduced.
g) Track of full cost of quality which comprises defect control costs, failure costs, and the cost of lost sales.
h) Highest possible degree of customer service.
i) Continuous improvement through new ideas.

Backflushing in a JIT System

(a) Back flushing requires no data entry of any kind until a finished product is completed. At that time the total amount finished is entered into the computer system, which multiplies it by all the components listed in the bill of materials for each item produced. This yields a lengthy list of components that should have been used in the production process and which are subtracted from the beginning inventory balance to arrive at the amount of inventory that should now be left on hand.

(b) Problems with back flushing- Incorrect production reporting, Incorrect scrap reporting, Impossible lot tracing, Inaccurate inventory records.

- **Kaizen Costing –**
  a) Kaizen means continual improvement. The kaizen strategy aims to involve workers from multiple functions and levels in the organization in working together to address a problem or improve a particular process.

  b) **Kaizen costing principals** – gradual improvements in the existing situation, at an acceptable cost, collective decision making and application of knowledge, no limits to the level of improvements that can be implemented, setting standards and then continually improving these standards to achieve long-term sustainable improvements, focus on eliminating waste, improving systems, and improving productivity, involves all employees and all areas of the business.

- 5 S's – It explains how a work space should be organized for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. 5 S include Sort, Set in Order, Shine, Standardise, Sustain.

- Total Productive Maintenance – Total Productive Maintenance (TPM) is a system of maintaining and improving the integrity of production and quality systems. TPM helps in keeping all equipment in top working condition so as to avoid breakdowns and delays in manufacturing processes.

  a) TPM performance is measured by Overall Equipment Effectiveness (OEE) measure which needs to quantify losses due to equipment failure, set-ups, idle time, stoppages, reduction in speed, reduction in yield, quality defects and network.

  b) Performance x Availability x Quality = OEE%
- Cellular Manufacturing – In the assembly line multiple cells are used. Each cell comprises of one or more machines which accomplish a certain task. The product moves from one cell to the next, each station completing part of the manufacturing process. U-shaped design is given to these cells because this allows for the supervisor to move less and have the ability to more readily watch over the entire process.

a) **Goals of cellular manufacturing** – move quickly, make wide variety of similar products, very less wastes.

b) **Advantages** – Flexibility in operations, changes easy to make, variety of product scaling, minor changes can be easily and quickly implemented, conducted by logic so reduces flow time, flow distance, floor space, inventory, handling, scheduling transactions, and scrap and rework, production and quality controls facilitated, improves group cohesiveness among employees.

c) **Limitations** – Decrease in production flexibility, difficulty in realignment of cells in case of decrease in demand, changes in flow may be very costly.

- **Six Sigma** – It is quality improvement technique whose objective to eliminate defects in any aspect that affects customer satisfaction. The premise of Six Sigma is that by measuring defects in a process, a company can develop ways to eliminate them and practically achieve "zero defects". The standard measure of Six Sigma is 34 errors per million.

- **Process Innovation** – Process innovation means the implementation of a new or significantly improved production or delivery method (including significant changes in techniques, equipment and/ or software).

- **Business Process Reengineering** – Business Process Reengineering (BPR) is "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed."

a) **Key components of BPR** – Fundamental rethinking of business processes, Radical redesign if we had to start the business afresh, Achieving dramatic improvements in performance measurements, Reengineering focuses on end-to-end business processes rather than on the individual activities that comprise the processes.

b) **Principles of BPR** – Organize around outcomes, not tasks, are those who need the results of a process perform the process, Integrate the processing of information into the work process that produces the information, Treat geographically dispersed resources as though they were centralized, Line parallel activities instead of integrating their results, Put the decision point where the work is performed, and build controls into the process, Capture information once and at the source.

CHAPTER - 4
COST MANAGEMENT TECHNIQUES

- **SUMMARY**

- **Cost Reduction and Cost Control** – Cost Control involves a comparison of actual with the standards or budgets, to regulate the actual costs. Cost Reduction is the achievement of real and permanent reduction in unit cost of products manufactured.

- **Scope of Cost Reduction** – Cost Reduction efforts can be put in the following areas – a) Product Design, b) Organization, c) Factory lay-out Equipment, d) Production Plan Programme and Method. It may be extended to administrative, selling and distribution methods, personnel management, purchase and material control, financial management and other services.

- **Target Costing** – A structured approach to determining the cost at which a proposed product with specified functionality and quality must be produced, to generate a desired level of profitability at its anticipated selling price.

  In Target costing, we first determine what price we think the consumer will pay for our product. We then determine how much of a profit margin we expect and subtract that from the final price. The remaining amount left is what is available as a budget to be used to create the product.

- **Advantages of Target Costing** – Proactive approach, top-to-bottom commitment to process and product innovation, helps to create a company's competitive future with market-driven management for designing and manufacturing products that meet the price required for market success, control systems to support and reinforce manufacturing strategies and to identify market opportunities that can be converted into real savings to achieve the best value rather than simply the lowest cost, proper planning, enhances employee awareness and empowerment, partnership with suppliers, Minimize non-value-added activities, lowest cost value added activities, reduced time to market.

- **Main Features of Target Costing System** – Integral part of the design and introduction of new products, target selling price determined using various sales forecasting techniques, target selling price helps in establishment of target production volumes, given the relationship between price and volume, helps in establishing cost reduction targets, fair degree of judgement is needed where the allowable cost and the target cost differ, a series of intense activities required to translate the cost challenge into reality.

- **Components of Target Costing System –**Value Analysis is a planned, scientific approach to cost reduction which reviews the material composition of a product and production design so that modifications and improvements can be made which do not reduce the value of the product to the customer or to the user.

Value Engineering is the application of value analysis to new products. Value engineering relates closely to target costing as it is cost avoidance or cost reduction before production.

The initial value engineering may not uncover all possible cost savings. Thus, Kaizen Costing is designed to repeat many of the value engineering steps for as long as a product is produced, constantly refining the process and thereby stripping out extra costs.

Further, Target Costing System is based on involving representatives of all the Value Chain such as suppliers, agents, distributors and existing after-sales service in the target costing system.
Issues dealt with during a Value Analysis/Value Engineering review

- Can we eliminate functions from the production process?
- Can we eliminate some durability or reliability?
- Can we minimize the design?
- Can we design the product better for the manufacturing process?
- Can we substitute parts?
- Can we combine steps?
- Can we take supplier's assistance?
- Is there a better way?
-

A mix of all the value engineering steps noted above must be applied to each product design to ensure that the maximum permissible cost is safely reached.

- **Problems with Target Costing** – Development process can be lengthened to a considerable extent, large amount of mandatory cost cutting can result in finger-pointing in various parts of the company, difficult to reach a consensus on the proper design, requires the development of detailed cost data, reduce the quality of products due to the use of cheap components which may be of inferior quality, requirement of a good team leader.

- **Most Useful Situations for Target Costing** – Assembly-oriented industries, diversified product lines, factory automation through use of technologies, having shorter product life cycles, implementing JIT, value engineering, etc.

- **Implementing a Target Costing System** – Create a Project Charter, Obtain a Management Sponsor, Obtain a Budget, Assign a Strong Team Manager, Enroll Full-Time Participants, Use Project Management Tools, Fullest possible support for target costing by all available means-management, money and staff. Only when all these elements are in place and concentrated on the goals at hand does a target costing program have the greatest chance for success.

- **Pareto Analysis** – Pareto Analysis is a rule that recommends focus on the most important aspects of the decision making in order to simplify the process of decision making. It is based on the 80: 20 rule where it is believed that 80% of the profits of an organization relates to 20% of the customers. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets.

- **Usefulness of Pareto Analysis** - Prioritize problems, goals, and objectives to identify root causes, define key quality improvement programs, Select key customer relations and service programs, employee relations improvement programs, and key performance improvement programs, proper allocation of physical, financial and human resources.
- Application of Pareto Analysis – Pricing of a Product, Customer Profitability Analysis, ABC Analysis- Stock Control, Application in Activity Based Costing.

- **Life Cycle Costing** – Life Cycle Costing involves identifying the costs and revenue over a product's life i.e. from inception to decline. The life cycle of a product consists of four stages viz., Introduction; Growth; Maturity; Saturation and Decline.

- **Benefits of Product Life Cycle Costing** – Results in earlier actions to generate revenue or to lower costs than otherwise might be considered, more accurate and realistic assessment of revenues and costs, promote long-term rewarding in contrast to short-term profitability rewarding, provides an overall framework for considering total incremental costs over the entire life span of a product, provides long-term picture of product line profitability, enhance the control of manufacturing costs, traces research and design and development costs etc.

- **Environmental Management Accounting [EMA]** – EMA is the process of collection and analysis of the information relating to environmental cost for internal decision making. EMA identifies and estimates the costs of environment-related activities and seeks to control these costs. The focus of EMA is not on financial costs but it also considers the environmental cost or benefit of any decisions made.

- The major areas for the application for EMA are: Product Pricing, Budgeting, Investment Appraisal, Calculating Costs and Savings of Environmental Projects, or Setting Quantified Performance Targets.

- **Environmental Costs-**

Environmental Prevention Costs–Pollution Control Equipment, Environmental Policy Formulation, etc.

Environmental Appraisal Costs – Monitoring, Testing and Inspection Costs, Reporting Costs, etc. Environmental Internal Failure Costs – Cost of Recycling or Disposing of Waste or Harmful Materials, Decommissioning Costs on Project Completion, etc. Environmental External Failure Costs- Carbon Emissions and the Adverse Impact these have on the Global Climate.

- **Identification of Environmental Costs** – Four management accounting techniques for the Identification and Allocation of Environmental Costs are – Input/Outflow Analysis, Flow Cost Accounting, Activity Based Costing and Lifecycle Costing.

Input-Output Analysis-

This technique records material inflows and balances this with outflows on the basis that, what comes in, must go out. By accounting for outputs in this way, both in terms of physical quantities and, at the end of the process, in monetary terms too, businesses are forced to focus on environmental costs.

Flow Cost Accounting-

Classic material flows are recorded as well as material losses incurred at various stages of production.

Life Cycle Costing-

Lifecycle costing considers the costs and revenues of a product over its whole life rather than one accounting period. Therefore, the full environmental cost of producing a product will be taken into account.

Activity Based Costing (ABC) –
ABC distinguishes between environment-related costs, which can be attributed to joint cost centres, and environment-driven costs, which tend to be hidden on general overheads.

- **Need to manage Environmental Costs**- A 'carbon footprint' (as defined by the Carbon Trust) measures the total greenhouse gas emissions caused directly and indirectly by a person, organization, event or product, environmental costs are becoming huge and such significant costs need to be managed, regulation is increasing worldwide at a rapid pace, with penalties for non-compliance also increasing accordingly.

- **Advantages of EMA**- Improved Revenues (Production of new products or services meeting the environmental needs or concerns of customers can lead to increased sales) and Cost Reductions (Simple improvements in processes can lead to significant costs savings).

- **Disadvantages of EMA**- Increases in Costs for legal and regulatory requirements, Costs of Failure if there is poor environmental management.

Life Cycle Characteristics

	Introduction	**Growth**	**Maturity**	**Decline**
Objectives	Create product awareness & trial	Maximize market share	Maximize profits while defending market share	Reduce expenditures & milk the brand
Sales	Low sales	Rapidly rising	Peak sales	Declining sales
Costs per Customer	High cost per customer	Average cost per customer	Low cost per customer	Low cost per customer
Profits	Negative	Rising profits	High profits	Declining profits
Customers	Innovators	Early adopters	Middle majority	Laggards
Competitors	Few	Growing number	Steady number beginning to decline	Declining number

Strategies

	Introduction	Growth	Maturity	Decline
Product	Offer basic product	Offer product extensions, service & warranty	Diversify brands and models	Phase out weak items
Price	Cost plus profit	Price to penetrate market	Price to match or beat competitors	Price cutting
Advertising	Build product awareness amongst early adopters & dealers	Build awareness & interest in mass market	Stress on brand differences and benefits	Reduce level to keep hard core loyalty
Distribution	Build selective distribution	Build Intensive distribution	Build more intensive distribution	Go selective: Phase out unprofitable outlets
Sales Promotion	Use heavy sales promotion to entice trial	Reduce to take advantage of heavy consumer demand	Increase to encourage brand switching	Reduce to minimal level

CHAPTER - 5
COST MANAGEMENT FOR SPECIFIC SECTOR

- **SUMMARY**

- Thermal Power is main source of electricity in India. Fuel sources include – coal, natural gas, neptha, etc. The various types of energy sources include hydro- electricity, solar power, wind power, nuclear power, etc.

- **Key Risks in Power Sector** – Highly Capital Intensive, Deficiency of Coal Supply.

- Electricity is generated at power plants and moves through a complex system, sometimes called the grid, of electricity substations, transformers, and power lines that connect electricity producers and consumers.

- **Features of Power Sector** – Limited number of Suppliers, Complexity in determination of tariff, stakeholders include consumers, industries, government, regulators, and investors, Continuous growing demand of electricity, Flexible Cost allocation, Distribution loss and inefficiency gaps between generation and consumption of electricity, In-disciplined consumer, Continuous network between generators, transmitters, distributors, and consumers, public sector undertakings, impact on national treasury through energy subsidies.

- **Application of Cost Management Techniques in Power Sector-** Determining prices and regulating tariffs, Developing a flexible cost allocation, Distribution loss and inefficiency gap analysis, Multi-dimensional costing calculations, Powerful analysis and reporting.

- **Value Chain Analysis** – Value creation in all the activities both inbound and outbound activities undertaken by the power company starting from electricity generation to the point of supply or distribution of the electricity supply.

- **Agricultural Sector Features** – Fragmented and unorganized industry, lack of understanding of costs, potential of working collaboratively, target costing techniques for price determination, imbalance of power across the supply chain.

- **Cost Management in Agricultural Sector** – Activity Based Costing technique is being increasingly accepted for the purpose of cost management as it is adjustable costing technique, faster and more accurate, and enables a more detailed cost analysis.

- **IT Sector Features** – Complex operating structure, difficult implementation of cost allocation methods.

CHAPTER - 6
DECISION MAKING

LEARNING OUTCOMES

After studying this chapter, you will be able to:

- **Analyse** short-term decisions
- **Analyse** product mix decisions, including circumstances where linear programming methods are needed to identify 'optimal' solutions
- **Analyse** information to assess risk and its impact on short-term decisions
- **Discuss** the nature of risk and uncertainty and the attitudes to risk by decision makers
- **Evaluate** information to support project appraisal
- **Analyse** information for use in long-term decision making (including consideration of tax, inflation and other factors)
- **Compare and Contrast** alternative approaches proposed to address business challenges or opportunities for a given entity.

- **SUMMARY**

- CVP analysis involves analyzing the interrelationships among revenues, costs, levels of activity, and profits. It helps in planning, controlling decisions and evaluating decisions.

- Conventional CVP analysis assumes volume based measures. Activity based costing provides a more accurate determination of costs because it separately identifies and traces non- unit based costs to products rather than combining them in a pool of fixed costs as volume based approach does.

- The Break-even can then be expressed as follows:

  Break-even units = [Fixed costs + (Setup cost x Number of Setups) + (Engineering Cost X Number of Engineering Hours)]/ (Price – Unit Variable Cost)

- A comparison of the ABC break-even point with the conventional break-even point reveals two important differences. First, the fixed costs differ. Some costs previously identified as being fixed may actually vary with non-unit cost drivers, in this case setups and engineering hours. Second, the numerator of the ABC break-even equation has two non-unit-variable cost terms: one for batch-related activities and one for product- sustaining activities.

- Cost-Volume-Profit analysis suffers from a limitation that it does not consider adjustments for risk and uncertainty. A possible approach by which uncertainty can be incorporated into the analysis is to apply normal distribution theory. The analysis can be changed to include fixed cost, variable cost and selling price as uncertain variables. The effect of treating these variables as uncertain will lead to an increase in the standard deviation because the variability of the variable cost, fixed cost and selling price will add to the variability of profits.

- To apply CVP analysis in service and non-profit organizations, we need to focus on measuring their output, which is different from tangible units sold by manufacturing and merchandising companies.

- **Short run decision making** – Based on relevant costs, Short run in nature, referred to as tactical decisions, choosing among alternatives, often have long run consequences, immediate or limited time frame, small scale actions that serve a larger purpose.

- For a cost to be relevant to a decision it must be
  - A future cost, i.e. related to the future.
  - A differential Cost, i.e. its level must be different for each of the alternatives under consideration.

  Accordingly, only future costs can be relevant to decisions. However, to be relevant, a cost must not only be a future cost but must also differ from one alternative to another. If a future cost is the same for more than one alternative, it has no effect on the decision. Such a cost is irrelevant cost.

- Non- Financial information which a company should focus that would turn out to be advantageous while making decisions for a company are: Quality, Employee Satisfaction, Customer Satisfaction, Corporate Social Responsibility, Environmental Factors, Intellectual Property, Intangible Assets, Competitor's Movements, Brand Name.

- Ethics are moral principles that guide the conduct of individuals. By their behavior and attitude, managers set the company culture.

- **Guideline for Ethical Conduct**: Identify an ethical decision by using personal ethical standards of honesty and fairness, Identify the consequences of the decision and its effect on others, consider obligations and responsibilities to those that will be affected by decision, make a decision that is ethical and fair to those affected by it.

- **Decision Making Model** – Define the problem, identify alternatives, eliminating unfeasible alternatives, identify costs & benefits of each alternative, examine total relevant costs, benefits of each alternative, assess non-financial factors and ethical issues, select alternative with greatest overall benefit.

- **Some Common Applications –**

  (a) **Out Sourcing Decision** – A 'make or buy' decision requires incremental analysis.
  If incremental cost savings + opportunity costs < incremental costs, reject the outsourcing, unless qualitative factors fiercely impact the decision.

  If incremental cost savings + opportunity costs > incremental costs, accept the outsourcing unless qualitative factors fiercely impact the decision.

  If incremental cost savings + opportunity costs are = incremental costs, focus primarily on qualitative factors to evaluate the decision.

  (b) **Sell or Further Process** – To decide either to sell a component/ product/ raw material as it is or alternatively process it further by incurring additional expenses usually in the case of joint products. Only the incremental costs and revenues of the further process are relevant. The joint process costs are irrelevant – they are already 'sunk' at the point of separation

  (c) **Minimum Pricing Decisions** – Relevant where there is a lot of intense competition, surplus production capacity, clearance of old inventories, getting special orders and/or improving market share of the product. The minimum price should be set at the incremental costs of manufacturing, plus opportunity costs (if any).

(d) **Keep or Drop Decisions** – The decision is based on whether or not the segment's revenue exceeds the costs directly traceable to the segment, including any direct fixed costs.

(e) **Special Order Decisions** – Whether a special priced order should be accepted or rejected. Relevant if the firm is operating below its maximum productive capacity. Price discrimination laws require that firms sell identical products at the same price to competing customers in the same market. This law does not apply to – Noncompeting customers from the same market and Potential customers in markets not ordinarily served.

(f) **Product Mix Decision** – Other things being the same the product which yields the highest contribution is best one to produce. But, if there is shortage or limited supply of certain other resources which may act as a key factor like for example, the machine hours, then the contribution is linked with such a key factor for taking a decision.

CHAPTER - 7
PRICING DECISION

- **SUMMARY**

- **Theory of Price** – The basic approach in most of the micro-economic theory (theory of the individual firm and its relation to other firms) defines the term optimum price as that price which yields the maximum profits (excess of total revenues over total costs). It also assumes that the firm takes into consideration the position of demand and cost functions and that the firm produces one product.

- **Pricing Model** – Pricing model is a mathematical model which uses economic theory of pricing.

(i) As per economic theory of pricing, Profit is Maximum at a level of output where Marginal Revenue (MR) is equal to Marginal Cost (MC). This model determines the level of production up to which production can be continued.

(ii) The Basic Price Equation, which is used to determine the Price where Profit is Maximum.
The equation is written as:

$P = a - bQ,$

Where,

P = Price,

b = Slope of the Demand curve, Calculated as $\left[b = \frac{\text{Change in Price}}{\text{Change in Quantity}} \right]$,

Q = Quantity Demanded,

a = Price at which demand is zero.

(iii) The Marginal Revenue equation is written as:
Marginal Revenue (MR) = $P = a - 2bQ$

- **Pricing under Different Market Structures –**

(i) **Perfect Competition** – Under this type of market, firm has no pricing policy of its own as the sellers are price takers (i.e. it has to accept the price determined by the market) and sell as much as they are capable of selling at the prevailing market price.

(ii) **Monopoly** – Under the monopoly, a firm is a price setter i.e. it can fix any price but here also the pricing is done taking elasticity of demand for the product into consideration. That means though the seller/ producer can fix any price but it will go for the price where demand for the product and consequent profit will be maximum.

(iii) **Monopolistic Competition** – Under monopolistic condition, consumers may buy more at a lower price than at higher price. The profit can be maximized by equating marginal revenue with marginal cost.

(iv) **Oligopoly** – The oligopolistic firm, while determining the price for its product, consider not only the demand for the product but also the reactions of the other firms in the industry to any action or decision it may take.

- **Pricing Strategies of Oligopolies** –

(i) **Predatory Pricing** – Keeping price artificially low, and often below the full cost of production.

(ii) **Limit-Pricing**– Strategy to discourage entrants, which is also called entry forestalling price.

(iii) Collusion with rivals and raise price together, but this may attract new entrants.

(iv) **Cost-Plus Pricing** – A straightforward pricing method, where a firm sets a price by calculating average production costs and then adding a fixed mark-up to achieve a desired profit level.

Non-Price Strategies – Non-price competition is the favored strategy for oligopolists because price competition can lead to destructive price wars. Strategies like improving Quality &after Sales Servicing, Spending on Advertising, Sponsorship, and Product Placement etc.

- **Pricing Policy** – Although cost is an important aspect of pricing, consumer demand and competitive environment are frequently far more significant in pricing decisions.

- Creating value for the customers is one of the important objectives of a firm. A firm makes all the efforts to create value and to achieve this it formulates its marketing strategy in that direction.

- **Price Sensitivity** – It measures the customer's behavior to the change in price of a product.
  Nine factors that contribute to price sensitivity are Unique Value Effect, Substitute Awareness Effect, Difficult Comparison Effect, Total Expenditure Effect, End- Benefit Effect, Shared Cost Effect, Sunk Investment Effect, Price Quality Effect and Inventory Effect.

- Controlled experimentation for measuring price sensitivity – In this method, customers are offered different brands at different prices and customer's responses are obtained. Then the company's brand prices are changed and customer's response at each price level is recorded. The price at which demand for the product starts declining is the level where price sensitivity begins and based on the response level, sensitivity can be measured. It depends on the nature of the product and buyer characteristics.

- **Price Customization** – Price customization is done in various ways –
  (i) Based on product line, (ii)Basedon customer's past behavior, (iii) Based on demographics and (iv) Based on time differential.

- **Pricing Methods –**
  (i) **Cost-Based Pricing Method** – estimate the cost of product & fix a margin of profit. The term 'cost' here means Full Cost at current output and wages level since these are regarded as most relevant in price determination.

  Pricing based on total costs is subjected to two limitations viz arbitrary allocation of inter-departmental overheads and estimation of normal output.

  In order to avoid these complications, Variable Costs which are considered as relevant costs are used for pricing, by adding a markup (to include fixed costs allocation also).

  (ii) **Competition-Based Pricing Method** – When a company sets its price mainly on the consideration of what its competitors are charging, its pricing policy under such a situation is called competitive pricing or competition-oriented pricing.

Going Rate Pricing – It is a competitive pricing method under which a firm tries to keep its price at the average level charged by the industry. The use of such a practice of pricing is especially useful where it is difficult to measure costs.

Sealed Bid-Pricing – Competitive pricing dominates in those situations where firms compete on the basis of bids, such as original equipment manufacturer and defense contract work.

(iii) **Value** – Based Pricing Method – to price the product on the basis of customer's perception of its value.
Objective Value or True Economic Value (TEV) –
TEV = Cost of the Next Best Alternative + Value of Performance Differential

- Strategic Pricing of New Products – A new product is analyzed into three categories for the purpose of pricing –
  (i) **Revolutionary Product** – Revolutionary product may enjoy the premium price as a reward for its innovation and taking first initiative.

  (ii) **Evolutionary Product –** The evolutionary products may be priced taking cost-benefit, competitor, and demand for the product into account.

  (iii) **Me-too Product** – The me-too products are price takers as the price is determined by the market mainly by the competitive forces.

- While preparing to enter the market with a new product, management must decide whether to adopt a skimming or penetration pricing strategy.

  (i) **Skimming Pricing** – It is a policy of high prices during the early period of a product's existence. This can be synchronized with high promotional expenditure and in the later years the prices can be gradually reduced.

  (ii) **Penetrating Pricing**–means a pricing suitable for penetrating mass market as quickly as possible through lower price offers. The company may not earn profit by resorting to this policy during the initial stage. Later on, the price may be increased as and when the demand picks up.

- Predatory Pricing (loss leading) is the practice of selling a product or service at a very low price, intending to drive competitors out of the market or create barriers to entry for potential new competitors.

- **Price Adjustment Polices –**
  (i) Distributor's Discounts – It means price deductions that systematically make the net price vary according to buyer's position in the chain of distribution.
  (ii) Quantity discounts are price reductions related to the quantities purchased.
  (iii) Cash discounts are price reductions based on promptness of payment.
  (iv) Price Discrimination – charging different prices and it takes various forms according to whether the basis is customer, product, place or time.
  (v) Geographic Pricing – Pricing policies may be established whereby the buyer pays all the freight expense, the seller bears the entire cost, or the seller and buyer share this expense. The strategy chosen can influence the geographic limits of a firm's market, locations of

its production facilities, sources of its raw materials, and its competitive strength in various geographic markets.

- **Pricing and Product Life Cycle**

  (i) **Introduction Stage** – Skimming Policy with high prices, but low profit margin due to high fixed costs. Growth Stage – Reduce price to penetrate market further. Maturity Stage – Price to match or beat competitor. Decline Stage – Cut price if not repositioning.

  (ii) **Introduction Stage** – Penetration Policy to enter the market and gain a high share quickly or to prevent competitors from entering. Maturity Stage – Retain higher prices in some market segments. Decline Stage – Some increases in prices may occur in the late decline stage.

- **Pricing of Services (Issues)** – Each service transaction is likely to have distinct pricing structure, accommodation of the intangible costs that a customer may have to bear with, pricing regulated by government or collective groups like trade associations in certain specific sectors.

- If the selling price is below the total cost but above the marginal cost the contribution will leave an under-recovery of fixed expenses. If the product is sold at marginal cost, the loss will be there to the extent of fixed expenses. If sold at a price less than the marginal cost, the loss will be greater than fixed expenses.

- In periods of recession, a firm may sell its articles at a price less than the total cost but above the marginal cost for a limited period.

- It may also be justifiable to sell the product at a price below marginal cost for a limited period provided the materials are of perishable nature, stocks are huge and market prices have fallen, reduction results in increased sales of other products having larger profit margin.

- Differential selling prices, which is above, the marginal cost but below the total cost is resorted to in order to absorb surplus capacity. This can be done in two ways either dumping of branded products in another market above marginal cost, of the firm may produce and sell a branded article, say product A, which covers the entire fixed overheads and use the surplus capacity to produce another product B, which may be sold at a price above its marginal cost.

CHAPTER - 8
PERFORMANCE MEASUREMENT AND EVALUATION

- **SUMMARY**

- Responsibility Accounting is the collection, summarization, and reporting of financial information where individual managers are held accountable for certain costs, revenue or assets of the firm.

- **Linking CSFs to KPIs and Corporate Strategy –**
  - **Critical Success factors** – Critical Success Factors are elements tied to the strategy of business and they represent objectives that businesses are trying to achieve, as a corporation, as a department, or as a business unit.

  - Key Performance Indicators are a consequence of critical success factors – they represent the 'how'. Having outlined 'what' businesses want to achieve, a company must subsequently define sets of measures and associated targets in such a way that achieving those targets will translate into successful completion of a CSF.

  - Each critical success factor should have a KPI associated with it. A single Critical Factor can also have more than one KPI, if need be. The objectives, CSFs, and KPIs together represent a chain of links that together deliver a company's strategic goal, by breaking down that strategic vision in to a set of quantifiable targets.

- Pure financial performance measures are Return on Investment, Residual Income, Residual Income, Economic Value Added and Shareholder Value Added.

- Triple Bottom Line (TBL) – TBL expands traditional accountancy reporting systems, looking at social and environmental performance, rather than simply financial performance.
- Non – Financial Performance Measures like quality, reliability, flexibility, etc. are also required to be measured to access the success of any department or organization apart from costs, revenues and profits.

- **Integration of Financial and Non- Financial Measures –**
  - Balanced Scorecard – Balanced Score Card is a set of financial and non-financial measures relating to a company's critical success factors. It is an approach which provides information to management to assist in strategic policy formulation and achievement. It emphasizes the need to provide the user with a set of information which addresses all relevant areas of performance in an objective and unbiased manner. As a management tool, it helps companies to assess overall performance, improve operational processes and enable management to develop better plans for improvements. It offers managers a balanced view of their organization upon which they can base real change.
    Advantages of Balanced Scorecard – Management's focus on strategy and vision, single management report, comprehensive picture of business operations, easy communication of organizational goals, provides strategic feedback and learning.

    Major Components of Balanced scorecard – Customer Perspective i.e how do customers see us, Internal Perspective i.e. what must we excel at, Innovation and Learning Perspective i.e. can we continue to improve and create value, Financial Perspective i.e. how do we look to our shareholders.

Process of Creating a Balanced Scorecard – Identify Vision i.e. where and organization is going, Identify Strategies i.e. how an organization is planning to go there, Identify CSFs and Perspectives i.e. what we have to do well in each perspective, Identify Measures which will ensure that everything is going in the expected way, Evaluate i.e. ensuring what we are measuring is right, Create Action Plan, Follow up and Manage i.e. what should be the structure of the reports and who should have the authority to look at it.

- **Performance Pyramid** – The Performance Pyramid is also known as Strategic Measurement and Reporting Technique. They view businesses as performance pyramids. The attractiveness of this framework is that it links the business strategy with day-to-day operations.
-

  Benefits of Performance Pyramid – Develops agreed measures, clarifies the objectives of the organization, greater understanding of process, helps in comparison between departments, promotes accountability to stakeholders, helps in setting targets, measures the effectiveness of the organization.

  Problems Performance Pyramid – Tunnel Vision i.e. undue focus on measurements, Sub-Optimization i.e. focus on one measurement, Myopia i.e. focus on short term measures, Misrepresentation of Data, Misinterpretation of Data, Ossification i.e. representing out dated data.

- **Building Block Model** – Fitzgerald and Moon have developed an approach to performance measurement in business services that is based on the three building blocks of dimensions, standards and rewards
  Dimensions are the goals, i.e. the CSFs for the business and suitable measures must be developed to measure each performance dimension and include competitiveness, Financial Performance, Quality of Service, Flexibility, Resource Utilisation, Innovation. CSFs could be relative market share, in case of Competitiveness, turnover growth in case of Financial Performance, product reliability in case of Quality of Service, etc. Standards Set, i.e. the KPIs, should have ownership, availability, awareness and Rewards should be motivating base on clarity of standards set and linked to controllable factors.
  Advantages of building block model – All the key determinants of success are measured, Targets are set in such a way that staff are engaged and motivated.

- **Performance Prism** – The Performance Prism is an approach to performance management which aims to effectively meet the needs and requirements of all stakeholders. This is in contrast with the performance pyramid which tends to concentrate on customers and shareholders and is also in contrast with value based management, which prioritizes the needs of shareholders.

  Features – Starts with stakeholders rather than strategies of the organization, recognizes that stakeholder satisfaction is the key to organization success.
  Steps of Performance Prism – Focus on who are the stakeholders and what are the needs and wants of the stakeholders, plan the strategies required to fulfill the wants and needs of the stakeholders, identify the processes required for satisfying the above strategies, identify the capabilities for operating and enhancing the process and take into account what contribution does the management needs from its stakeholders.

Benefits of Performance Prism – Allows organizations to develop strategies, business processes and measures geared to the specific needs of all important stakeholder groups, enable an organization to more directly address the risks and opportunities in its business environment, facilitate the communication and implementation of strategy relative to each stakeholder.

- **Disadvantages to Non-financial Performance Measures** – Multiple measures create conflict in the short term can also be time consuming, unlike accounting measures, non-financial data are measured in many ways, there is no common denominator.

- **Benchmarking Schemes** – Benchmarking is a technique for continuous improvement in performance. It involves comparing a firm's products, services or activities against other best performing organizations, either internal or external to the firm. The objective is to find out how the product, service or activity can be improved and ensure that the improvements are implemented.

  - **Types of Benchmarking** – Competitive Benchmarking involves the comparison of competitors products, processes and business results with own, Strategic Benchmarking by examining the long term strategies, Global Benchmarking through which distinction in international culture, business processes and trade practices across companies are bridged and their ramification for business process improvement are understood and utilized, Process Benchmarking involves the comparison of an organization critical business processes and operations against best practice organization that performs similar work or deliver similar services, Functional Benchmarking look to benchmark with partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes, Internal Benchmarking involves seeking partners from within the same organization, for example, from business units located in different areas, External Benchmarking involves seeking help of outside organization that are known to be best in class.
    In intra group benchmarking the groups of companies in the same industry agree that similar units within the cooperating companies will pool data on their process. The processes are benchmarked against each other at or operational level. 'Improvement task forces' are established to identify and transfer best practice to all members of the group. In inter-industry benchmarking a non-competing business with similar process is identified and asked to participate in a benchmarking exercise.

  - **Goals of Benchmarking** – Performance improvements and returns based on efficiency, cost savings and new revenues, effort to shift the culture of a company to be more customer oriented and results focused.

  - **Process of Benchmarking** – Planning, Collection of Data and Information, Analysing the Findings, Recommendations, Monitoring and Reviewing.

  - **Pre-requisites for Successful Benchmarking** – Senior management support, clearly defined objectives, appropriate scope of work, availability of sufficient resources, clarity of organization picture among the benchmarking teams, right skills and competencies of the benchmarking team, reasons for benchmarking are informed to all the stakeholders.

  - **Difficulties in implementation of Benchmarking** – Time Consuming, delegation of authority not possible, resistance from employees, costly, non-identification of necessary improvements may result in wastage of time and resources.

- **Benchmarking Code of Conduct** – Principle of Legality, Principles of Exchange, Principle of Confidentiality, Principle of Use, Principle of First Party Contact, Principle of Third Party Contact and Principle of Preparation.

- **Performance Measurement in NFPs-**
  - Value for money is interpreted as providing an economic, efficient and effective service (3 E's).
  - Multiple and diverse objectives – NFP organizations are unlikely to have an objective of maximization of shareholder wealth. Instead they are seeking to satisfy the particular needs of their members or sections of society, which they have been set up to benefit.

CHAPTER - 9
DIVISIONAL TRANSFER PRICING

SUMMARY

- Divisions could be departments within a company or group companies of a parent organization.

- Inter divisional transfers could involve transfer or goods and services, payments for intangibles like intellectual property for usage of brand, patent in the form of royalty fee or license fee, or inter-divisional loans at specified interest rates.

- Valuation of inter-divisional transfer of goods and services in the management accounting system is called Transfer Pricing

- **Utility of Transfer Pricing** – Performance Evaluation (profit accountable divisions), Employee Engagement and Compensation (motivates employees in improving divisional profits), Resource Allocation (optimization of resources and critical like make or buy), Taxation and Profit Remittance (impact earnings of multi-national companies affecting the over-all tax burden for the company as well as the profits that may need to be repatriated to its head office).

- **Fair Value** – Transfer pricing is often associated with the term "arms-length" price. This implies that the price for inter-divisional transfer has to be fair and competent enough as if dealing with a third party. Fair value from a business perspective depends on how each division finds the price compatible with its profit targets.

- **Transfer Pricing Methods and Transfer Pricing Decision in Different Scenarios-**

  i) Market Price – Transfer price is based on market price of goods or services similar to the ones transferred internally within divisions. The transfer can be recorded at the external market price, adjusted for any costs that can be saved by internal transfer e.g. selling and distribution expenses, packaging cost.

  Advantages– Unbiased, less-ambiguous, more objective divisional performances.
  Disadvantages – Fluctuating market prices may not be suitable, non-availability of market prices in case of intermediate products, manipulative pricing strategies.
  Behavioral Consequences – The supplying division will have to compete with the outside vendor that may lead to cost competitive operations. The purchasing division has more alternatives to choose from. However, the purchasing division must ensure that quality of the goods is also comparative.
  Shared Profit Relative to Cost Method – Cost incurred by each division indicates the value it has added to the product cost that is finally used to arrive at the selling price of the final product. The primary advantage of this method is that it allocates profit based on the proportion of value addition to the product in terms of cost.

ii) **Cost Price Method** – Cost based pricing models are based on the internal cost records of the company. They may be used when the management wants to benchmark performance with the cost targets set within the company or may be an alternative when market prices for the goods cannot be determined due to lack of comparable market.
Advantages – Benchmarking to budget, easy availability of information.
Disadvantages – Multiple ways of interpreting costs like variable cost, standard cost, full cost, find little incentive to lower the cost of production by adopting cost efficient methods since its passed on to the receiving department.

a) **Variable Cost** – Transfer price is recorded marginal cost required to produce one additional unit.
Advantages – useful when the supplying division has excess capacity, while the purchasing division enjoys the benefit of a lower price compared to the market.
Disadvantages – No fixed cost or mark-up is allowed to be charged to the purchasing division.
Behavioral Consequences – Profit evaluation is centralized at the entity level. Therefore, the supplying division may have little incentive to find measures for making cost efficient. Non-recovery of fixed costs would de-motivate the supplying division.

b) **Standard Cost** – Transfer price is recorded at a predetermined cost, which is based on budgets and certain assumptions regarding factors of productions like capacity utilization, labour hours etc.
Advantages– Performance evaluation against budgeted costs, variance analysis.
Disadvantages – Profit performance measurement is centralized.
Behavioral Consequences – Budgeted costs are generally based on historic records. Therefore, little incentive exists to make costs more efficient to improve profitability.

c) **Full Cost** – Transfer price is based on full product cost. It includes cost of production plus a share of other costs of the value chain like selling and distribution, general administrative expense, research and development etc.
Advantages – Supplying division will not show a loss.
Disadvantages – Since mark-up cannot be charged on internal transfers, the supplying division does not record any profit on these sales

d) Full cost plus Mark-up – Transfer price is based on full product cost plus a mark-up. Mark-up could be a percentage of cost or of capital employed.
Advantages – Full incentive to supplying division.
Disadvantages – The purchasing division may bear a share of the selling expenses although none was incurred for such internal sales.
Behavioral Consequences – The problem with using full cost as a basis for transfer pricing is that it distorts the company's cost structure while making decisions.

iii) **Bargained or Negotiated Pricing** – Managers of the purchasing and supplying divisions independently negotiate and arrive at a mutually agreeable transfer price.
Advantages – Autonomy to decide whether to purchase (or sell) from its sister unit or source then from (or to) external market.
Disadvantages – Requires sufficient external information to be available regarding the external market price, terms of trade etc. Internal cost information must also be shared in order to negotiate a reasonable price.
Behavoral Consequences – Provides for autonomy in decision making at the same time promotes goal congruence through efficient performance of the concerned divisions

- **Divisional Conflict –**

Dual Pricing – The supplying division records transfer price by including a normal profit margin thereby showing reasonable revenue. The purchasing division records transfer price at marginal cost thereby recording purchases at minimum cost.

Advantages – Allows better evaluation of each division's performance, improves co-operation between divisions, promoting goal congruence and reduction of sub-optimization of resources.
Disadvantages – Complicate the records, artificial profits can be used only for internal evaluations

Two Part Pricing System –
Transfer Price
= Marginal Cost of Production + a Lump-Sum Charge (two part to pricing).
Lump-Sum charge enables the recovery of some portion of the fixed cost of the supplying division. Therefore, while the supplying division can show better profitability, the purchasing division can purchase the goods a lower rate compared to the market price.

- **Transfer Pricing and Goal Congruence –**

a) Minimum Transfer Price (determined by the supplying division)
= Additional Outlay Cost per unit + Opportunity Cost per unit.
Additional Outlay Cost
= Marginal Cost + Any Additional Incidental Costs incurred by the supplying division
e.g. storage, transportation etc.

b) Maximum Transfer Price (determined by the purchasing division)
= Lower of Net Marginal Revenue and the External Buy-in Price
Net Marginal Revenue
= Marginal Revenue (i.e. Selling Price P.U) – Marginal Cost to Purchasing Division

- Transfer Pricing Different Capacity Levels –

When the supplying division has excess capacity, the range for transfer pricing would be
a) Minimum Transfer Price
= Marginal Cost P.U
b) Maximum Transfer Price
= Lower of Net Marginal Revenue and the External Buy-in Price

When the supplying division operates at full capacity, the range for transfer pricing would be
a) Minimum Transfer Price
= Marginal Cost P.U + Opportunity Cost P.U
b) Maximum Transfer Price
= Lower of Net Marginal Revenue and the External Buy-in Price

- **Transfer Pricing Decision** – Different Demand Levels: while catering to different levels of demand, any change in cost should also be accounted for to calculate transfer pricing. The general rule for minimum and maximum range of transfer price applies here too.
- International Transfer Pricing – Taxation, profit repatriation and transfer prices are critical considerations to the senior management of the multi-national companies. Multi-national organizations try to maximize profits by using transfer pricing as a tool to reduce the tax impact on earnings. Where, the supplying division is in a country with higher tax rate, the transfer price will be set lower in-order to reflect higher earnings (resulting from lower purchase cost) in the purchasing division, which has a lower tax rate. Likewise, supply from lower tax rate countries may be priced higher, in order to reflect higher earnings for that unit, thereby reducing the tax impact.

CHAPTER -10
STRATEGIC ANALYSIS OF OPERATING INCOME

SUMMARY

- **Strategic Profitability Analysis** – Operating Profit of a firm is affected by various components which are responsible for changes in the revenue and costs. Majorly there are three components
-

(i) Growth Component measures the change in the quantity of output sold. The growth component of the change in the operating income measures the increase/decrease in revenue and in costs due to selling more/ less quantity units from the previous period.

(ii) Price Recovery Component of change in operating income measures the changes in the revenue and costs solely due to changes in prices.

(iii) Productivity Component measures the change in the operating income due to changes in the product mix and/ or yield of inputs as compared with the last year. This component uses current year's prices of input to measure the changes in costs only.

- **Profitability Analysis Through Activity Based Costing –**

(i) Activity Based Costing (ABC) which has become an important aspect of manufacturing or service organizations can be defined as a methodology that means the cost and performance of activities, resources and cost objects.

(ii) It acts as an aid to management evaluation and decision making.

(iii) In service sector, direct costs are generally low and overheads tend not to be volume related or capable of being easily attributed to product/service/ customer being supplied. ABC helps cost to identify more easily and managed more effectively.

(iv) The resource consumption by different products, customers or segments of the business is more accurately measured, activity-based profitability analysis is likely to provide more useful information to management.

- **Direct Product Profitability (DPP)** – DPP "used primarily within the retail sector, DPP involves the attribution of both the purchase price and other indirect costs (for example distribution, warehousing and retailing) to each product line. Thus, a net profit, as opposed to a gross profit, can be identified for each product. The cost attribution process utilizes a variety of measures (for example warehousing space an d transport time) to reflect the resource consumption of individual products."

- **Benefits of DPP** – Cost analys is, pricing decisions, management of stores and warehouse space, rationalization of product ranges.

- **Direct Product Profitability Statement** – Indirect costs, for DPP may be analysed into basic cost categories as follows:

(i) Overhead Cost: This is incurred through an activity that is not directly linked to a particular product.

(ii) Volume Related Cost: The cost is incurred in relation to the space occupied by products. This includes storage and transport costs.

(iii) Product Batch Cost: This cost is often a time-based cost. If product items (that is a number of identical products which are handled together as a batch) are stocked on shelves a labour time cost is incurred.

(iv) Inventory Financing Costs: This is the cost of typing up money in stock and is the cost of the product multiplied by interest rate per day or per week.
Direct Product Profit can be derived as shown below:

Sales	XX
Less: Cost of Goods Sold	XX
Gross Margin	**XX**
Less: Direct Product Costs (Warehouse, Transportation, Store etc.)	XX
Direct Product Profit	**XX**

- **Customer Profitability Analysis** – In many organizations, it is just as important to cost customers as it is to cost products. Different customers or groups of customers differ in their profitability. Not all customers cost the same to serve even if they require the same products. Some customers may be located a long way from the factory and transport may cost more.

- **Benefits of Customer Profitability Analysis** – Identification of profitable customers/ non-profitable customers, provides a basis for constructive dialogue between buyer and seller to improve margins.

- **Activity Based Costing in Advanced Manufacturing Environment** – In advanced manufacturing environment, where support function overheads constitute a large share of total costs, ABC provides more realistic and accurate product costing.

- **Activity Based Cost Management (ABM)** – A discipline that focuses on the management of activities as the route to improving the value received by the customer and the profit achieved by providing this value. This discipline includes cost driver analysis, activity analysis, and performance measurement.

- **Value-Added Activities (VA)** – The VA activities are those activities which are indispensable in order to complete the process. The customers are usually willing to pay (in some way) for these services. Eg. polishing furniture by a manufacturer dealing in furniture is a value-added activity.

- **Non-Value-Added Activities (NVA) –** The NVA activity represents work that is not valued by the external or internal customer. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. Non-Value Added activities create waste, result in delay of some sort, add costs to the products or services and for which the customer is not willing to pay. Moving materials and machine set up for a production run are examples of NVA activities.

- **Difference between ABC and ABM** – The ABC refers to the technique for determining the cost of activities and the output that those activities produce. ABM refers to the management philosophy that focuses on the planning, execution and measurement of activities as the key to competitive advantage.

- **Activity Based Budgeting (ABB)** – Activity Based Budgeting is a process of planning and controlling the expected activities for the organization to derive a cost-effective budget that meets forecast workload and agreed strategic goals.

CHAPTER - 11
BUDGETARY CONTROL

SUMMARY

- Budgetary Control is "Systematic control of an organization's operations through establishment of standards and targets regarding income and expenditure, and a continuous monitoring and adjustment of performance against them."

- Characteristics those are common to businesses with effective budgetary control include clarity of marginal responsibility, challenging and achievable business targets, establishment of data collection, analysis and reporting techniques, accountability of individual managers, shorter time periods, timely variance reports, timely actions to prevent variances.

- Feedback and Feed-forward Control – Feedback Control refers to 'Measurement of differences between planned outputs and actual outputs achieved, and the modification of subsequent action and/or plans to achieve future required results. Feedback control is an integral part of budgetary control and standard costing systems.'

    - A feedback system would simply compare the actual historical results with the budgeted results.

    - Feed-forward Control is defined as the 'forecasting of differences between actual and planned outcomes and the implementation of actions before the event, to avoid such differences.'

- **Behavioral aspects of Budgetary Controls** – Many of the conflicts arise due to the human nature of a budgetary control system. Managers do not always follow organizational goals, they do not always think long term, they may be wary of moving away from the plan etc. This provides a conflict between many of the goals of a budgetary control system which needs to be considered at a strategic level when implementing such a system.

- **Budget Slack** – Budget affects the attitudes and behavior of managers and used to motivate the managers. Unrealistic demanding targets tend to affect manager's performance adversely. Allowing managers to set their own targets will introduce slack targets. This helps satisfy one of the purposes of budgeting in that it can aid motivation. But it can have a detrimental impact on the other purposes such as distorting the evaluation of actual performance if managers incorporate 'slack' into the budget in order to make it easier to achieve.
  Budget level that motivates the best level of performance may not be achievable. In contrast, the budget that is expected to be achieved motivates a lower level of performance as managers no longer aspire to meet the budget target.

- **Participation in Budget Setting Process** – Budgets can be prepared centrally and subordinates have little influence on the target setting. This called top down budget or imposed style approach. The benefit of top down approach is that it can be produced quickly and involve less management time than other options. However, there are significant risk of inaccurate budgets being set that are also not acceptable to the subordinate managers. An alternative to top-down approach is for the subordinate managers to participate in the preparation of their own budgets and then these budgets to be reviewed by senior management. This is called bottom up approach (sometimes referred participative approach). Participation must be used selectively; but if it is used in the right circumstances, it has an enormous potential for encouraging the commitment to

organizational goals, improving attitudes towards budgeting system, and increasing subsequent performance.

- **Circumstances Where T op-Down Budget Setting is Preferable** – Personality traits of the participation limiting the benefits of participation, lack of managerial motivation at individual level, highly programmable processes in the system, homogeneous units produced in stable environment.

- **Limitations of Traditional Budgets** – time consuming, costly, constrain flexibility and responsiveness, barrier to changes, contradictory, no focus on strategies, concentration on cost reduction and not value creation, developed too frequently, based on guess work, raises departmental barriers, discourage knowledge sharing, demotivate employees.

- **Beyond Budgeting** – An idea that companies need to move beyond budgeting because of the inherent flaws in budgeting especially when used to set contracts. It is argued that a range of techniques, such as rolling forecasts and market related targets, can take the place of traditional budgeting.

- **Characteristics of Beyond Budgeting** – The rolling budgets may incorporate KPIs based on the balanced scorecard which is linked to the organization strategy, benchmarking with external players may help better evaluation, focus on improving future results rather than dwelling on post poor performances, allows operational managers to react to changing environment, encourages culture for innovation, flexible and do not rely on obsolete figures.

- **Suitability for Beyond Budgeting** – Rapidly changing business targets, organization using TQM/ continuous improvement management techniques, organizations under business process reengineering.

- **Benefits of Beyond Budgeting model** – Internal rivalry among managers is reduced as focus shifts on competitors, motivating employees, proper delegation of authority of operational managers, customer-oriented teams, fast and open information across organization.

- **Steps essential for implementing Beyond Budgeting** – Define the Case for Change and Provide an Outline Vision; Be Prepared to Convince the Board; Get Started; Design and Implement New Processes; Train and Educate People; Rethink the Role of Finance; Change Behavior-New Processes, Not Management Orders; Evaluate the Benefits and Consolidate the Gains.

CHAPTER - 12
STANDARD COSTING

SUMMARY

- **Planning & Operational Variances** – A Planning Variance simply compares a revised standard to the original standard.
  An Operational Variance simply compares the actual results against the revised amount. Operating variances would be calculated after the planning variances have been established and are thus a realistic way of assessing performance.
  Controllable Variances are those variances which arise due to inefficiency of a cost centre/department. Uncontrollable Variances are those variances which arise due to factors beyond the control of the management or concerned department of the organization.

- **Variance Analysis in Activity Based Costing** – Variance analysis can be applied to activity costs (such as setup costs) to gain insight into why actual activity costs differ from activity costs in the static budget or in the flexible budget. Interpreting cost variances for different activates requires understanding whether the costs are output unit-level, batch level, product sustaining, or facility sustaining costs.

- **Variance Analysis in Advanced Manufacturing Environment/ High Technology Firms** – In the high-technology environment, large part of manufacturing process is computerized. Many costs that once were largely variable have become fixed, most becoming committed fixed cost. Some high technology manufacturing organizations have found that the two largest variable costs involve materials and power to operate machines. In these companies, the emphasis of variance analysis is placed on direct materials and variable manufacturing overhead. For these firms labour variances may no longer be meaningful because direct labour is a committed cost, not a cost expected to vary with output.

- **Impact of Learning Curve** – Learning curve is a geometrical progression, which reveals that there is steadily decreasing cost for the accomplishment of a given repetitive operation, as the identical operation is increasingly repeated. The amount of decrease will be less and less with each successive unit produced. Automated manufacturing is unlikely to have much variation or to display a regular learning curve. In less-automated processes, however, where learning curves do occur, it is important to take the resulting decline in labour hours and costs into account in setting standards, determining prices, planning production, or setting up work schedules.

- **Investigation of Variances** – An investigation should only be undertaken if the benefits expected from the investigation exceeds the costs of searching for and correcting the source of the variance. Interpretation may suggest possible cause of variances but investigation must arrive at definite conclusions about the cause of the variance so that action to correct the variance can be effective.
  Relevant Cost Approach to Variance Analysis is used if inputs are limited. Failure to use limited inputs properly leads not only to increased acquisition cost but also to a lost contribution. Therefore, it is necessary to consider the lost contribution in variance analysis. When this approach is used, price or expenditure variances are not affected.

- **Standard Costing in Service Sector** - Use of activity based costing can provide a constructive basis for variance analysis of overheads in service sector organizations.

- **McDonaldization** – Breaking tasks into smallest possible units and rationalizing them to find the single most efficient method for completing each task. All other tasks are discarded. Standards can be more accurately set and assessed. Helpful in services like hairdressing, dentistry, or opticians' services.

- **Behavioral Issues of Standard Costing** – Focus on short term, sub-optimal behavior of the employees like incorporation of budget slacks. These issues can be overcome by involving employees in budget preparation and taking a long- term view of organization strategy incorporating various qualitative and quantitative measures.

- **Possible Interdependence between Variances** – Using cheaper materials will result in a favorable material price variance, but using the cheaper material in production might increase the wastage rate (adverse material usage) and cause a fall in labour productivity (adverse labour and variable overhead efficiency). A more expensive mix of materials (adverse mix variance) might result in higher output yields (favorable yield variance).
  Using more experienced labour to do the work will result in an adverse labour rate variance, but productivity might be higher as a result (favorablelabour and variable overhead efficiency).
  Standard costing may be inappropriate in the modern production environment because: products may not be standardized, get outdated quickly, automation of production, emphasis on continuous improvement, delay in problem solving.

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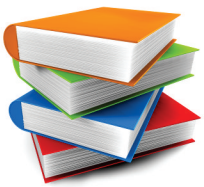

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