Vol 1.

NIMEET PITI
COST • TUTORIALS

Advanced Management Accounting

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Decision Making using Cost Concepts and CVP Analysis.

CVP Analysis.

CVP analysis stands for Cost Volume Profit analysis. The tool is also called a, what if analysis tool as it studies the impact or cost (either fixed or variable) and volumes, on profit. Some of the very common answers it helps to arrive are:

What if the volume falls?

What if the volume increases, should we incur further fixed costs and reduce the variable costs?

What is the level where the organisation won't at least make a loss? And so on.

The answer to all the questions is the impact on profit.

Let's try and understand the above with an example.

Let's say, you have qualified as a Chartered Accountant and now you set up your own practice. It is obvious, a practicing CA cannot really work in isolation in his office with his laptop. He has to visit to the respective taxation authorities, clients etc. Being a new start up, you want to keep your travelling costs low. You think of purchasing a motorcycle to travel around.

A motorcycle would cost you, let's say around INR 200,000/-. The life of the motorcycle is around 100,000 kms. The per km cost of running the motorcycle including gen, repairs and maintenance would cost you, INR 4/-, as against the taxi fare of Rs. 14/-.

In the above scenario, the decision to be taken is whether to buy the motorcycle or not. There are two kinds of cost which are involved in taking such a decision.

The first cost, is the cost of buying the motorcycle, which is 200,000/- Now, once the asset is purchased, there is no cost increase or decrease, no matter how may kms you clock.

On the other hand, you have the per km running cost, which is 4/-. This cost would keep increasing as the kms increase.

The kms here are known as level of activity. As the level of activity would increase, so does the running cost. Any cost, which increases in DIRECT PROPORTION. To the level of activity, is known as variable costs.

The purchase cost of the bike would not increase or decrease, no matter the kms clocked. The costs which do not respond to the level of activity, is known as FIXED COSTS.

In the current situation, there is a saving in running costs (difference between taxi per km cost and motorcycle per km cost) of Rs.10/-. However, to save that Rs 10/- a one-time cost of 200,000 has to be paid.

When will the cost of the bike be recovered? The savings of Rs. 10 per km would be directed towards repayment of the initial outlay and at 20,000 kms, the savings would be 20,000kms* 10 which is 200,000. exactly the purchase price of the motorcycle. This point, the point at which the fixed cost is fully recovered is known as the break- even point.

Question 8

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:

Particulars	(Amount in Rs.)
Sales	500000
Direct Materials	250000
Direct Labour	100000
Variable Overheads	40000
Capital Employed	400000

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.

Explanation: The question provides the current cost structure along with profit detail 12..5% of capital employed). However, the question doesn't specify the fixed costs. However, that can be calculated.

Also, the question further states that, a reduction of 2% in ALL ELEMENTS of cost. This would mean, reduction in fixed costs as well. Thus, fixed costs have to be calculated first.

Let's say, if the proposal couldn't achieve a 23% return on the capital employed, but achieved less than that, let's say 18%. In my opinion, it should still be chosen since it is more than the current return of 12.5%.

However, the question specifically states that the proposal to earn 23% return and thus, it is considered that as a minimum hurdle.

Solution:

Note.

Calculation of current fixed costs

Sales	5,00,000
Less: Variable Cost	(3,90,000)
(Direct Material + Direct Labour + Variable Overhead)	
Contribution	1,10,000
(–) Fixed Cost	**60,000**
Profit (12.5% of 400,000)	50,000

As per the new sales manager,

Particulars	Amount
Sales (current + 10% volume + 4% rise in Selling Price) (500,000 + 10% × 1.04)	572,000
Variable Cost (Current + 10% volume – 2% Reduction) [(390,000 + 10%) – 2%]	420,420
Contribution	151,580
(–) Fixed Cost (current – 2%)	58,800
Profit	92,780
Return = $\frac{92,780}{400,000} \times 100 = 23.195\%$	

Since, the proposal brings in 28% return, it should be adopted.

Question 34

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

	(Rs.)
Original cost estimate	1,75,200
Costs incurred so far	1,48,500
Cost 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)	Rs. 1,050
Direct Wages Dept.: A	15 men days
Dept.: B	25 men days
Variable Overheads	25% of Direct Wages in each Dept.
Delivery Costs	Rs. 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 Rs. 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 Rs. 120 per man day.

(3) Department B is extremely busy. Its direct wages rate is Rs. 100 per man day and it is currently yielding a contribution of Rs. 3.20 per rupee of direct wages.

(4) Supervisory overtime payable for the modification is Rs. 1,050.

(5) The cost of the control device that the new customer does not require is Rs. 13,500. If it is taken out, it can be used in another job in place of a different mechanism. The latter mechanism has otherwise to be bought for Rs. 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 Rs. 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 realise Rs. 11,400 as scrap. The drawings, which are included as part for the job can be sold for Rs. 1,500.

Required:

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

Solution:

WN 1:Calculation of point (5)

Savings in cost if this control device is used elsewhere		10,500
(–) Removal Cost:		
One-man day in Dept. A.	120	
(+) 25% Variable Overhead on above	30	(150)
Net savings from removal of control device		10,350

WN 2:Calculation of point (6).

The statement reads “If the conversion is not carried out”, meaning any revenue would be considered as opportunity cost, since, the benefit would be foregone due to the acceptance of this order.

Saving in material foregone	12,000
(–) Removal Cost:	
Two men days in Dept A = 120× 2 =240	
(+) 25% Variable Overhead on above = 25% of 240 =60	300
Net savings foregone (A)	11,700
Scrap Value of other materials foregone (Given) (B)	11,400
Opportunity costs of drawings (Given) (C)	1,500
Total opportunity costs (A) + (B) + (C)	24,600

Relevant cost for the new order:

Original cost to be incurred	29,700
Direct Material (Opportunity Cost)	2,250
Department A labour:	
15 men days – 15× 120 = 1,800	
(+) Variable Overhead – 25% of 1800 = 450	2,250
Department B labour	
25 men days – 25 × 100 = 2,500	
(+) Variable Overhead 25% of 2500 = 625	
(+) Opportunity Cost [3.2 × 2500] (refer note) = 8,000	11,125
Delivery Costs	1,350
Supervisory overtime	1,050
Savings in cost (Point 5 WN 1)	(10,350)
Opp. Cost (Point 6 WN2)	24,600
Net relevant cost/min cost to be quoted	**61,975**

→ **Opportunity Cost of Department B Labour**

Dept B is earning a contribution of Rs. 320 for every rupee of Direct labour Cost. This would mean that for every Rs. 100 spent on Direct labour an opportunity cost of Rs. 320 (3.20 × 100) would be chargeable to the job.

In the above case labour cost is Rs. 2500 & therefore opportunity Cost chargeable would be
2,500 × 3.2 = 8000

Question 63

A company manufactures a single product in its factory utilising 60% of its capacity. The selling price and cost details are given below:

Particulars	**Rs.**
Sales (6,000 units)	5,40,000
Direct materials	96,000
Direct labour	1,20,000
Direct expenses	18,000
Fixed overheads:	
Factory	2,00,000
Administration	21,000
Selling and distribution	25,000

An analysis of fixed factory and selling & distribution overheads reveals that 12.5% of factory overheads and 20% of selling and distribution overheads are variable with production and sales. Administration overheads are wholly fixed.

Since existing product could not achieve budgeted level for two consecutive years, the company decides to introduce a new product with marginal investment but largely using present plant and machinery.

The cost estimates of the new products are as follows:

Cost elements:	**Rs. per unit**
Direct materials	16.00
Direct labour	15.00
Direct expenses	1.50
Variable factory overheads	2.00
Variable selling and distribution overheads	1.50

It is expected that 2,000 units of the new products can be sold at a price of Rs. 60 per unit. The fixed factory overheads are expected to increase by 10% while fixed selling and distribution expenses will go up by Rs. 12,500 annually. Administration overheads remain unchanged. However, there will be an increase of working capital to the extent of Rs. 75,000, which would take the total project cost to Rs. 8.75 lakhs.

The company considers that 20% pre-tax and interest return on investment is the minimum acceptable to justify and new investment.

Required:

(1) Should the new product be introduced?

(2) Give the data above and making any assumptions that you consider appropriate, are there any further observations or recommendation you wish to make?

Explanation: As soon as you might have read that the firm is working at 60% capacity and is manufacturing, 6,000 units, you might have assumed that the total capacity of the firm is 10,000 units. This statement, however, is true, only on one condition i.e. the firm being a single product manufacturing firm. Capacities are generally expressed in hours and not units.

Consider this. You have a capacity of 10,000 Hrs. Currently, you were manufacturing a product which took an hour. So, the capacity, is then of 10,000 units, Now, if at all you start manufacturing a product which only takes half an hour, your capacity will be of 20,000 units. But has the capacity actually doubled? No. It hasn't changed as such. The only thing happened has the units can now be manufactured 2x because they take only 0.5 x time. **Thus, as a thumb rule for questions henceforth, always keep that in mind, capacities are always and will always be expressed in Hours first.** If at all there are no details as to the hours and only units are provided, then you can consider products as a measure to express capacities, otherwise, never do that.

Solution:

Calculation of Contribution per unit of the existing & new product

Particulars	**Existing**
Sales	5,40,000
(–) Variable Cost:	
Direct Material	96,000
Direct Labour	120,000
Direct Expenses	18,000
Variable Fixed Overhead [2,00,000× 12.5%]	25,000
Variable S & D [25,000×20%]	5,000
Contribution	276,000
(–) Fixed costs	
Factory [200,000 – 25,000]	175,000
Administration	21,000
Selling [25,000– 5,000]	20,000
Profit	**60,000**

Current return on Capital Employed = $\frac{60,000}{875,000 - 75,000} = 7.5\%$

Cost structure of the new product: -

SP	60
(–) Variable Cost	
Direct Material	16

Direct Labour	15
Direct Expenses	1.5
Variable Factory Overhead	2.0
Variable S & D Overhead	1.5
Contribution per unit	**24**
(x) no. of units	2,000
Total Contribution	**48,000**
(–) Fixed Cost **(Only relevant)**	
Factory Overhead [200,000 – 25,000] 10%	17,500
Administration	—
Selling	12,500
Profit	**18,000**

Return on new product = $\frac{18,000}{75,000} = 24\%$

Total return of both products = $\frac{60,000 + 18,000}{8,00,000 + 75,000} = 8.9\%$

Question 69

A Co. Ltd. manufactures several different styles of jewellery cases. Management estimates that during the third quarter, the company will be operating at 80 percent of the normal capacity. Because the company desires a higher utilisation of plant capacity, the company will consider a special order.

The company has received special order inquiries from two companies. The first order is from JCP Co. Ltd. which would like to market a jewellery case similar to one of A Co. Ltd.'s jewellery cases. JCP jewellery case would be marketed under JCP's own label. JCP Co. Ltd. has offered A Co. Ltd. Rs. 57.50 per jewellery case for 20,000 cases to be shipped by the last date of the quarter. The cost data for A Co. Ltd. jewellery case that would be similar to the specifications of JCP special order are as follows:

Particulars	**Rs.**
Regular selling price per unit	90
Cost per unit	
Raw Materials	25
Direct Labour 0.5 hour @ Rs. 60	30
Overhead 9.25 machine hour @ Rs. 40	10
Total Cost	**65**

According to the specifications provide by JCP Co. the special-order case requires less expensive raw materials. Consequently, the raw materials will only cost Rs. 22.50 per case, Management has estimated that the remaining costs, labour time and machine time will be the same as for A Co. Ltd. jewellery Case.

The second special order was submitted by K Co. Ltd. for 7,500 jewellery cases at Rs. 75 per case. These jewellery cases, like the JCP cases, would be marketed under K label and have to be shipped by the last date of the quarter. However, the K Jewellery case is different from any jewellery case in the A. Co Ltd. line. The estimated per unit cost of this case are as follows.

Particulars	**Rs.**
Raw Materials	32.50
Direct Labour 0.5 hour @ Rs. 60	30.00
Overhead 0.5 machine hour @ Rs. 40	20
Total Costs	82.50

In addition, A Co. Ltd. will incur Rs. 15,000 in additional setup costs and will have to purchase a Rs. 25,000 special devices to manufacture these cases, these devices will be discarded once the special order is completed.

The A Co. Ltd.'s manufacturing capabilities are limited to the total machine hours available. The plant capacity under normal operations is 90,000 machine hours per year or 7,500 machine hours per month. The budgeted fixed overhead for the current year amounts to Rs. 21,60,000. All manufacturing overhead costs are applied to production on the basis of machine hours at Rs.40 per hour.

A Co. Ltd. will have the entire quarter to work on the special orders. Management does not expect any repeat sales to be generated from either special order. Company practice precludes from subcontracting any portion of an order, when special orders are not expected to generate repeat sales.

Required:

Should A Co. Ltd. accept either special order? Justify your answer and show the calculations.

Explanation: The overheads are charged at Rs. 40/- hour. However, it is not mentioned whether these are fixed overheads or variable overheads. This is important to know, because, if the overheads are variable, they are certainly relevant and will have an impact on contributions and PV ratios. Also, if the overheads are fixed and specific to a particular order, then they might also be relevant. So, to iron out that, we need to have a break up of overheads as fixed and variable.

Whenever, the question used JUST THE TERM OVERHEADS, they refer to both fixed and variable together. If at all the question uses the term overheads, the first thing you need to do is to bifurcate them. The question will always hint you towards the bifurcation. Be careful in picking up the figures. Your first working note in such cases, should be the bifurcation, since unless the variable overheads are not known. The contribution won't arrive anyways.

Solution:

WN-1

Hours available for the quarter: -	
Hours available for the year	90,000 hours
Hours available for the quarter	22,500 hours
Capacity Utilized 80%	18,000 hours
Hours available	4,500 hours

WN-2

Segregation of Fixed & Variable Overheads:

Total Fixed Overheads	21,60,000
Total Hours per year	90,000 hours
∴ Fixed overheads per hour (21,60,000/90,000)	Rs. 24/hour
Total Overheads recovery rate	Rs. 40/hour
∴ Balance, will be variable overheads recovery rate	Rs. 16/hour

Max units that can be manufactured.

Particulars	**Order from JCP Co. Ltd.**	**Order from K. Ltd. Co.**
Hours required per box	0.25 hours	0.5 hours
Hours, available	4,500	4,500
Units that can be manufactured	18,000 units	9,000 units
	(4500/0.25hours)	(4,500/0.5 hours)
Order size	20,000 units	7,500 units
∴ Maximum units that can be manufactured	18,000 units	7,500 unit

Cost sheet for the two orders.

Particulars	**JCP Co. Ltd.**	**K. Co. Ltd.**
Selling Price	57.50	75
(–) Variable Cost		
Raw materials	22.50	32.50
Direct Labour	30.00	30.00
Variable overhead	4.00	8.00
Contribution	1.00	4.5
(x) no of units	18,000	7500 units
Total contribution	18,000	33,750
(–) Additional Fixed Cost	–	40,000
Net Gain	18,000	(6250)

If an order of 18,000 units can be processed, then the order from JCP Co. Ltd. can be processed or else both the order should be rejected.

Total cost @ present i.e. 4000 units [4000×34]	136,000
Total cost @ proposed i.e. 6000 units [6000× 31]	186,000
Incremental Cost of 2000 units	50,000
Incremental revenue [2000 units × 28]	56,000
This, net revenue	6,000

Since, the net revenue is positive, the offer should be taken.

Question 72

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 (Rs.)	40	75	85
Less : Direct Materials per unit (Rs.)	10	14	18
Direct Wages per unit @ Rs. 2 per hour	8	12	10
Variable Overhead per unit (Rs.)	8	9	10
Fixed Overhead per unit (Rs.)	16	18	20
Profit / Loss	(2)	22	27

After the finalisation of the above manufacturing schedule, it is observed that presently only 80% capacity being utilised by these 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 utilisation 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:

	(Rs.)
Selling Price	60
Direct Material	28
Direct Wages @ Rs. 3 per hour	12
Variable Overheads	6
Fixed Cost (Total)	1,05,500

(c) Product A, Band 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 maximise its profit?

Solution:

Statement showing capacities &contribution per unit

	A	B	C
Wages per unit	8	12	10
(÷) Wages per hour	2	2	2
∴ hours per unit	4	6	5
(x) no. of units	10,000	25,000	20,000
Total hours	40,000	150,000	100,000
This is 80% capacity		290,000 hrs	
$\therefore$ 100% capacity = $\frac{290,000 \times 100}{80} = 362,500\,\text{hrs}$			
∴ Spare hrs (362,500 – 290,000) =72,500 hours			

Statement showing contribution per unit& total Fixed costs for each product

	A	**B**	**C**
Selling Price	40	75	85
(–) Direct Material	10	14	18
(–) Direct Wages	8	12	10
(–) Variable Overhead	8	9	10
Contribution per unit	14	40	47

Fixed Cost per unit	16	18	20
(×) no. of units	10,000	25,000	20,000
Total Fixed Cost	160,000	450,000	400,000

(i) Profitability under existing situation.

	A	**B**	**C**	**Total**
Sales units	10,000	25,000	20,000	
(x) Contribution per unit	14	40	47	
Total contribution	140,000	10,00,000	940,000	2080,000
(–)Fixed Cost	160,000	450,000	400,000	10,10,000
Profit/loss	(20,000)	550,000	540,000	10,70,000

(ii) (a) Discontinue A & use released capacity for either B or C or both.

Released capacity -40,000 hrs. $\frac{\text{Produce only B} \rightarrow \text{units possible} \rightarrow 6666 \text{ units}}{\text{Produce only C} \rightarrow \text{units possible} \rightarrow 8000 \text{ units}}$

Share equally $< \begin{matrix} 3333 \text{ units of A} \\ 4000 \text{ units of B} \end{matrix}$

It is assumed that the changes are applicable to all units and not just incremental units

	B	**C**
Current contribution per unit	40	47
(–) Increase in Material Cost	1.4	0.9
	[14×10%]	[18×5%]
(–) Decrease in Selling Price	1.5	4.25
	[75×2%]	[85×5%]
Revised contribution	37.1	41.85
(÷) No of hours	6	5
Contribution per/hour	6.18	8.37

∴ Manufacture C since the contribution p/hr is higher for product C

Profitability, if A's capacity is used by C.

Sales volume [20,000 (current) +18,000 (additional)]	28,000 units
(x) Contribution per unit	41.85
Total contribution	11,71,800
(–) Fixed costs	4,00,000
	7,71,800

(+) Profit of B	550,000
Total Profit	1321800

Proposal (b)

Capacity released + idle =40,000 hours+72,500 hours = 112500 hours

Hours required per unit of D = 12/3 = 4 hours

Possible production = 112500/4 = 28,125 units

Calculation of Contribution per unit of D

Selling Price		60
(–) Direct Material	28	
(–)Direct Wages	12	
(–) Variable Overhead	6	46
Contribution		14 per unit
(x) no. of units		28,125 units
Total contribution		393,750
(–) Fixed Cost		105,500
		288,250
(+) Profit of 'B'		550,000
(+) Profit of 'C'		540,000
Total Profit		13,78,250

Proposal (c) : Hire out idle capacity

Profit per hour = (10,70,000/290,000 hours)	3.69
(x) idle hours	72,500 hours
Revenue	267,500
(+) Existing profit	1070,000
Total Profit	13,37,500

Summary

Existing	Proposal A	Proposal B	Proposal C
10,70,000	**13,21,800**	**13,78,250**	**13,37,500**

Question 85

ABC Ltd. manufactures three prototype toy furniture products – chairs, benches and tables. The budgeted unit cost and resource requirements of each item is detailed below.

Particulars	**Chair (Rs.)**	**Bench (Rs.)**	**Table (Rs.)**
Timber cost	5.00	15.00	10.00
Direct labour cost	4.00	10.00	8.00
Variable overhead cost	3.00	7.50	6.00
Fixed overhead cost	4.50	11.25	9.00
Total Cost	**16.50**	**43.75**	**33.00**
Budgeted volumes per annum	4,000	2,000	1,500

These volumes are believed to equal the market demand for these products. The fixed overhead costs are attributed to three products on the basis of direct labour hours.

The labour rate is Rs 4.00 per hour

The cost of the timber is Rs 2.00 per square metre.

The products are made from a specialist timber. A memo from the purchasing manager advises you that because of a problem with the supplier, it is to be assumed that this specialist timber is limited in supply to 20,000 square metres per annum.

The sales manager has already accepted an order for 500 chairs, 100 benches and 150 tables which if not supplied would incur a financial penalty of Rs 2,000. These quantities are included in the market demand estimates above.

The selling prices of the three products are:

Product	**Rs**
Chair	20.00
Bench	50.00
Table	40.00

Required:

Determine the optimum production plan and state the net profit that this should yield per annum.

Solution:

(a) Calculation of Total Fixed Overheads, Contribution per unit & Total Timber requirement

Particulars	**Chair**	**Bench**	**Table**	
Fixed Overhead cost per unit	4.5	11.25	9.00	
(x) volumes	4000	2000	1500	
Fixed Overhead	18,000	22,500	13,500	
Total Fixed Overhead				**54,000**

Particulars	**Chair**	**Bench**	**Table**
Selling Price	20	50	40
(–) Variable Cost:			
Timber Cost	5	15	10
Direct labour	4	10	8
Variable overhead	3	7.5	6
Contribution	**8**	**17.5**	**16**

Timber requirement

	Chair	**Bench**	**Bench**
Timber required per unit [Timber cost ÷ 2]	2.5 sq. mt. [5/2]	7.5 sq. mt. [15/2]	5 sq. mt. [10/2]
(x) Production	4,000	2,000	1,500
Total timber required	10,000	15,000	7,500
	32,500 sq. mtr.		
Total Timber available	20,000 sq. mtr.		

Ranking:	**Chair**	**Bench**	**Table**
Contribution	8	17.5	16
(÷) Timber required	2.5 sq.mt.	7.5 sq. mt.	5 sq. mt.
Contribution per sq. mt.	3.2	2.33	3.20
Ranking	I	II	I

Allocation:

Timber available	**Allotted to**	**Balance**
20,000 sq. mt.	4000 chairs	10,000 sq. mt.

	[4,000 × 2.5 = 10,000 sq. mt.]	
10,000 sq. mt.	1,500 tables [1,500 × 5 sq. mt. = 7,500 sq. mt.]	2,500 sq. mt.
2,500 sq. mt.	Balance to manufacture benches [2,500/7.5 sq. mt. = 333 benches]	2.5 sq. mt.

Profit

Particulars	**Chairs**	**Benches**	**Tables**	
Units produced	4000	333	1500	
(x) Contribution per unit	8	17.5	16	
Total Contribution	32,000	58,275	24,000	
				61827.5
(–) Fixed Cost				54,000
Profit				**7827.5**

Question 89

A manufacturer of industrial pump buys 30,000 components annually from a supplier @ 300 per set. Purchase Department has received request from vendor for an upward revision of price per set of components by 5% from the next financial year. Production manager is in favour of manufacturing the 40,000 components in the factory itself so that the same may be used to match its enhanced capacity of manufacturing pumps. He has submitted the following cost estimates.

	For 40,000 units
Direct Material	Rs 80.00 lakh
Direct wages	Rs 30.00 lakh
Factory overheads	Rs 12.00 lakh

The Manager has proposed for procurement of required machines the cost estimate for which Rs 20 lakh and life of the same is 10 years. Additional Maintenance cost per annum will be Rs 1.00 lakhs which is not included in variable factory overheads. Loan arrangement with the bank of Rs 25.00 lakhs against additional working capital requirement @ 12% per annum has been finalized. On critical analysis, it has been seen that 30% of the factory overheads included in the cost of component are fixed in nature.

You are required to place your views.

Solution:

Cost to manufacture 40,000 components: -

(Rs In Lakhs)

Direct material	80
Direct wages	30
Factory Overhead (Only variable i.e. 70% of 12)	8.4
Additional Dep. (20 lakhs /10 year)	2
Additional Maintenance	1
Interest on loan (25 lakhs × 12%)	3
Total Cost	**124.4**

∴ Cost per unit 124.4 lakhs /40,000 units	Rs 311
Cost to buy (300 + 5% increase)	Rs 315

Thus, there is a saving of Rs 4 per unit resulting in total savings of 40,000 × 4 = Rs 160,000. Therefore, component should be manufactured.

Question 90

A manufacturer of household Pressure Cooker buys 20,000 components annually from a supplier @ Rs 45. Production manager has given a proposal of manufacturing the component in the own factory, the detailed cost estimates are given a below:

	For 20,000 units	**Per unit (Rs.)**
Direct Material	Rs 4.00 lakh	20.00
Direct wages	Rs 3.50 lakh	17.50
Factory overheads (60% Variable)	Rs 1.75 lakh	8.75
Total Cost	**Rs 9.25 lakh**	**46.25**

Moreover, production manager argument is that in-house facilities will provide better flexibility to enhance the production to the extent of 25,000 units of Pressure cooker. It has been indicated that for enhancing the production the banker of the company has in principle agreed to arrange additional working capital requirement of Rs 20.00 lakhs at a cost of 12% annum. However, marketing department has indicated that price of Pressure cooker may require reduction in price by at least 4% to take care of additional sale. Existing per unit sales price of Pressure Cooker Rs 1,300 and Contribution is Rs 250.

As the production cost is more than the procurement price from the market, management of the company seek your views as Management Accountant on Make or Buy decision.

Solution:

Relevant Cost to manufacture the component

Direct Material	20
Direct wages	17.5
Factory Overhead (Variable only – 8.75 ×.6)	5.25
Cost to manufacture	**42.75**

Manufacturing would bring reduction in cost by Rs 2.25 per unit (45-42.75)

If 25,000 cookers are to be sold:

Existing contribution	250
(+) Reduction in Variable Cost of component	2.25
(–) Decrease in Selling Price (1,300 × 4%)	(52)
Revised Contribution	**200.25**
(x) no. of units	25,000 units
Total Contribution	**50,06,250**
(–) Working capital interest (20,00,000 × 12%)	240,000
Net Contribution	**47,66,250**

Original Contribution = 250 per unit × 20,000 units = 50,00,000

Since, there is a decline in contribution, the project should not be carried forward.

Question 92

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 Rs 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	Rs 75,000
Direct labour	Rs 65,000
Variable overhead	Rs 55,000
Fixed overhead:	
Factory supervision	Rs 35,000
Other fixed cost	Rs 65,000
Total production costs	Rs 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 indifferent between buying and producing the blades. If the 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 Rs 45,000 per year. How would this affect the make or buy decision?

Explanation:

The company in question i.e. X ltd manufactures many products along with some kind of blades for their motors. An outside vendor is willing to sell those blades to us at a flat rate of Rs 25 per blade. Now, X Ltd has given us their cost structure for 10,000 blades.

Now, the cost structure is made up of variable costs and fixed costs. Now, the supervisor costs, even though fixed in nature, is still relevant for decision making, as this cost will not be incurred if we discontinue.

i.e. Continue operations = Hire the supervisor

Discontinue operations = Do no hire the supervisor.

Thus, the cost even though fixed, changes between alternatives and thus relevant to decision in hand.

Also, a close attention should be towards the assumptions made in the question.

Assumption 1: The equipment utilized to produce the blades has no alternative use and no market value: -

It means that machine will not generate any contribution by producing something else or no salvage value. If there were any of it, it would have been reduced the cost of buying!

Assumption 2: The space occupied by blade production will remain idle if the company purchases rather than makes the blades: –

This means that the space cannot be rented out and no rental income can be earned. If there was any rental income, it would have reduced the cost of buying!

Assumption 3: Factory supervision costs reflect the salary of a production supervisor who would be dismissed from the firm if blade production ceased. This means that the salary of the supervisor can be saved if production is not taking place. This means, that the salary, even though fixed, is relevant for decision making.

Solution:

Calculate of cost of production (WN1)

(i)	Direct Material	75,000
	Direct Labour	65,000
	Variable Overhead	55,000
	Factory Supervisor	35,000
	Total Cost	**230,000**
	(÷) no of blades	10,000
	Cost per blade	**Rs 23**

The vendor is offering the blades at a cost of Rs 25. Thus, X ltd. should continue production as loss form purchasing is Rs 2 per blade.

Variable cost without supervisor cost = $\left(230,000 - \frac{35,000}{10,000}\right) = 19.5$

(ii) Indifference point between buying & manufacturing

Saving in variable cost 25– 19.5 = Rs. 5.5 per unit

Indifference Point (35,000 ÷ 5.5) = 6,364 blades

(iii) The lease rent can either be added as opportunity cost to cost of manufacture or can be reduced from cost of buying as savings.

We will add to cost of manufacture as opportunity cost.

Cost to manufacture	23
(+) Opportunity Cost (45,000/10,000)	4.5
	27.5

It is now viable to buy the product as the cost to manufacture in house is higher by Rs 2.5 per blade

Question 97

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 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 details related with non-contracted units of Gurgaon unit.

(Amount in Rs)

Particulars	**A-1**	**B-2**	**C-3**	**D-4**
Selling Price per unit	360	285	290	210
Direct Labour @ Rs 45 per hour	112.5	67.5	135	67.5
Direct Material M-1 @ Rs 50 per kg.	50	100	—	75
Direct Material M-2 @ Rs 30 per litre.	90	45	60	—
Variable Overhead (varies with labour hours)	12.5	7.5	15	7.5
Variable Overhead (varies with machine hours)	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 Rs 200.000 per unit. One unit of F-1 requires one unit of material Z.

Material Z can also be manufactured at Gurgaon unit but for the 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 6,50,00 kg. of M-1 and 6,00,000 litres 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 resources and make decision accordingly.

(iii) Calculate the purchase price of material Z at which your decision in (i) can be sustained.

Explanation:

Aditya Ltd. has two plants, one in Gurgaon and the other one in Faridabad. Different products are manufactured at both the plants. Aditya Ltd. has got into a contract to sell 10,000 units A1, B2, C3, D4 (all of which are manufactured in Gurgaon) and these units have to be delivered without fail.

One of the products that are made in Faridabad, requires a raw material Z, which can either be sourced from market @ Rs. 200 per unit or can be manufactured at Gurgaon. However, Gurgaon has constraints in their raw materials. However, it is pertinent to note that short term decision making can solve situations with one constraint. If there is more than one constraint, the solution will be arrived using Linear Programming. So, we will have to identify that one material which is actually the constraint.

One important area that I would like to bring to your attention is the calculation of variable overheads which varies with labour hours. Now the key term is that it varies with labour HOURS and not labour COST. Even though, it will not make a difference, it is always a good habit to follow the question to the letter. Thus, the nexus has to be drawn with labour hours. For example, Direct labour cost is Rs 112.5 paid at the rate of Rs. 45 per hour, which means labour hours are 2.5 hours. For 2.5 hours, variable overheads are Rs 12.5, which means, variable overheads are Rs 5 per hours. The same relation can be drawn for other products as well.

Part 1 of the question is asking whether material Z, which is raw material from product manufactured in Faridabad, should be manufactured in Gurgaon or should be purchased from the market. You will have to understand that there is a shortage of material in Gurgaon. So, if material Z is manufactured, some of the products will not be manufactured, meaning, there will be contribution foregone. This would mean that material Z will have variable cost + opportunity cost. Now, if that is lesser than the purchase price, it is worthwhile to manufacture or else, it should be purchased from the market.

One should also bear in mind that Aditya Ltd. has already contracted for sale of 10,000 units. Those units have to be manufactured no matter what. So, for deciding the sale units for the outside market, resources for those 10,000 units should be kept aside and then, the balance should be utilized.

Part 2 of the question is asking for a basic production plan that will be carried out at the Gurgaon plant.

Part 3 of the question is asking for that minimum market rate of product Z., where manufacturing it would be feasible. For example, if the manufacturing cost along with the opportunity cost works out to Rs 300 per unit, it would mean that if product Z, is not sold at the outside market for a minimum of Rs 300, it is just not worthwhile for it to be manufactured. The question is asking for that rate (in out example which is Rs 300)

Solution:

Calculation of requirement of material M_1 & M_2.

Particulars	**A_1**	**B_2**	**C_3**	**D_4**
Material requirement M_1 (Material Cost/50)	1 kg.	2 kg.	—	1.5 kg.
Material required M_2 per unit (Material Cost/30)	3 litres	1.5 litres	2 litres	—

Particulars	**A_1**	**B_2**	**C_3**	**D_4**	**Total**
Total M_1 required					
For contracted sale	10,000 kg.	20,000 kg.	—	15,000 kg.	45,000 kg.
Non-contracted Sale	90,000 kg. (90,000 × 1)	190,000 kg. (95,000 × 2)	—	112,500 kg. (75,000 × 1)	392,500 kg.
					437,500 kgs.

Total requirement of M_2

Particulars	**A_1**	**B_2**	**C_3**	**D_4**	**Total**
For contracted sale	30,000 litres	15,000 litres	2000 litres	–	65,000 litres
Non-contracted sale	2,70,000 litres (90,000×3)	142500 litres (95,000 ×1.5)	16000 litres (80,000 ×2)	–	572,500 litres
					637,500 litres

M_1 is in supply, but M_2 is not in supply. Thus, optimization should be done as per M_2 being the constraint.

Optimization plan.

Particulars	**A_1**	**B_2**	**C_3**	**D_4**
Contribution (Sales-Variable Cost)	86 (360–274)	53 (285–232)	71 (290–219)	45 (210-165)
(÷) Units of M_2 required	3	1.5	2	–

Contribution per litre of M_2	**28.67**	**35.33**	**35.5**	
Ranks	**III**	**II**	**I**	

Litres Available	**Issued for**	**Balance**
600,000 litres	10,000 units A_1, B_2 C_3, D_4 65,000 litres (Refer WN)	535,000 litres
535,000 litres	80,000 units of C_3 160,000 litres	375,000 litres
375,000 litres	95,000 units of B_2 142,500 litres	232,500 litres
232,500 litres	Balance units of A_1 232,500/3 = 77,500 units	-

(i) If product Z is to be manufactured & since M_2 is in short supply. A_1 unit will have to be sacrificed so as to Manufacture Z. Opportunity cost of 28.67 Litre will be charged to product Z.

Manufacturing cost of Z.	**(Rs.)**
Direct labour (2 hours × 45)	90
Direct Material [2.54 litres × (30+28.67)]	146.68
Variable Overhead (2 hours × 5) *	10
Variable Overhead (3 hours × 3)	9
	255.68

Thus, it is better to purchase, than to manufacture

(ii) If the market quotes a minimum of Rs. 255.68 unit of Material Z. it is only then worthwhile to manufacture or else it is better to buy the product.

* refer question analyses.

Question 105

Apex Limited manufactures 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 (Rs / 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. Inventory 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 Cost (Rs)	
	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 opportunity cost of meeting P's demand fully?

Explanation:

The term opportunity cost here would mean the amount that should be totally recovered from the units of product P not manufactured, i.e. 20,000 units.

The additional fixed costs for units above 200,000 for product P is 520,000/- Also, since production of P will be taken up, we will have to sacrifice the contribution that will be made from 70 batches of Q, which is 70*120= Rs 84,000/-

Therefore,

Total amount to be recovered	
(additional Fixed costs + Opportunity Costs)	604,000/-
Less : Contribution that will be generated from production of 20,000 units of P	(200,000/-)

(20,000 ×10)	
Opportunity Cost	404,000

The question here means that WHAT WAS THE MINIMUM AMOUT TO BE RECOVERED IF PRODUCTION OF 20,000 UNITS OF PRODUCT P WAS TO BE MANUFACTURED. Thus, it would be the total amount it NEEDS to be recovered towards the ADDITIONAL FIXED COSTS AND THE CONTRIBUTION that would be lost if production of product P was taken up.

Solution: (1) Calculation of contribution per machine hour.

	P	**Q**
Contribution per batch of 100 units	1000	1200
	(10×100)	(12×100)
(÷) no. of hours	15	25
Contribution per hour.	66.67/-	48/-
Rank	I	II
Demand (batches)	220,000 units	175,000 units
	100	100
	2,200 batches	1,750 batches

Produce P as much as possible and balance allocate to Q.

Hours for 2200 batches of P	— 2200 ×15	33,000 hours
Balance hours for Q	$\frac{75,000 - 33,000}{25 \text{hrs.}}$	1,680 batches

Statement showing incremental cost

	P	Q
First 100,000 units	600,000	550,000
Next 100,000 units	750,000	670,000
Next 100,000 units	520,000	330,000

For units above 200,000 units of P, i.e. 20,000 units contribution would be 20,000 × 10 i.e. 200,000 but an additional fixed cost of 520,000 would have to be incurred. Thus, these 20,000 units or 200 batches would not be manufactured. However, time saved on these 200 batches i.e. 200 × 15 = 3,000 hours would be used to manufacture Q, 3000/25, 120 batches of
Q. But the demand for Q remains to 1750 batches. Therefore only 70 more batches (1750 – 1680) would be manufactured. Thus, ideal production profit will be as follow 2000 batches of P & (1680 + 70) = 1750 batches of Q.

<u>Profit Calculation</u>		20,00,000
Contribution from P (2000 × 1000)		
Contribution from Q (1750 ×1200)		21,00,000
Total Contribution		41,00,000

(–) Fixed Costs		
Product P	1350,000	
Product Q	1220,000	24,70,000
Profit		15,30,000

Transfer Pricing

Consider this, the TATA Group is one of the biggest conglomerate of the world, having a piece of every industry, be it, automobiles, technology, hospitality, FMCG and so on. Or let's just say, they have direct or indirect connections in every industry except Tobacco and Alcohol.

Now, let's say, the Hospitality division of TATA, i.e. the Taj Group of Hotels wants to serve green tea in their hotels which is manufactured by Tetley, which is also owned by the TATA Group.

The procurement manager of Taj can simply order the green tea from the market and pay what generally the market pays for that green tea, OR can call up the sales team of Tetley
and ask for a quotation. He can bargain with Tetley, on probably these few points:

1. We are sister concerns and I do deserve some benefit
2. Selling to me means, you don't have to pay commission to anyone, so at least give me that amount as discount.
3. Selling to me means, you don't have to pack it the way you do it for retail customers, just give me a bulk packing, save on your packing costs and give me that amount as discount.

So, if you see, a transfer between two known entities, can be done at a reduced price, since there are costs which can be reduced and eliminated. In this case, what price needs to be set, is the agenda of this particular study.

There are two parties to this pricing decision:

1. Tetley: who is the transferor of the goods
2. Taj Group: who is the transferee of the goods.

The price that will be set between the two parties, is called the Transfer Price. The transfer price is generally set keeping the transferor in focus, i.e. the transferor looks in and checks what is the best price that it can offer.

Now, understand this, Tetley is a separate entity and it is Tetley's responsibility to generate its own profits. Thus, when the departments, companies are SEPARATE RESPONSIBILITY CENTRES OR PROFIT CENTRES, in no case, Tetley will sell at a loss.

The basic, line of thinking is dependent on the following: -

The **minimum transfer price** that would be charged is the extra cost incurred to manufacture the product which is the **variable cost.**

However, the manufacturing capacities also have to be kept in mind. Only if there is spare capacity available with the transferor, the minimum transfer price, will be the variable cost.

Question 6

Hardware Ltd. manufactures computer hardware products in different divisions which operate as profit centers. 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 Rs 20 per unit from the present price of Rs 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 Rs 70 per unit. A similar component is being produced by the Components Division of Hardware Ltd. and sold outside at a price of Rs 100 per unit. Components Division can make this component for the Printer Division with a small modification in the specification, which would mean areduction in the Direct Material cost for the Components Division by Rs 1.5 per unit. Further, theComponent 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 Rs 50 per unit of thecomponent.

Component Division has the capacity to produce 75,000 units, of which only 64,000 units can be absorbed by the outside market.

The current budgeted income statement for Components Division is based on a volume of 64,000 units considering all of it as sold outside.

	Printer Division (Rs in '000)	**Component Division (Rs in '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 Rs 20 per unit even if it is not able to procure the components from the Component Division at Rs 50 perunit?

(ii) Without prejudice to your answer to part (i) above, assume that Printer Division needs 17,400 units and that, either 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 Rs 50 perunit?

(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 Rs50?

Solution:

(i) Should Printed Division reduce price by Rs20/unit even if it procures component from market?

Computation of Profitability of Printer Division on reduction of selling price	
Particulars	**Amount**
Selling Price	400-20 = 380
Less: Component Cost	1050/15 = (70)
Less: Other DM/DL/VOH	1680/15 = (112)
Less: Variable Marketing Costs	270/15 = (18)
Contribution(per unit)	180
Contribution (total)	180*(15000+2400) = 31,32,000
Fixed Costs (all)	480000+855000 = (13,35,000)
PROFIT	**17,97,000**

Since the profit is increasing by Rs1,32,000 (1797000-1665000), the Printer Division should reduce its selling price, irrespective of the fact that it procures the component from Component Division or open market.

(ii)Should Component division be willing to supply all 17,400 units at Rs50/unit to Printer Division?

Computation of Net Contribution on transfer of 17400 units	
Particulars	**Amount**
Transfer Price	50
Less: Variable Production Cost {(1920/64)-1.5}	(28.5)
Contribution	21.5
Total Contribution from 17400 units	374100
Less: Opportunity Cost (Note 1)	409600
Net Contribution	(35500)

Therefore, if Component division transfers all 17400 units to Printer division at a transfer price of Rs50/unit, the contribution of Component division will **reduce by Rs35,500**

[**Note 1:** Since there is an excess capacity of 11000 units (75000-64000), opportunity cost will be calculated only for 17400-11000 = 6400 units.

Calculation of Opportunity Cost (not selling 6400 units in the market)	
Particulars	**Amount**
Selling Price	100
Less: Variable Production Cost (1920/64)	(30)
Less: Variable Marketing Cost (384/6)	(6)
Contribution	64
Opportunity Cost (6400units*Rs64/unit)	**409600**

(iii) **Is it beneficial for Hardware Ltd, as a whole, if Components Division supplies all components to Printer Division at Rs50/unit?**

The component produced at the Components Division can be sold at two stages: -

- Sold directly from Components Division at contribution of Rs64/unit, OR
- Transferred to Printers division and sold from there as part of Finished Goods

Analysis of benefit to Hardware Ltd if Component Division transfers 17400units to Printers Division			
Particulars	**Printers Division**	**Component Division (transfer)**	**Component Division (sold in market)**
Selling Price	380	50	100
Less: Variable Costs	180	28.5	36
Contribution	200	21.5	64
Units sold	17400	0	64000
Total Contribution	34,80,000		40,96,000

a) Contribution on Transfer of Component = Contribution earned by Printers Division + Contribution earned by Component Division
= Rs34,80,000 + Rs.37,41,000 (from answer ii) = Rs7, 221 ,000

b) Contribution on Sale from Component Division = Rs4, 096, 000

c) Incremental Contribution on transfer to Hardware Ltd = Rs3, 125, 000

Therefore, it will be in the best interest of Hardware Ltd if Component Division sells the units to Printers Division @ Rs50/unit.

Question 12

A Company is organized into two divisions. Division X produces a component, which is used by division Y in making of a final product. The final product is sold for Rs.540 each. Division X has capacity to produce 2,500 units and division Y can purchase the entire production. The variable cost of division X in manufacturing each component is Rs.256.50.

Division X informed that due to installation of new machines, its depreciation cost had gone up and hence wanted to increase the price of component to be supplied to division Y to Rs.297, however division Y can buy the component from outside the market at Rs.270 each. The variable cost of division Y in manufacturing the final product by using the component is Rs.202.50 (excluding

component cost).
Present the statement indicating the position of each Division and the company as whole taking each of the following situations separately:

(i) If there is no alternative use for the production facility of X, will the company benefit, if division Y buys from outside suppliers at Rs.270 per component.

(ii) If internal facilities of X are not otherwise idle and the alternative use of the facilities will bring annual cash saving of Rs.50,625 to division X, should division Y purchase the component from outside suppliers?

(iii) If there is no alternative use for the production facilities of division X and the selling price for the component in the outside market drops by Rs.20.25, should division Y purchase from outside supplier?

What transfer price would be fixed for the component in each of the above circumstances?

Solution:

(i) If Division Y purchases the component from outside market the cost to buy is Rs.270 per component whereas if the same is bought internally the cost is Rs.256.50. Thus in this case there is a net saving of Rs.13.50 per unit.
Therefore, the total benefit to the company is Rs.33,750 (13.50 x 2,500) making it beneficial for the company as a whole to transfer component from Division X

(ii) If there are alternative facilities available for Division X then in this case there will be an opportunity cost. The opportunity cost per unit will be Rs.20.25 (50,625/2,500). Thus the transfer price in this case will be Rs.276.75 (256.50+20.25) whereas the same if bought from outside supplier costs Rs.270. Thus in this case there is a net saving of Rs.6.75 per unit on purchase.
Therefore, the total benefit to the company is Rs.16,875 (6.75 x 2,500) making it beneficial for the company to buy component from outside supplier.

(iii) If the market price for the component falls by Rs.20.25, then the cost to buy from the outside supplier will be Rs.249.75 whereas if the same is bought from division X will cost Rs.256.50. Thus in this case there is a net saving of Rs.6.75 per unit on purchase.
Therefore, the total benefit to the company is Rs.16,875 (6.75 x 2,500) making it beneficial for the company to buy component from outside supplier.

(iv) Transfer Price**:**

a. Where there is no alternative use of capacity of division X, then variable cost i.e. Rs.256.50 per component will be charged.

b. If facilities of division X can be put to alternative use then variable cost Rs.256.50+ opportunity costRs.20.25 =Rs.276.75 will be transfer price.

c. If market price gets reduced to Rs.249.75 and there is no alternative use of facilities of Division X the variable cost Rs.256.50 per component should be charged.

Question 23

Bearings Ltd. makes three products, A, B and C in Divisions A, Band C respectively. The following information is given:

Particulars	**A**	**B**	**C**	
Direct Materials (excluding material A for Divisions B and C)	4	15	20	Rs. per unit
Direct Labour	2	3	4	Rs. per unit
Variable overhead	1	1	1	Rs. per unit
Selling price to outside customers	15	40	50	Rs. per unit
Existing Capacity	5,000	2,500	2,500	(Number of units)
Maximum External demand	3,750	5,000	4,000	(Number of units)
Additional fixed costs that would be incurred to install additional capacity	24,000	6,000	18,700	Rs.
Maximum Additional units that can be produced by additional capacity	5,000	1,250	2,250	(Number of units)

B and C need material A as their input. Material A is available outside at Rs.15 per unit. Division A supplies the material free from defects. Each unit of B and C requires one unit of A as the input material.

If B purchases from outside, it has to payRs.15 per unit. If B purchases from A, it has to incur in addition to the transfer priceRs.2 per unit as variable cost to modify it.

B has sufficient idle capacity to inspect its inputs without additional costs.

If C gets material from A, it can use it directly, but if it gets material from outside, which is at Rs.15, it has to do one of the following:

(i) Inspect it at its own shop floor at Rs.3 per unit

Or

(ii) Get the supplier to supply inspected products and pay the supplier Rs.2 p. u. as inspection charges.

Or

(iii) A has enough idle labour, which it can lend to C to inspect at Rs.1 per unit even though C purchases from outside.

A has to fix a uniform transfer price for both B and C. The transfer price will not be known to outsiders and is at the discretion of the Divisional Managers.

What is the best strategy for each division and the company as a whole?

Solution:

Working Note:

1) The question beautifully states that there will be a uniform transfer price to be fixed for both the departments. Transfer price acceptable to Division B will be Rs.13 per unit as the department gets the same material at Rs.15 per unit from outside and the department spends Rs.2 per unit as modification cost if it receives transfer from Division A.

   Division C has options available with it when it purchases from the market, which are analyzed as follows:-

   (i) It will purchase from market at Rs.15 per unit and incur an inspection cost of Rs.3 per unit at its own shop floor. The total cost under this option will be Rs.18 per unit (Rs.15+Rs.3).

   (ii) Here the division will get the product inspected from the vendor and pay him Rs.2 per unit as inspection charges. The total cost under this option will be Rs.17 per unit (Rs.15+Rs.2).

   (iii) In this case Division A will lend its idle labour to Division C for Rs.1 per unit. Thus in this case the total cost will be Rs.16 per unit (Rs.15+Rs.1)

But the question clearly specifies that the Division A has to follow a uniform transfer pricing policy, so the transfer price to Division C will be the same as transfer price to Division A i.e. Rs.13 per unit, which will be acceptable to both the division.

2) Statement showing Contribution per unit; considering transfer price to Division B & C as Rs.13 per unit.

Particulars	**Division A**		**Division B**	**Division C**
	Market	**Transfer**		
Selling Price	15	13	40	50
Less: Direct Material	(4)	(4)	(15)	(20)
Less: Material A	-	-	(13)	(13)
Less: Modification Cost	-	-	(2)	-
Less: Direct Labour	(2)	(2)	(3)	(4)
Less: Variable Overhead	(1)	(1)	(1)	(1)
Contribution Per Unit	**8**	**6**	**6**	**12**

3) Costs benefit analysis with respect to quantities to be supplied.

Division A's demand is dependent on demand from Division B & C. Therefore, demand of Division B & C have to be crystallized first to estimate A's demand.

Particulars	**Division A**	**Division B**	**Division C**
Demand	3,750	5,000	4,000

Normal Production Capacity	5,000	2,500	2,500
Balance Demand to be fulfilled	-	2,500	1,500
Extra demand that can be supplied by enhancing capacity	5,000	1,250	2,250
Further units will be lower of balance demand/supply from enhanced capacity	-	1,250	1,500
Extra Contribution earned	30,000 (5,000 x 6)	7,500 (1,250 x 6)	18,000 (1,500 x 12)
Fixed Cost (Given)	24,000	6,000	18,700
Whether to enhance capacity	**Yes**	**Yes**	**No**

Division A's requirement (Market + B's Demand + C's Demand) = 3,750+3,750+2,500 = 10,000 units.

Particulars	**Division A**		**Division B**	**Division C**
	Sale to Market	**Transfer to B & C**		
Units	3,750	6,250 (3,750+2,500)	3,750	2,500
Total Contribution	**30,000 (3,750 x 8)**	**37,500 (6,250 x 6)**	**22,500 (3,750 x 6)**	**30,000 (2,500 x 12)**
	67,500		22,500	30,000
Additional Fixed Cost	24,000		6,000	-
Profit	**43,500**		**16,500**	**30,000**

Question 29

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 isproduct 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 Rs. 10 per unit and Rs. 8 per unit on units delivered to external customers and Z respectively. Y also incurs Rs. 6 per unit picked up from X, whereas external suppliers supply at Y's factory at the stated price of Rs. 85 perunit.

Additional information is given below:

	Figures (Rs.)/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.

Solution:

Since this is a pure strategy and negotiation oriented question, we need to analyze the best option for each division individually

Tripod Ltd has three divisions X, Y and Z

X can:

(i) either sell in the open market or

(ii) transfer its production to Y

Y can:

(i) either sell open market or

(ii) transfer its production to Z

Z can:

(i) only sell in the open market

DIVISION X

The **least price Division X will quote** is the sum of variable costs incurred on transfer to Division Y

Minimum Price = Direct Material + Direct Labour~~+ Sales Agent's Commission~~

= 40+30 = Rs70/unit

The **maximum price Division Y will accept** is the market price less additional charges it will have to pay on internal transfer

Maximum Price = Market Price - Additional Charges

=85 - 6 = Rs79 per unit

Therefore, RANGE ON TRANSFER FROM DIVISION X TO DIVISION Y = Rs70 per unit to Rs79 per unit

DIVISION Y

There are four situations arising in case of Division Y. We will have to calculate the range of contribution in all four situations to identify the best strategy for Division Y.

The least price that will be charged by Division Y from Division Z will be its variable cost = Direct Material + Direct Labour + Cost of delivery to Division Z= Rs70 + Rs6 + Rs50 + Rs8 = Rs134 per unit

Since the maximum amount that Division Z will pay to Division Y is its Market Price = Rs135 per unit

Particulars	**Buy from X (Rs70)**	**Buy from X (Rs79)**	**Buy from X (Rs70)**	**Buy from X (Rs79)**	**Buy from Market**	**Buy from**

						Market
	Sell to Z	**Sell to Z**	**Sell to Market**	**Sell to Market**	**Sell to Z**	**Sell to Market**
Market Price	135	135	170	170	135	170
Less: Direct Material	(70)	(79)	(70)	(79)	(85)	(85)
Less: Additional Handling cost (from Division X)	(6)	(6)	(6)	(6)	-	-
Less: Additional delivery cost (to Division Z)	(8)	(8)	(10)	(10)	(8)	(10)
Less: Direct Labour	(50)	(50)	(50)	(50)	(50)	(50)
Less: Sales Agent Commission	-	-	(15)	(15)	-	(15)
Contribution	**1**	**(8)**	**19**	**10**	**(8)**	**10**

We can clearly see that the range of contribution which Division Y will earn on transfer to Division Z will be Rs1 to Rs(8).

Institute's Answer

Therefore, the strategy for Division Y will be to buy from Division X at Rs70 and sell 26000 units in the market.

If Division Y receives product x from Division X at Rs70/unit, then it may transfer balance 4000 units (excess capacity) to Division Z and earn a contribution of Re1/unit.

Deviation from Institute's Answer

Since Division X can earn a contribution of Rs25/unit when selling in the open market, it will obviously want to satisfy the market demand first. In doing so, only 6000 units of Product X are available for transfer to Division Y.

Since, only 6000 units of product X can be transferred to Division Y, Division Y will not transfer ANY PRODUCT to Division Z because, for Division Y - the priority will be to sell in the open market.

Therefore, in the given solution, there will be no internal transfers taking place from Division Y to Division Z

Question 33

AB Cycles Ltd. has two 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 for 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	Rs. 3000 per unit
Long Run Average Market Price of Sub-Assembly	Rs. 2000 per unit
Incremental Cost of Completing Sub-Assembly in Division B	Rs. 1500 per unit
Incremental Cost in Division A	Rs. 1200 perunit

Required

(i) If Division A's maximum capacity is 1,000 units p.m. and sales to the intermediate are now 800 units, should 200 units be transferred to B on long-term average pricebasis.

(ii) What would be the transfer price, if manager of Division B should be keptmotivated?

(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 outsidemarket?

Solution:

(i) Should Division 'A' transfer 200 units to Division B on long-term average price basis?

The maximum capacity of Division A is 1000 units and the market can absorb only 800 units. Therefore, there is a surplus capacity of 200 units on which no opportunity cost will be incurred.
Therefore, if Division 'A' has the option of transferring bicycle frame to Division B at its variable cost which is Rs1200/unit, the company can earn an extra Rs300 (Rs3000-(1500+1200)).
Division A should transfer 200 units to Division B at its incremental cost and NOT on long-term average price basis.

(ii)Transfer Price to keep the manager of Division B motivated

Profit Analysis of Division B if transfer price is Long Term Average Price Basis(i.e. Rs2000)	
Particulars	**Amount (Rs/unit)**
Selling Price	3000
Less: Incremental Cost of completing Sub-assembly	(1500)
Less: Transfer Price	(2000)
Profit/(Loss)	(500)

Profit Analysis of Division A if transfer price is Long Term Average Price Basis(i.e. Rs2000)	
Particulars	**Amount (Rs/unit)**
Selling Price/Transfer Price	2000
Less: Incremental Cost of completing Sub-	(1200)

assembly	
Profit/(Loss)	800

Net Profit for the enterprise = 800-500 = 300

Therefore, to keep the manager of Division B motivated, a part of the profit will have to be allocated to his division.

This allocation can be on any reasonable basis. Some common reasonable allocation bases are-

- Equal share to both divisions
- Profit share divided based on marginal cost (i.e. incremental cost of production)
- Profit share based on an agreement between the two divisions or as per company policy

If we take equal share as the base, then 50% share of Rs300 i.e. Rs150 will have to be allocated to Division A and Division B each.

Therefore, transfer price will be Rs1200+Rs150 (profit share of Division A) = Rs1350

(iii)<u>If outside market demand increases to 1000 units</u>

Profit to Company when Division A sells entire production to Market

Particulars	**Amount**
Selling Price	2000
Less: Incremental Cost in Division A	(1200)
Profit	**800**

Profit to Company when Division A sells part of the production to Division B

Particulars	**Amount**
Selling Price	3000
Less: Incremental Cost in Division B	(1500)
Less: Incremental Cost in Division A	(1200)
Profit	**300**

Therefore, the company will want to sell to the market as much as possible and only when the market demand is completely satisfied will it want Division A to turn to Division B to absorb excess production.

Since, in the given case, Division A is producing only 1000 units, all of which can be absorbed by the market, the Company will not want Division A to transfer any units to Division B, as profit on sale at sub-assembly level is greater than profit on sale of final output.

About the Author

The faculty is qualified Chartered Accountant and Company Secretary and has experience of 10 years in Textile Industry and has around 3 years of experience of teaching.The family has its own Textile Business and he has been managing the same since last 10 years and as the textile business is a lot related to production planning, he from the very start found a great inclination towards the subject. He has been teaching in several classes in Mumbai like PDLC, Pinnacle and is a faculty at WIRC, Rajkot and Mumbai. He has also started teaching at Yasha's, Bangalore.