Marginal Costing

① Marginal Cost = Cost of producing one additional unit

Situ 1			Situ 2		
Capacity	Production at present		Capacity	Production at present	
10 Lakh	6 Lakh		10 Lakh	6 Lakh	
Targeted Production	Var. Cost P.u = ₹ 30	Total FC = ₹ 25 Lakh	Var. Cost P.u. = 30	Targeted Production	Total FC = 25 Lakh → 40 Lakh
9 Lakh			13 Lakh		

$$\text{Marginal Cost p.u.} = \frac{\text{Change in Total cost}}{\text{Change in Qty}}$$

Situ 1 $= \frac{3 \text{ Lakh units} \times 30}{3 \text{ Lakh}}$

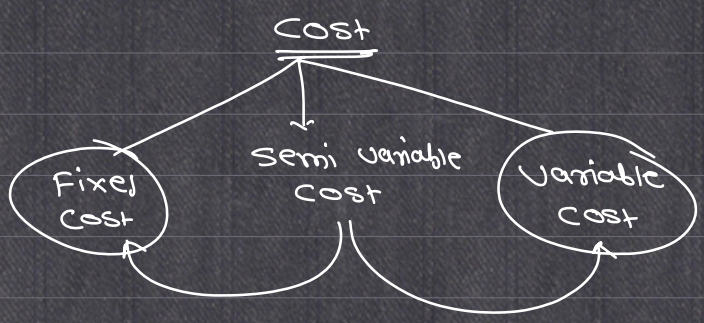
$= 30$ p.u.

Situ 2 $= \frac{(7 \text{ Lakh} \times 30) + 15 \text{ Lakh}}{7 \text{ Lakh}}$

$= 32.14$ p.u.

Marginal Cost = Incremental cost = Differential cost

②

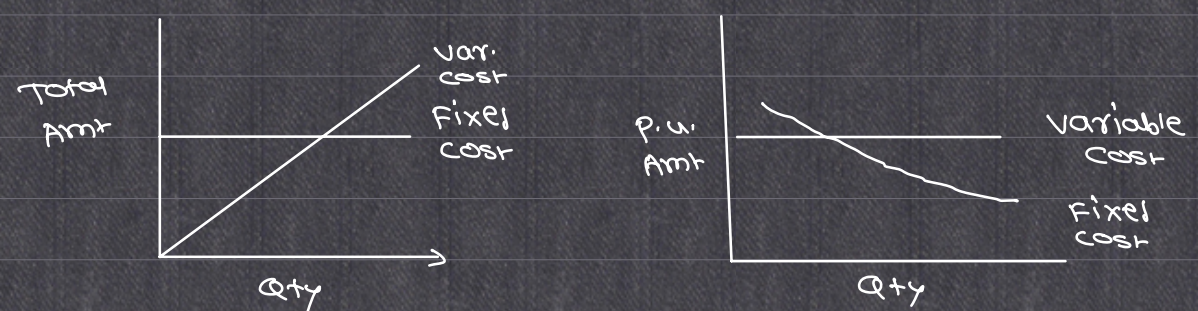


	Qty Produced	P.U. Amt	Total Cost Amt
Low	- - -	- - -	- - -
	- - -	- - -	- - -
	- - -	- - -	- - -
High	- - -	- - -	- - -

* (R1) If Total Cost Amt remains same irrespective of Qty then it Fixed Cost.

* (R2) If P.U. Amt is constant then it is Variable Cost

* If it is none of the two then it is SVC.



Bifurcation of SVC

- Analytical method
- High Low method
- Regression method

High Low method

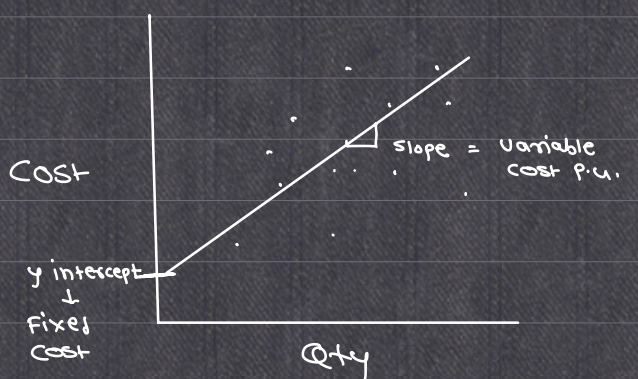
$$\text{Variable cost P.U.} = \frac{\text{Change in Total Cost}}{\text{Change in Qty}}$$

Total cost = Variable cost + Fixed cost

----- = (V.C. p.u. × Qty) + $\underline{\underline{c}}$

c = ---

Regression Method (Least Squares method)



$y = (m)x + c$

- y → Total cost
- m → Var. cost p.u.
- x → Qty
- c → Fixed cost

Que

Qty (x)	Cost Amt (y)	$(x-\bar{x})$	$(y-\bar{y})$	$(x-\bar{x})(y-\bar{y})$	$(x-\bar{x})^2$
1200	27600	-850	-13450	1,14,32,500	7,22,500
1700	37400	-350	-3650		
2300	43700	250	2650		
3000	55500	950	14450		
$\bar{x}=2050$	$\bar{y}=41050$		Σ	2,71,00,000	18,10,000

m (b_{yx}) $= \text{Cor.}_{xy} \times \frac{\sigma_y}{\sigma_x}$

$= \frac{\text{Cov.}\,xy}{\sigma_x \cdot \sigma_y} \times \frac{\sigma_y}{\sigma_x}$

$= \frac{\text{Cov}_{xy}}{\sigma_x^2}$

$= \frac{\left[\Sigma (x-\bar{x})(y-\bar{y})\right]/n}{\frac{\Sigma (x-\bar{x})^2}{n}}$

$= \frac{\Sigma (x-\bar{x})(y-\bar{y})}{\Sigma (x-\bar{x})^2}$

$m = \frac{2,71,00,000}{18,10,000}$

$= 14.9723 / \text{unit}$

$y = mx + c$

$\bar{y} = m\bar{x} + c$

$41050 = 14.9723 \times 2050 + c$

$\therefore c = 10356.78$

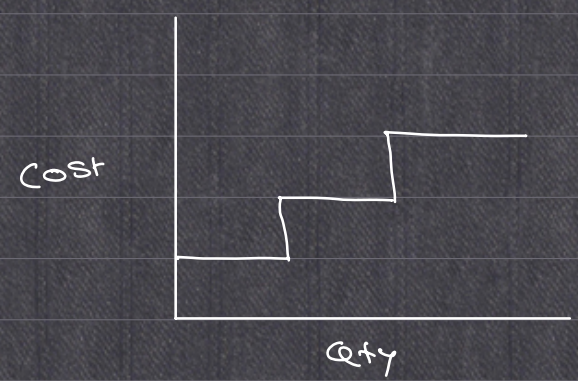
↓

Total Fixed cost

Find out Total cost for 4400 units

$= (4400 \times 14.9723) + 10356.78$

$= 76234$



Step up cost

③ Why to use marginal costing ?

→ Decisions should be taken on the basis of marginal cost.

Selling price = Marginal cost p.u. + Profit

Room : 500

Fixed cost = ₹ 12 cr. p.m.

Var. cost : ₹ 4000 per Room per Day for 2 Guests

Rooms sold online / Retail channel = 300 Rooms

$$\text{Cost Per Room Per Day} = \left[\frac{12 \text{ cr.} \div 30 \text{ Days}}{500}\right] + 4000$$

$$= 8000 + 4000$$

$$= 12000 \text{ p.r. p.d.}$$

Selling price = 12000 + 30% of 12000

= 15600 per Room per Day.

Counter offer = 11000 per Room per Day.

	Reject	Accept
Profit	= 0	$= (11000 - 4000) \times 150_{\text{Rooms}} \times 3 \text{ Days}$
		$= 31,50,000$

④ Statement of Income

	₹
Sales	- - -
Less: Variable cost	- - -
∴ Contribution	- - -
Less: Fixed cost	- - -
Net Profit	- - -

$$P/V\ Ratio = \frac{Contribution}{Sales} \times 100$$

OR

$$= \frac{Change\ in\ Profit}{Change\ in\ sales} \times 100$$

} → Fixed cost is assumed to be same

$$Profit = (Sales \times P/V\ Ratio) - Fixed\ cost$$

Sales (mix) (Proportion)

- Sales (value) mix: 10 : 4 : 3 → 58.82% . 23.52% . 17.64%
- Sales Qty mix: 10 : 4 : 3

Que

	A		B		C
P/V Ratio	30%		25%		45%
Sales value mix	2	:	3	:	4

Find overall P/V Ratio.

Ans.

	A	B	C	Total
Sales Amt	200	300	400	900
× P/V Ratio	30%.	25%.	45%.	
∴ Contribution	60	75	180	315

$$\therefore \text{overall or Combined P/V Ratio} = \frac{315}{900} \times 100$$

$$= 35\%.$$

Overall PV Ratio is Weighted Avg. of Individual P/V Ratio with weight being assigned to Sales Value Mix

$$\text{P/V Ratio} = \left(30 \times \frac{2}{9}\right) + \left(25 \times \frac{3}{9}\right) + \left(45 \times \frac{4}{9}\right)$$

$$= 35\%.$$

Que What will be your answer in above question if given mix is sales qty mix.?

Ans. Can't be calculated

	A	B	C	Total
Sale qty	200	300	400	900

Que

	A	B	C
P/V Ratio	20%	30%	35%
V.C./unit (₹)	12	8	25
Sales Qty mix	5 :	4 :	3

Find overall P/V Ratio.

Ans:

	A	B	C	Total
Qty	500	400	300	1200
S.P./unit $\left(\frac{\text{V.C./unit}}{100\% - \text{PVR}}\right)$	$= \frac{12}{80\%}$	$= \frac{8}{70\%}$	$= \frac{25}{65\%}$	
	= 15	= 11.42	= 38.46	
∴ Sales	7500	4568	11538	23,606
Less: Var. cost (Qty × V.C./unit)	6000	3200	7500	
∴ Contribution	1500	1368	4038	6906
Contribution P.u.	$= 12 \times \frac{20}{80}$	$= 8 \times \frac{30}{70}$	$= 25 \times \frac{35}{65}$	
	= 3	= 3.42	= 13.46	

Sales	V.C.	Contribution
100	80	20
?	12	?

$$\text{Overall P/V Ratio} = \frac{6906}{23606} \times 100$$

$$= 29.25\%$$

Weighted Avg. of Individual S.P./unit = Weighted selling price

— " — V.C./unit = Var. cost

— 11 — Contribution/unit = Contribution

Weight being assigned to sales qty mix

Weighted Avg. S.P.	19.67
$\left(15 \times \frac{5}{12}\right) + \left(11.42 \times \frac{4}{12}\right) + \left(38.46 \times \frac{3}{12}\right)$	
Less: Weighted Avg V.C.	13.91
$\left(12 \times \frac{5}{12}\right) + \left(8 \times \frac{4}{12}\right) + \left(25 \times \frac{3}{12}\right)$	
∴ Weighted Avg. Contribution/unit	5.75

∴ P/V Ratio $= \frac{5.75}{19.67} \times 100$

$= 29.25\%$

How Contribution is expressed?

- Contribution per unit in ₹
- P/V Ratio ↓ Contribution per ₹100 of sales
- Contribution per 1% capacity utilisation

⑤ Break Even Analysis (Operating Break Even Point)

Expression of BEP

- **Amt.** → Break even Sales
  - BES (₹) = $\frac{\text{Total Fixed Cost}}{\text{P/V Ratio}}$
- **Qty** → Break even qty
  - BEQ = $\frac{\text{Total Fixed Cost}}{\text{Contribution per unit}}$
- **Break even Capacity**
  - BEC = $\frac{\text{Total FC}}{\text{Contribution per 1\% capacity}}$

Overall = Combined = Composite = Weighted Avg

Fixed Cost = ₹ 25,00,000

P/V Ratio = 30%.

Sales	Contri
100	30
?	25 Lakh

Individual P/V Ratio & Sales value mix ↓ Combined P/V Ratio

Contribution per unit & Sales qty mix ↓ Wt. Avg. Contribution/unit

⑥ Desired sales to get given profit

$$\text{Desired sales Amt} = \frac{\text{Total fixed cost} + \text{Desired Profit}}{\text{P/V Ratio}}$$

$$\text{Desired sales Qty} = \frac{\text{Total fixed cost} + \text{Desired Profit}}{\text{Contribution per unit}}$$

$$\text{Desired sales Amt } (x) = \frac{\text{Total fixed cost} + 10\% \text{ of } x}{\text{P/V Ratio}}$$

⑦ Margin of Safety (MOS)

MOS is sales in excess of Break even Sales

(a) MOS Sales = Actual Sales − Break even Sales

(b) MOS Ratio = $\frac{\text{MOS Sales}}{\text{Actual Sales}}$

(c) MOS Capacity = Actual Capacity Utilisation − Break even capacity utilisation

(d) Profit = MOS Sales × P/V Ratio

(e) Profit = MOS Qty × Contribution/unit

MOS Qty = Actual Qty − Break even Qty

e.g.

S.P./unit	30
P/V Ratio	25%
Total Fixed Cost	₹ 15,00,000
Qty Sold	650000 units

Calculate

① MOS Sales ② MOS Ratio ③ Operating Leverage

Ans:

Sales (650000 × 30)	1,95,00,000
Less: Var. Cost (19500000 × 75%)	1,46,25,000
∴ Contribution	48,75,000
Less: Fixed Cost	15,00,000
∴ Profit	33,75,000

$$\text{Break Even Sales} = \frac{\text{Total Fixed Cost}}{\text{P/V Ratio}}$$

$$= \frac{15,00,000}{25\%}$$

$$= 60,00,000$$

$$\text{MOS Sales} = \text{Actual sales} - \text{Break even Sale}$$

$$= 1,35,00,000$$

$$\text{MOS Ratio} = \frac{\text{MOS Sales}}{\text{Actual Sale}}$$

$$= \frac{135}{195}$$

$$= 0.6923$$

Both indicate Level of Operating Risk

$$\text{Operating Leverage (OL)} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{48,75,000}{33,75,000}$$

$$= 1.4444$$

$$OL = \frac{1}{\text{MOS Ratio}} = \frac{1}{0.6923}$$

$$= 1.444$$

	Increase	Decrease
MOS Ratio	Operating Risk Decreases	Operating Risk Increases
Operating Leverage	Operating Risk Increases	Operating Risk Decreases

$$\text{MOS Ratio} = \frac{\text{MOS Sales}}{\text{Actual sale}} \quad \underline{\text{OR}} \quad \frac{\text{EBIT}}{\text{Contribution}}$$

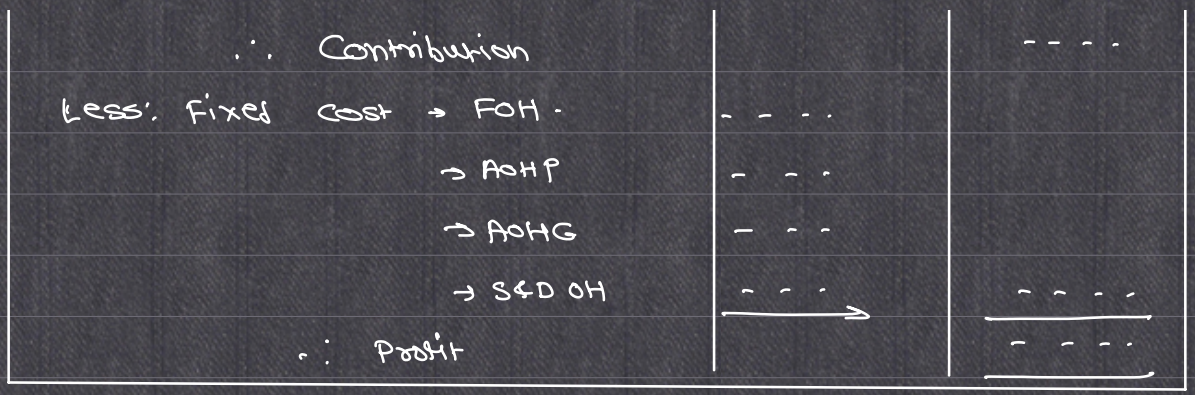
$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \quad \boxed{\text{OR}} \quad \frac{\text{Actual sale}}{\text{MOS sale}}$$

⑧ Profitability Statement under Marginal Costing (IMP)

Cost Item	Absorption Costing	Marginal Costing
Direct Material	Product cost	① Product cost
Direct Labour	Product cost	② Product cost
Direct Expenses	Product cost	③ Product cost
Variable Factory OH	Product cost	④ Product cost
Fixed Factory OH	Product cost	Period cost
AOHP - Variable	Product cost	⑤ Product cost
- Fixed	Product cost	Period cost
AOHG - Variable	Period cost	Period cost
- Fixed	Period cost	Period cost
S & D OH → Variable	Period cost	Period cost
→ Fixed	Period cost	Period cost

Income Statement
(Marginal Costing)

Particulars	₹	₹
Sales		- - - -
Less: Variable cost		
Opening Stock	- P - -	
+ Cost of Goods Produced (1 to 5)	- Q - -	
- Cl. Stock	- R - - *	
∴ Variable cost of Goods sold	- A - -	
+ AOHG - Variable	- B - -	
+ S&D OH - Variable	- C - - -	A+B+C - - - -



* Cl. Stock calculation

↓

FIFO → Cl. Stock comprises of production from current period

WAC → We mix Goods from op. stock and current periods production.

↓

$$\text{Cl. Stock} = \frac{\text{Cost of production for current period}}{\text{Prod. qty of current period}} \times \text{Cl. Stock qty}$$

$$R = \frac{Q}{\text{Qty produced}} \times \text{Cl. Stock qty}$$

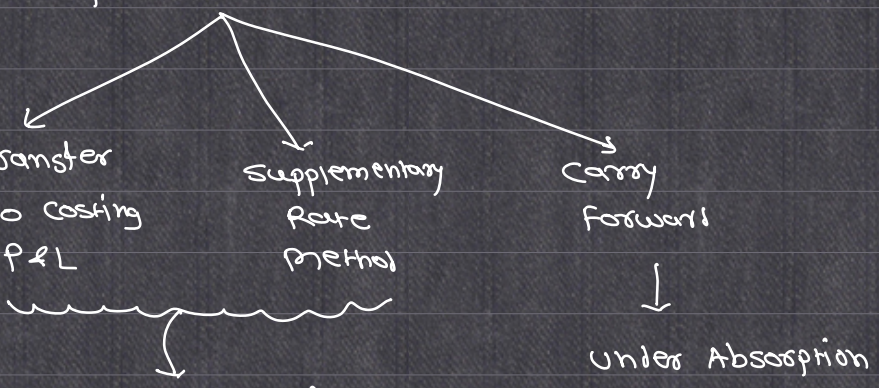
$$\text{Cl. Stock} = \frac{\text{op. stock Amt} + \text{Cost of production}}{\text{op. stock qty} + \text{production qty}} \times \text{Cl. Stock qty}$$

$$= \frac{\text{Cost of Goods available for sale}}{\text{op. stock qty} + \text{Prod qty}} \times \text{Cl. Stock qty}$$

$$R = \frac{P+Q}{\text{Total Qty}} \times \text{Cl. stock Qty}$$

e.g.

OH incurred	5,00,000
OH Absorbed	4,00,000
Under Absorption	1,00,000



⑨ Key Factor Analysis or Limiting Factor Analysis

Limiting factor = Resource in Limited supply / Shortage

+

Resource can be used in multiple products

How to solve Questions in exam ?

Step 1: Identify key factor

Step 2: Calculate Contribution per unit of key factor

$$\text{Contribution per key factor} = \frac{\text{Total Contribution per unit of FG}}{\text{Qty of key factor for}}$$

	1 unit of FG	
=	₹ 180 / 5 kg	₹ 260 / 8 kg
=	36	32.50
	↓ Product A	↓ Product B

Step 3: Do Ranking

Step 4: Do Allocation of available Resources

Product (1)	Available Resources (2)	Qty of FG Produced (3)	Resources used (4)	Balance Resources (5) = (2) − (4)
A	= 12000 kg	= 1300 units	= 1300 × 5 = 6500	5500
B	= 5500 kg	= 5500/8 = 687.5 i.e. 687 units	= 687 × 8 = 5496	4

→ Lower of Demand or what can be produced with available Resources

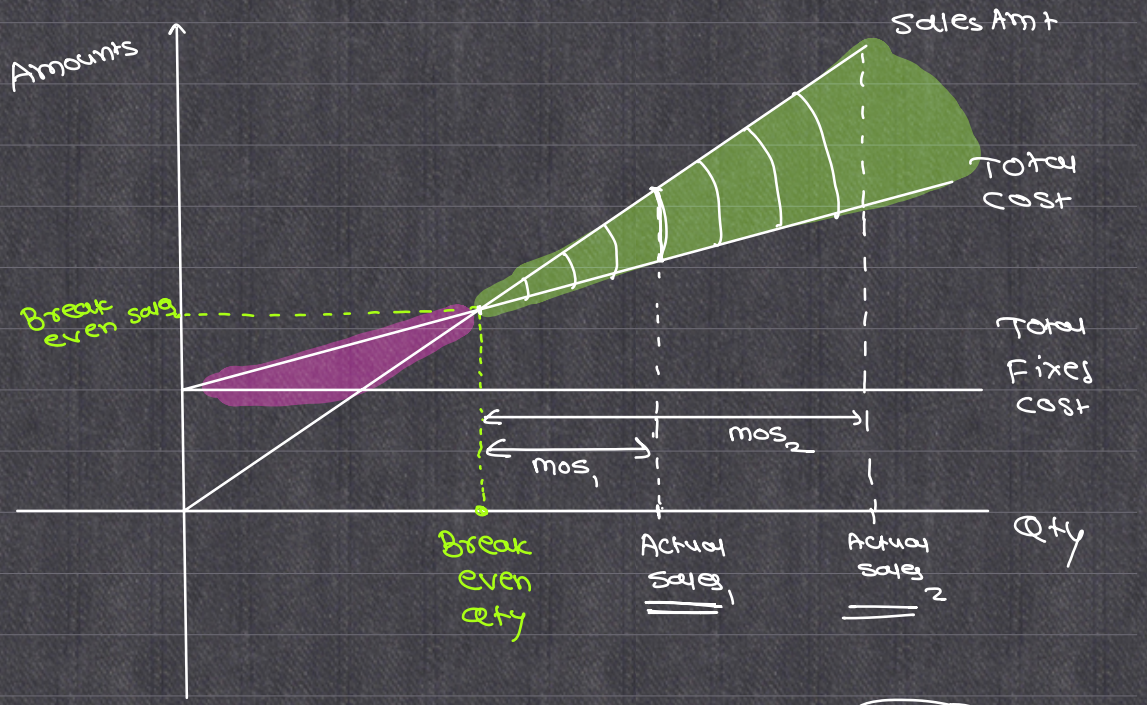
Optimum mix 1300 units : 687 units

(10) CVP Analysis and Angle of Incidence

C = Cost

V = Volume or Qty

P = Profit



- Wider the angle higher the Net Profit margin
- wider ——//—— more the MOS.

(11) Merger of Two plants

	Plant A	Plant B
Capacity	10000 units	6000 units
Actual sale	7000 units	3000 units
S.P./unit	₹ 25	₹ 47
V.C./unit	₹ 18	₹ 35
Total Fixed Cost	21000	₹ 19000

Find out Break even point post merger.

Ans: Post merger working

	site 1	site 2
Sales	= (7000 × 25) + (3000 × 47)	= (10000 × 25) + (6000 × 47)

	= 3,16,000	= 5,32,000
Less: Var cost	= (7000 × 18) + (3000 × 35)	= (10000 × 18) + (6000 × 35)
	= 2,31,000	= 3,90,000
∴ Contribution	85,000	1,42,000
Less: fixed cost	40000	40,000
∴ Profit	45,000	1,02,000
P/V Ratio	$= \frac{85,000}{3,16,000} \times 100$	$= \frac{142000}{532000}$
	= 26.89%	= 26.69%
Break even point	$= \frac{40000}{26.89\%}$	$= \frac{40000}{26.69\%}$
	= 1,48,754	= 1,49,869
Sales of A	= 1,75,000	2,50,000
B	1,41,000	2,82,000
Total	3,16,000	5,32,000
P/V Ratio of A	$= \frac{25-18}{25}$	
	= 28%	28%
B	$= \frac{47-35}{47}$	
	= 25.53%	25.53%
Overall P/V Ratio	$= \left(28 \times \frac{175}{316}\right) + \left(25.53 \times \frac{141}{316}\right)$	$= \left(28 \times \frac{250}{532}\right) + \left(25.53 \times \frac{282}{532}\right)$
	= 26.89%	= 26.69%

Question 4(b) Nov 2023

(i) Shut Down Decision

Particulars	At Present	After Shut Down
Sales	= 60000 x 15	
	= 9,00,000	0
Less: Var. Cost	= 60000 x 12	
	= 7,20,000	0
∴ Contribution	1,80,000	0
Less: Fixed Cost	4,20,000	420000 - 250000
		+ 25000
		= 195000
∴ Profit / (Loss)	(240000)	(195000)

(ii) Shut Down Point in units

Sales (2,25,000 ÷ 20%)	11,25,000
- Var. Cost	9,00,000
∴ Contribution	2,25,000
Less: Fixed Cost	420000
∴ Profit / Loss	(195000)

∴ Shut Down Point = $\frac{1125000}{15}$ = 75000 units