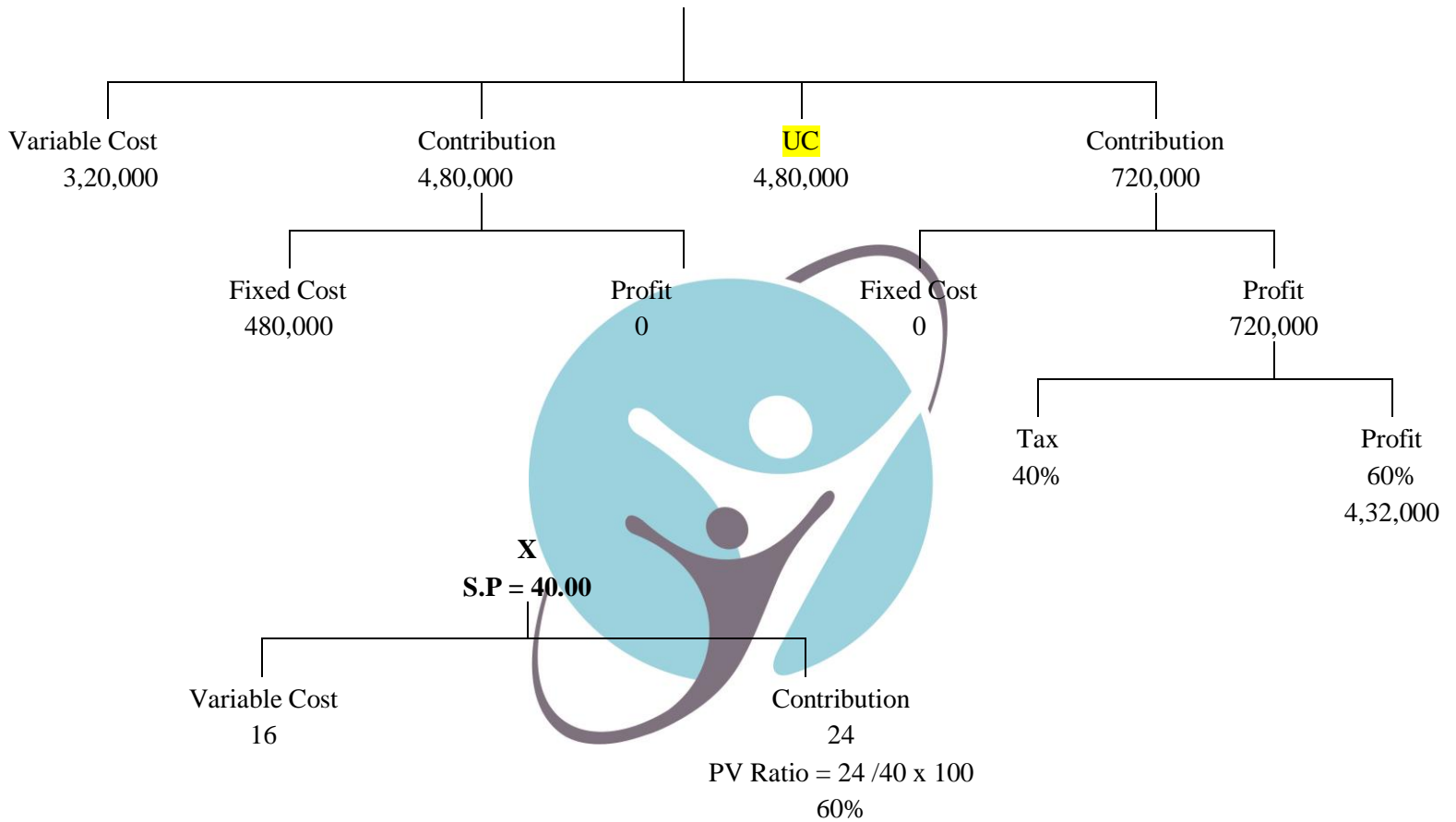






Sales 20,00,000  $\left(\frac{8,00,000}{40} \times 100\right)$   
 Break –Even Point (40 %) 8,00,000  $\left(\frac{480,000}{60} \times 100\right)$  MOS 12,00,000



**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	$\frac{666,600}{28.8} = 23,145.83$	

<b>X</b>	<b>Y</b>
7 : 3	
16,202.08	6,943.74
16,203	6,944
<u>x 40</u>	<u>x 50</u>
648,120	347,200

**Problem – 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:

<b>Per unit</b>	<b>Part A</b>	<b>Part B</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 :**

- Identify the spare part which will optimize contribution at the offered price.
- 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**

	<b>Part A</b>	<b>Part B</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
		<u>1,167.40 hours</u>
B S	(4,000 - (3,125 x .25))	= 1,968.75
T	(4,500 - (3,125 x .25))	= 31.25
		<u>2,000 hours</u>

**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

**Problem – 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%.

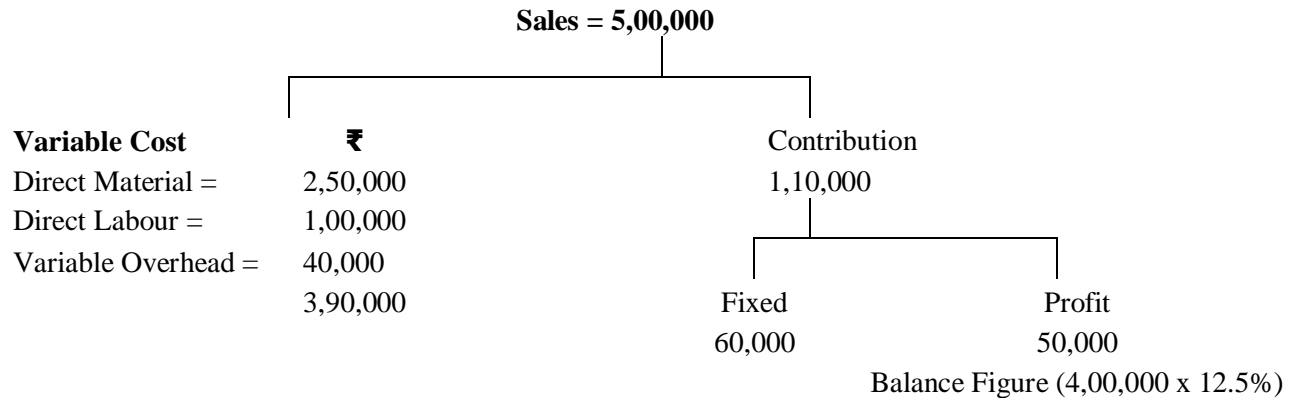
**Required:**

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 (5,00,000 x 110%)	5,72,000 (5,50,000 x 104%)
<b>(B) Relevant Cost</b>			
(1) Direct - Material	(2,50,000)	(2,75,000) (2,50,000 x 110%)	(2,69,500) (2,75,000 x 98%)
(2) Direct Labour	(1,00,000)	(1,10,000) (1,00,000 x 110%)	(1,07,800) (1,10,000 x 98%)
(3) Variable Overhead	(40,000)	(44,000) (40,000 x 110%)	(43,120) (44,000 x 98%)
Contribution	<b>1,10,000</b>	<b>1,21,000</b>	<b>1,51,580</b>
Fixed Cost	*(60,000)	(60,000)	(60,000 x 98%) 58,800
Profit / Loss	50,000	61,000	<b>92,780</b> = 23.19% $\left( \frac{92,780}{4,00,000} \times 100 \right)$

**Problem – 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 increase 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:**

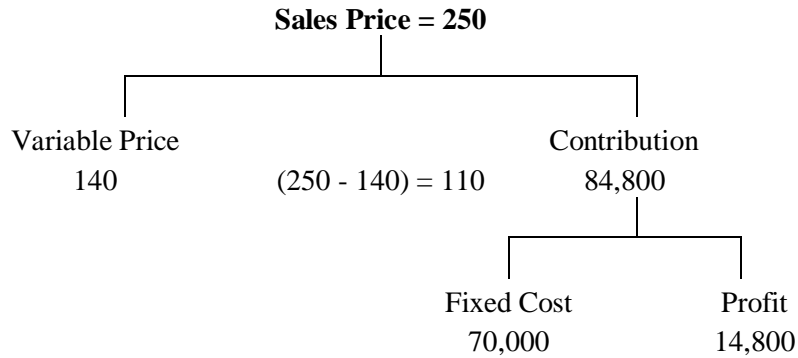
- (i) Calculate for each of the possible sales level at which your friend could expect to benefit by going into the venture on his own.
- (ii) Calculate the 'Break –Even Point' of the venture for each of the selling price.
- (iii) Advise your friend as to the viability of the venture.

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).

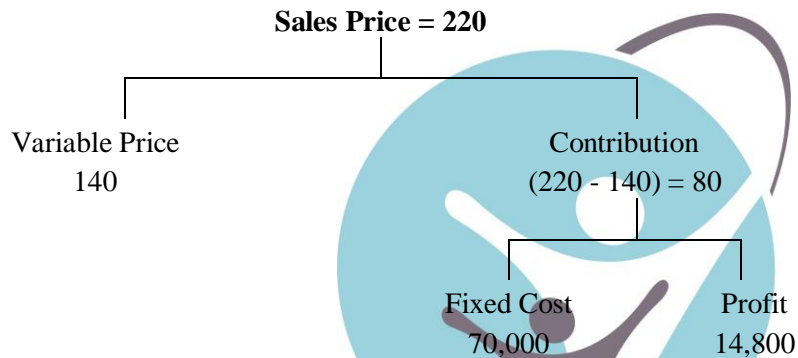
Minimum Sales (units) to recover assembly cost of ₹ 70,000 p.m. and earn a profit of ₹ 14,800

p.m. (Break –even Sales Level)

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

**Option 2**

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

**Option (3)**

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

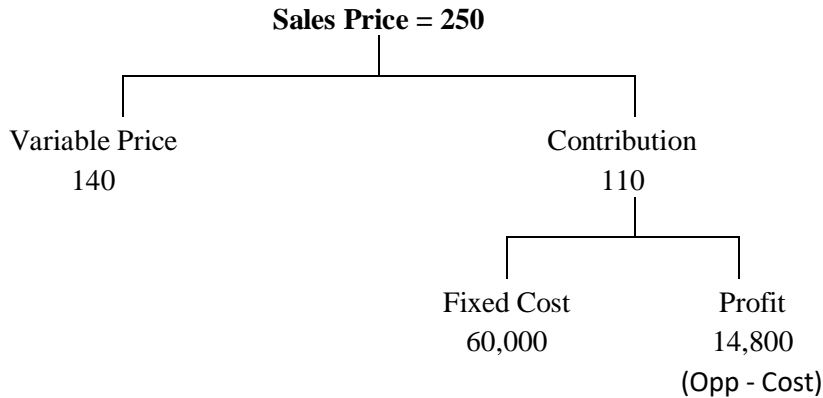
**Given**

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

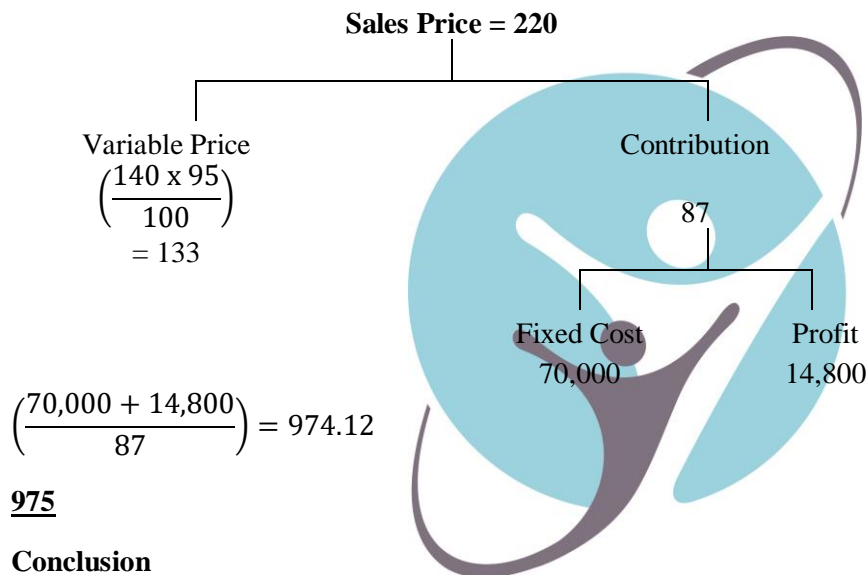
Opportunity Cost = 14,800 (P.M) Salary

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



**Option (I)**

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

**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%.

**Problem – 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 last 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			
$\left(\frac{\text{Sales}}{\text{₹20}}\right)$	$\left(\frac{10,00,000}{20}\right)$	$\left(\frac{11,00,000}{20}\right)$	$\left(\frac{12,00,000}{20}\right)$
	50,000 units	55,000 units	60,000 units
Cost of Production Variable			
	$\left(\frac{2,60,000}{65,000}\right)$	$\left(\frac{2,40,000}{60,000}\right)$	$\left(\frac{1,60,000}{40,000}\right)$
(P.U)	= 4.00	= 4.00	= 4.00
Variable Selling Expenses			
Variable Cost P.U = $x \rightarrow$	8.00	8.00	8.00
Fixed Cost = $y \rightarrow$	<b>90,000</b>	<b>90,000</b>	<b>90,000</b>
$50,000 x + y = 4,90,000$			
$55,000 x + y = 5,30,000$			
$5,000 x = 40,000$			
$x = 8$			
$(50,000 \times 8) + y = \underline{4,90,000}$			
Fixed Overheads	3,60,000	3,60,000	3,60,000
$\left(\frac{10,80,000}{3}\right)$			

**Statement Showing Analysis of Profit / Loss**

	2011 -12	2012-13	2013-14
(A) Sales	10,00,000	11,00,000	12,00,000
	(50,000 units x 20)	(55,000 x 20)	(60,000 x 20)
Variable Material Cost (Manufacturing)	(2,00,000)	(2,20,000)	(2,40,000)
	(50,000 x 4)	(55,000 x 4)	(60,000 x 4)
Variable Selling Expenses	(4,00,000)	(4,40,000)	(4,80,000)
	(50,000 x 8)	(55,000 x 8)	(60,000 x 8)
Contribution	<b>4,00,000</b>	<b>4,40,000</b>	<b>4,80,000</b>
Fixed Cost			
Manufacturing	(3,60,000)	(3,60,000)	(3,60,000)
Selling	(90,000)	(90,000)	(90,000)
Profit/Loss	<b>(50,000)</b>	<b>(10,000)</b>	<b>30,000</b>
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.

### **Problem – 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:-

	<b>First Quarter (₹ )</b>	<b>Second Quarter (₹ )</b>
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?

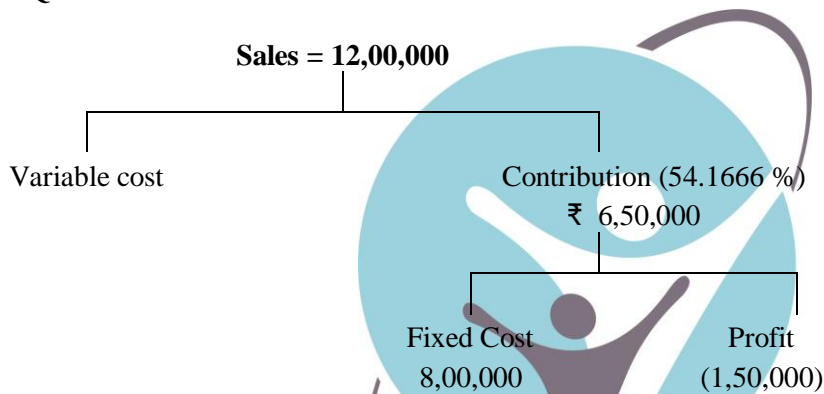
- iii. The firm's marketing people predict that if the selling price is reduced by ₹ 1.50 per carton (₹ 0.03 off per chocolate bar) and a ₹ 1,50,000 advertising campaign among school children is mounted, sales will increase by 20 % over the second quarter sales.

Should the plan be implemented?

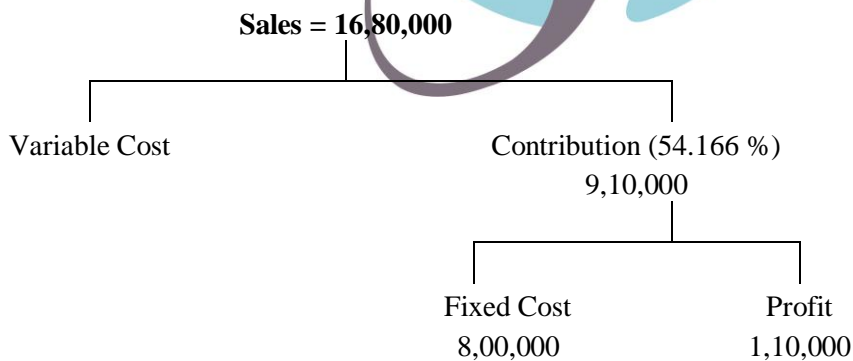
### Application of Semi Variable Overheads in Marginal Costing

$$\begin{aligned} \text{Profit Volume Ratio} &= \frac{\text{Change in profit}}{\text{Change in Sales}} \times 100 \\ &= \frac{1,10,000 - (1,50,000)}{\{(1,50,000) - 1,10,000\}} \times 100 \\ &= \frac{2,60,000}{4,80,000} \times 100 \\ &= 54.166 \% \end{aligned}$$

**First Quarter:**



**Second Quarter:**



$$\begin{aligned} \therefore \text{Break Even Point (Sales)} &= \frac{\text{Fixed Cost}}{\text{Profit Volume Ratio}} \\ &= \frac{8,00,000}{54.166 \%} \\ &= \boxed{\text{₹ 14,76,923}} \end{aligned}$$

÷ Selling price (per unit) 24

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

**(II) Question States: Do not use Profit Volume Ratio**

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

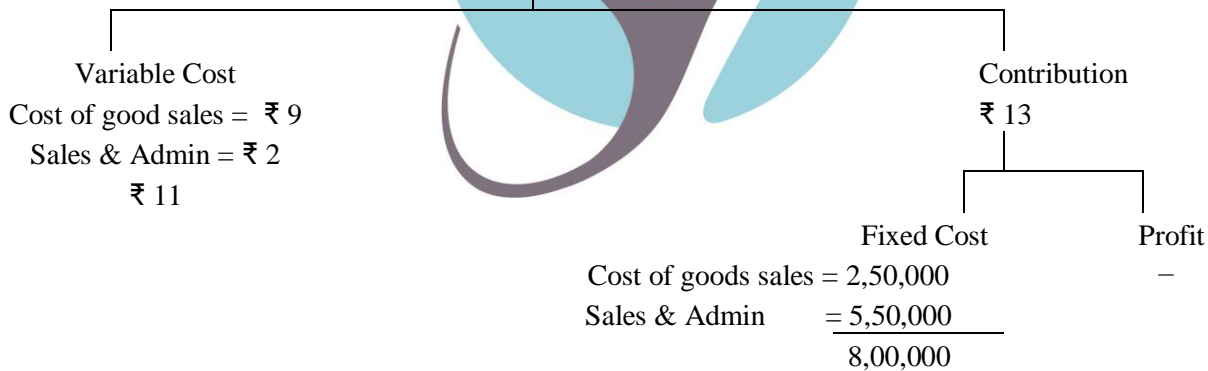
Let Variable Cost = x per unit	Fixed Cost = y
50,000 x + y	= 7,00,000
70,000 x + y	= 8,80,000
- 20,000 x	= - 1,80,000

$$\therefore x = 9$$

$$y = 2,50,000$$

Even Selling & Admin - Semi Variable

**Break Even Points Sales = Selling Price 24.00**



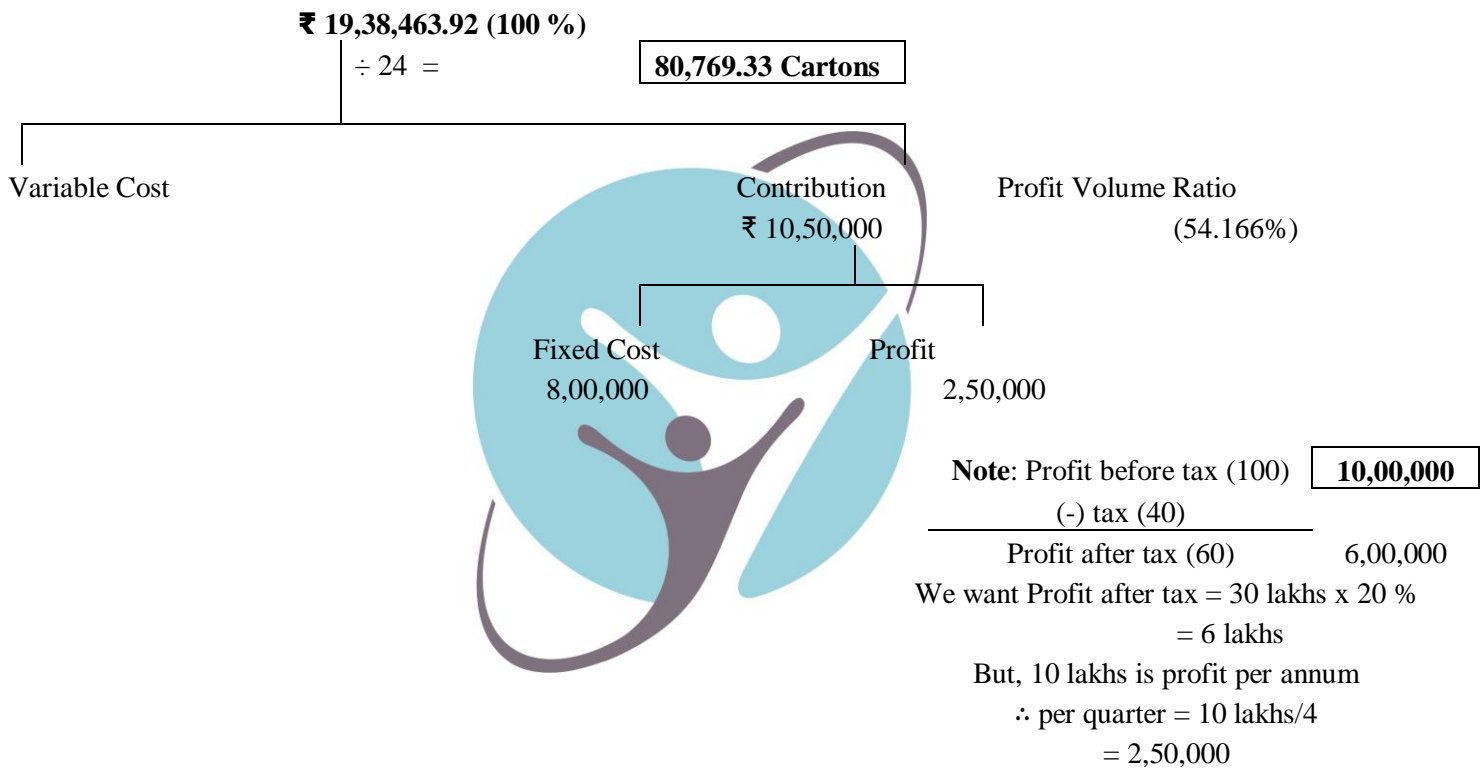
∴ Break Even Points (In Units) =

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

In Rupees = 14,76,923

**Calculation of Sales & Admin Expenses**

$$\begin{array}{rcl}
 \text{Let Variable Cost} = x \text{ per unit} & \text{Fixed Cost} = y & \\
 50,000x + y & = & 6,50,000 \\
 70,000x + y & = & 6,90,000 \\
 \hline
 \cancel{20,000x} & = & \cancel{40,000} \\
 & \therefore x = & 2 \\
 \therefore 50,000 \times 2 + y = 6,50,000 & & \\
 \therefore y = & \mathbf{5,50,000} & 
 \end{array}$$

**Quarterly****(b) Expected Sales for Required Profit**

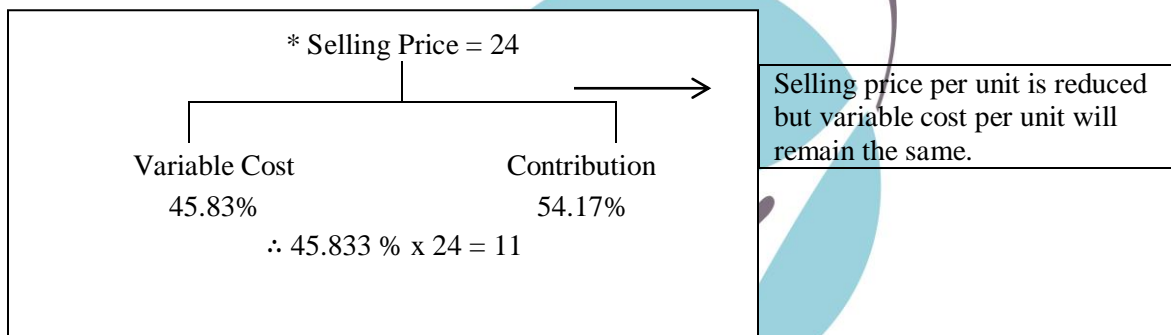
**(c) Analysis of Statement Showing Profit/Loss if plan is implemented**

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)	<u>(9,24,000)</u>
	Contribution	9,66,000
(-)	Fixed Cost	(8,00,000)
(-)	Advertisement Cost	<u>(1,50,000)</u>
	Profit before tax	16,000
(-)	tar (40 %)	<u>(6,400)</u>
	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.

**Problem – 8**

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>B</b>	<b>O</b>	<b>S</b>	<b>H</b>	
Sales (units)	2,00,000	2,60,000	1,60,000	3,00,000	<b>Total</b>
	(₹)	(₹)	(₹)	(₹)	(₹)
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 .....		<u>6,20,000</u>
		<b>31,00,000</b>

**The other information 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**

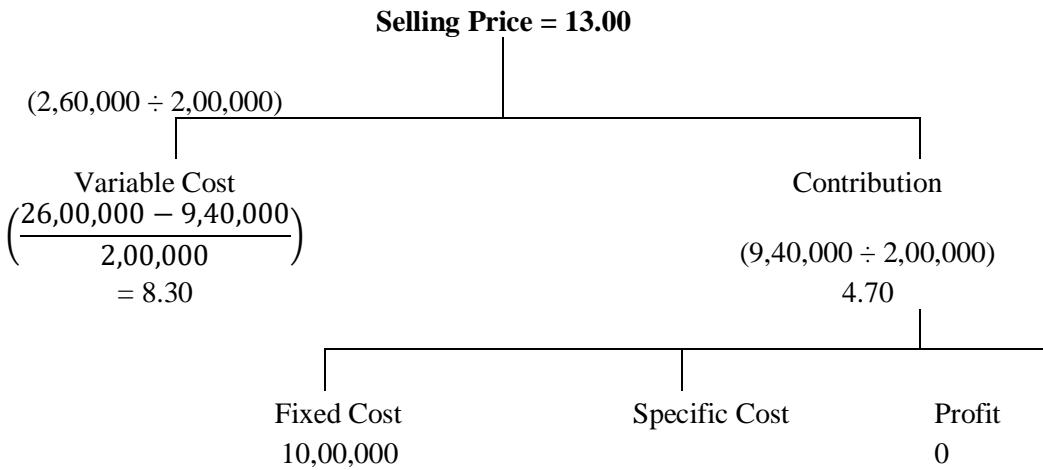
	<b>B</b>	<b>O</b>	<b>S</b>	<b>H</b>	<b>Total</b>
(A) Sales	2,00,000 units	2,60,000 units	1,60,000 units	3,00,000 units	9,20,000 units
(₹)	26,00,000	45,20,000	42,40,000	32,00,000	1,45,60,000
Direct Material	(6,00,000)	(18,20,000)	(18,80,000)	(10,00,000)	(53,00,000)
Direct Wages	(8,00,000)	(20,80,000)	(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)
				<b>Profit</b>	<b>8,00,000</b>

**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 + 1,60,000 + 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  $(10,00,000 \div 4.70) = 2,12,766$  units

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

$(34 \times 8.30) = 282.20$

(₹)	
Sales $(2,12,766 + 22) \times 13$	= 27,66,244
Variable Cost $(2,12,800 \times 8.30)$	= <u>17,66,240</u>
Contribution	10,00,004
Fixed Cost	<u>10,00,000</u>
Profit	X

**Opportunity Cost****Problem – 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:

	<b>X</b>	<b>Y</b>	<b>Z</b>
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**

<b>Products</b>	<b>X</b>	<b>Y</b>	<b>Z</b>
Sales Price (P.U)	10.00	12.00	12.00
Variable Price (P.U)	(6)	(9)	(7)
Contribution (P.U)	<b>4.00</b>	<b>3.00</b>	<b>5.00</b>
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****Problem – 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			<b>4,42,100</b>

**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.

**Problem – 11**

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

	A	B	C
	Manual (₹)	Semi - Automatic (₹)	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**

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

**Ans No. (i)**

No. of Units Sold =  $x$

**A & B**

$$240x + 15,000 = 140x + 45,000$$

$$100x = 30,000$$

$x = 300$  units (Cases)

**A & C**

$$240x + 15,000 = 40x + 1,25,000$$

$$240x = 1,10,000$$

$x = 550$  (Cases)

**B & C**

$$140x + 45,000 = 40x + 1,25,000$$

$$100x = 80,000$$

$x = 800$  (Cases)



Cases $\leq 300$	A	
$300 > \leq 800$	B	
$\geq 800$	C	
Ans No. (ii)	600 $\rightarrow$ B	
	850 $\rightarrow$ C	

**Problem – 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:**

- Compute the cost indifference points for these alternatives.
- 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 =  $x$

$$100x + 2,50,000 = 200x + 1,50,000$$

$$- 100x = - 1,00,000$$

$$x = \underline{1,000 \text{ units}}$$

 **$M_2$  and  $M_3$** 

$$200x + 1,50,000 = 400x + 70,000$$

$$- 200x = - 80,000$$

$$- x = \underline{400 \text{ units}}$$

**M<sub>1</sub> and M<sub>3</sub>**

$$100x + 2,50,000 = 400x + 70,000$$

$$- 300x = - 1,80,000$$

$$x = \underline{\underline{600 \text{ units}}}$$

**Ans No. (ii)**

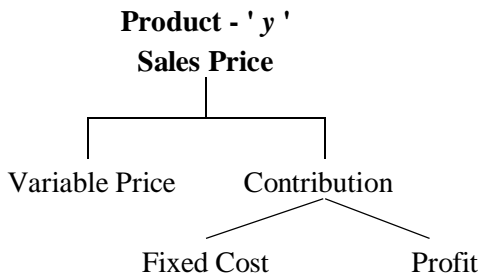
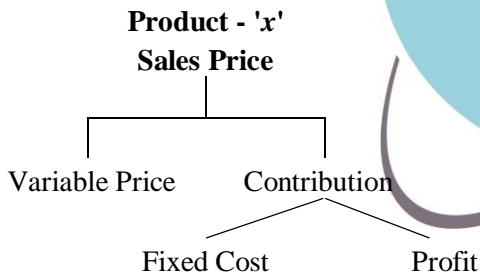
If Production = 1,200 units -

**Decision****M<sub>1</sub>****Problem – 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



$$(F_1 + F_2) = \underline{\underline{1,50,000}}$$

Break –Even Point 'x' = 1,800 Units / Indifference Points = 3,000

$$F_1 = 1,800 C_x$$



$$F_2 = 1,50,000 - 1,800 C_x$$

**Equal Profit = 3,000 Units**

$$3,000 C_x - F_1 = 3,000 \times 0.8 C_x - F_2$$

$$3,000 C_x - F_1 = 2,400 C_x - F_2$$

Contribution - Fixed Cost	=	Contribution - Fixed Cost
$3,000 C_x - 1,800 C_x$	=	$2,400 C_x - (1,50,000 - 1,800 x)$
$3,000 C_x - 1,800 C_x$	=	$2,400 C_x - 1,50,000 - 1,800 x$
$1,200 C_x$	=	$4,200 x - 1,50,000$
$- 3,000 x$	=	$- 1,50,000$
$x$	=	$50.00$
Fixed Cost =		$(1,800 \times 50) = 90,000$
Fixed Cost =		$(1,50,000 - 90,000) = 60,000$
		$x = 50.00$
		$y = (50 \times 80 \%) = \mathbf{40}$

**Problem – 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<sub>1</sub> (highly toxic) will be needed to complete the AT Industries' special job. XL Polymers purchased the R<sub>1</sub> two weeks ago for ₹ 7,500 for a job 'A' that recently was completed. The R<sub>1</sub> 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<sub>1</sub>. Current replacement cost of R<sub>1</sub> is ₹ 6,000.

Special job will require 250 hours of labour G<sub>1</sub> and 100 hours of labour G<sub>2</sub>. XL Polymers pays their G<sub>1</sub> and G<sub>2</sub> employees ₹ 630 and ₹ 336 respectively for 42 hours of work per week.

XL Polymers anticipates having excess capacity of 150 [G<sub>1</sub>] and 200 [G<sub>2</sub>] labour hours in the coming week. CLL Polymers can also hire additional G<sub>1</sub> and G<sub>2</sub> labour 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 <sub>1</sub> (Saving in Disposal Cost)	1,250	(No - use) (opportunity gain)
Labour G <sub>1</sub> Hrs. Required 250 Hrs. Available (150)	(1,500)	Future out flow
100		
Hourly rate X (630 ÷ 42 hrs.) = 15		
G <sub>2</sub>	–	Capacity
Minimum Price	<b>(250)</b>	Available

**Problem – 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)	

**Problem – 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)
<b>Minimum Cost</b>	<b>110</b>	

**Problem – 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 assessed 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.

**Problem – 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 out it 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 be sold for ₹1,500.

**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		
<b>Department A:</b> (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
<b>Department B:</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
	<b>61,975</b>	

<b>Note No. 1:</b>	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
		<u>24,600</u>

∴ Since we carried out it

**Problem – 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:

<b>Material C</b>	1,000 units
<b>Direct Labour :</b>	
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 though 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 -1                      Statement 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
<b>Net Savings</b>	<b>20,000</b>	

**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)	= <b><u>45,000</u></b>

**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	(Note No. 1)
(Note No.1)	1,35,000	
Relevant Cost		
Material XY	(21,000)	Opposition Cost
Material 'C'	(37,000)	(Note No. 2)
Direct Labour (Unskilled) (4,000 hrs. x 3)	(12,000)	
Direct Labour (Semi -skilled)	-	
Direct Labour (Highly -skilled) (4,000 x 11)	(44,000)	(Note No.3)
Variable Overheads (9,000 x 1)	(9,000)	(Note No.4)
<b>Net Relevant Saving</b>	<b>12,000 ₹</b>	

#### 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****Problem – 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 ₹
<b>Upto point of separation</b>	
Marginal Cost .....	30
Fixed Cost .....	20
<b>After point of separation</b>	
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 <sub>2</sub> ) =	37
Variable Price At (P <sub>2</sub> ) =	(20)
Fixed Cost (P <sub>2</sub> ) =	(5)
Inc - Profit	12

**Decision - P<sub>2</sub>**

**Ans No. (ii)**

**Statement Showing Analysis**

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

Decim-No

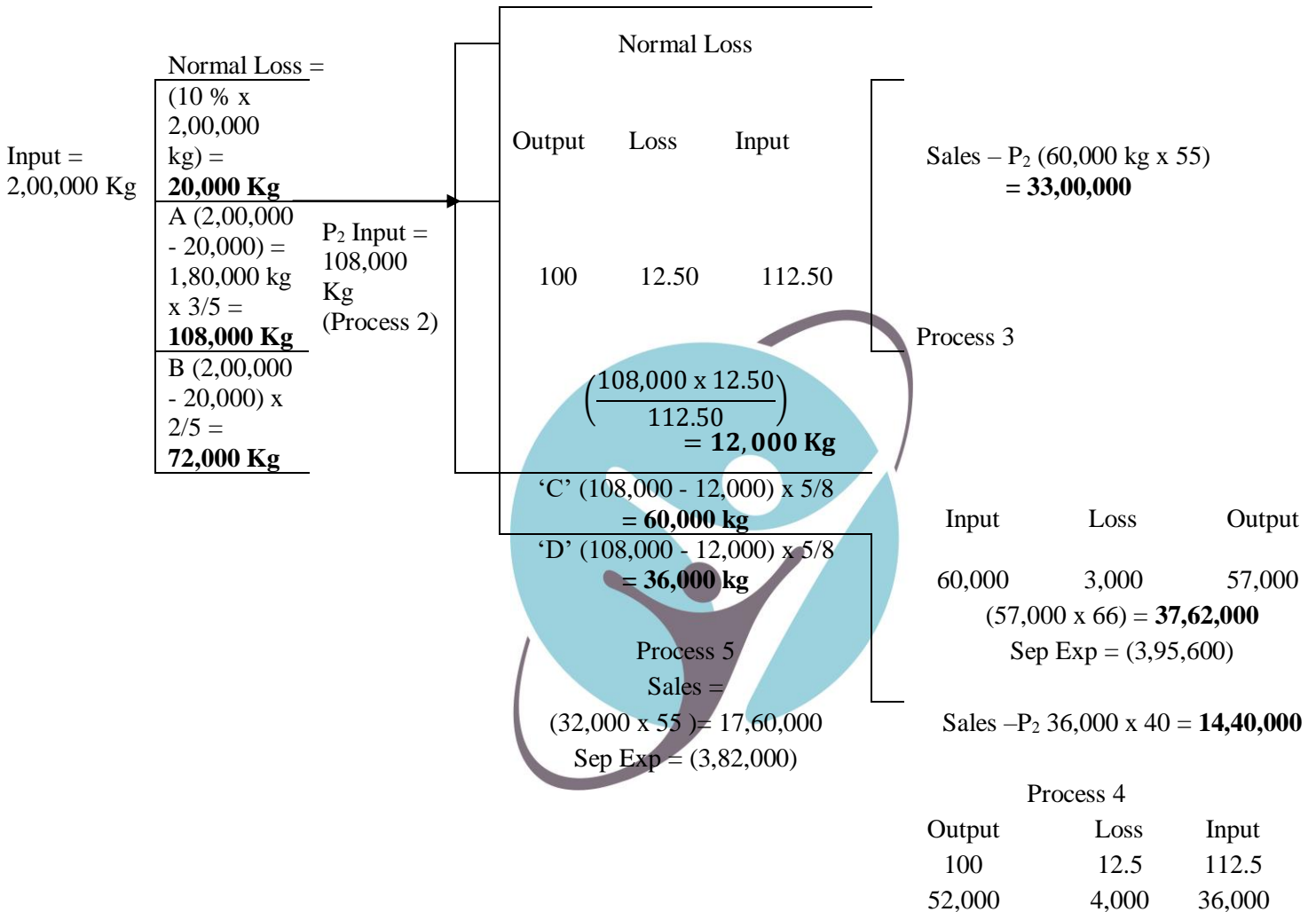
**Problem – 21**

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 <sub>2</sub>	(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****Problem – 22**

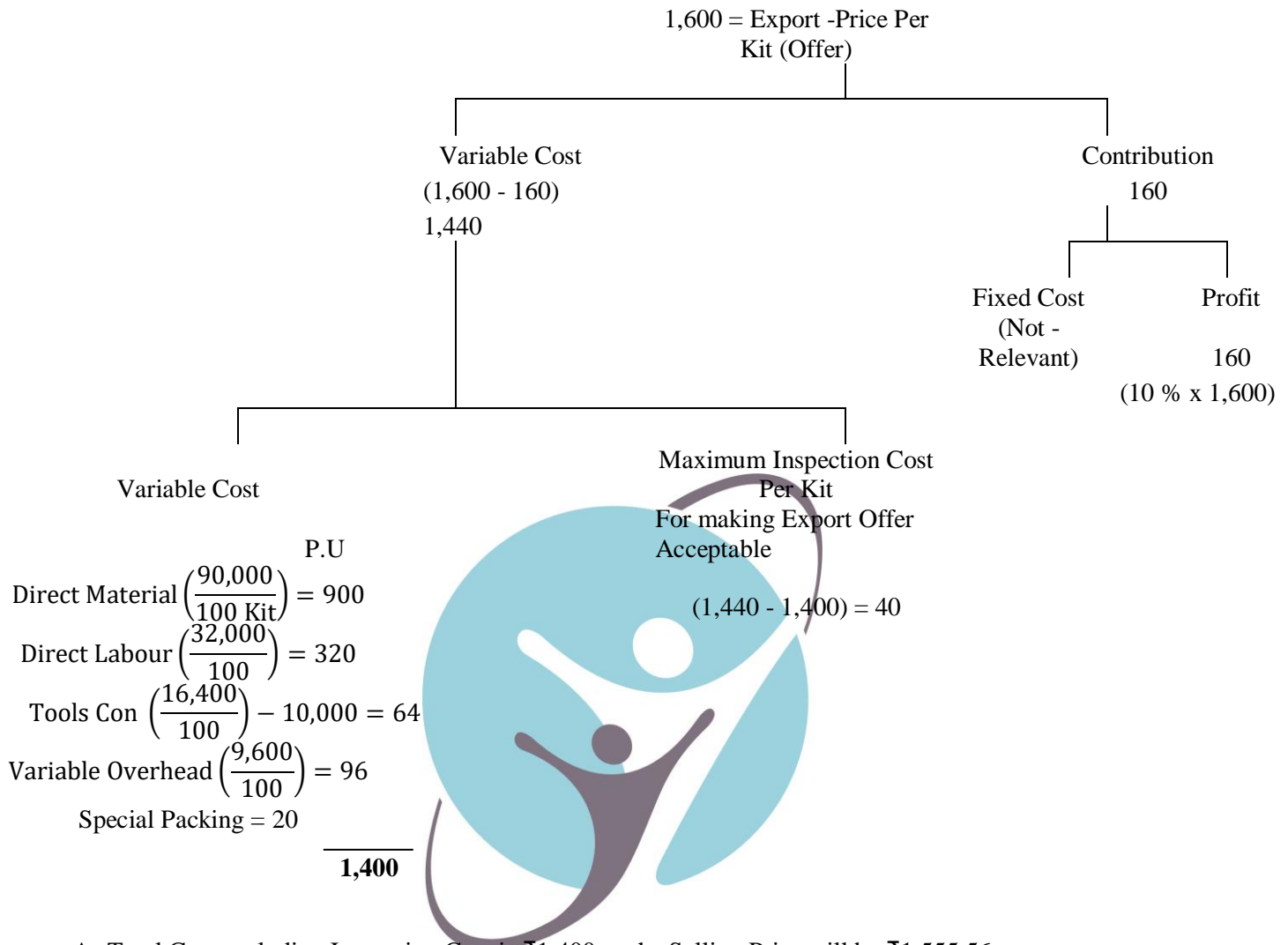
PQR Ltd., a manufacturer of tool kits has just completed XY's domestic order of 100 kits at a price of ₹ 1,650 per kit. The details of cost for XY's order are:

	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:**

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

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

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

Maximum Possible Discount on the Revised Selling price is ₹44.44

$$\dots (₹1,600 - ₹1,555.56)$$

Percentage of Discount is 2.77%

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

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.

**Problem – 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)**

$$\begin{aligned}
 & \text{'H' } 2,00,000 \text{ Units} \times 25 = 50,00,000 \\
 & 20,000 \text{ Units} \\
 & (10,20,000 - 6,00,000) = \left( \frac{4,20,000 + 50,00,000}{2,20,000} \right) \\
 & = 2,464
 \end{aligned}$$

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
	<u>102,00,000</u>
Fixed Cost =	<u>18,00,000</u>
Additional Input =	1,20,000

**Additional Variable Cost**

$$\begin{aligned}
 & \left( \frac{102,00,000}{12,00,000} \times 1,20,000 \right) \\
 & = 10,20,000
 \end{aligned}$$



**Problem – 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
<b>Profit</b>	<b>2.00</b>

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
<b>Prime Cost</b>		<b>10.00</b>
<b>Indirect Cost (Overheads)</b>		<b>8.00</b>
(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	
		<b>8.00</b>
<b>Total Cost</b>		<b>18</b>
Profit $\left(18 \times \frac{1}{9}\right)$		2
		<b>20</b>

**Statement Showing Overheads Absorption Rate**

$$\text{Absorption Rate} = \left( \frac{\text{Overheads}}{\text{Wages}} \times 100 \right)$$

$$125\% = \left( \frac{8}{6.40} \right) \times 100$$

**Statement Showing Break Up of New -Order**

		₹
Direct Cost :-		
(1) Direct Material		36,000
(2) Direct Labour		64,000
<b>Prime Cost</b>		<b>1,00,000</b>
Indirect Cost :-		
Overheads Administration (125% x 64,000)	=	80,000
<b>Total Cost</b>		<b>1,80,000</b>
Profit $\left(1,80,000 \times \frac{1}{9}\right)$		20,000
<b>Selling Price</b>		<b>2,00,000</b>

**The following points emerge:**

- Factory overheads only are to be recovered on the basis of direct wages.
- 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 ( $\frac{₹ 2.20}{₹ 6.40} \times 100$ )	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.

### **Problem – 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 ₹ 4,00,000 for 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 <u>15</u>		
120		

Cost (1-50 toys) = ₹ 400 → specific cost

**Depreciation is a Fixed Cost**

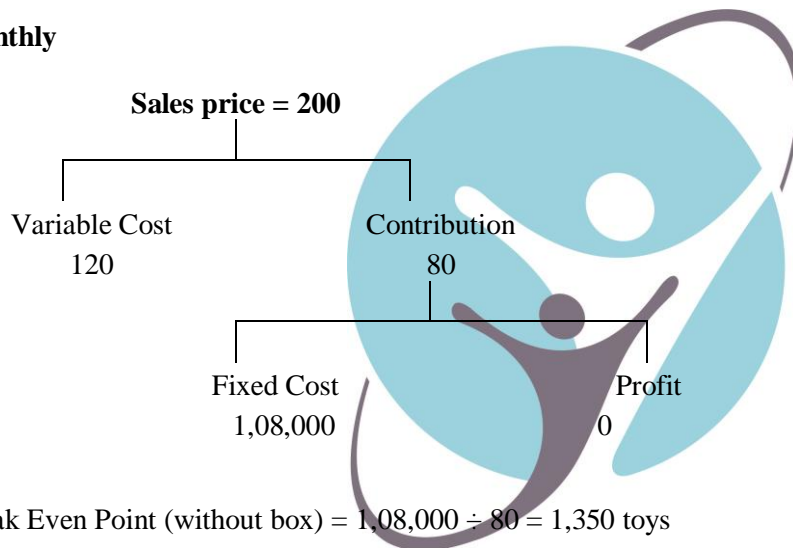
Fixed Cost	Year 1	Year 2
Fixed Overhead	4,00,000	4,24,000 (4 lakhs + 6 %)
Depreciation	8,96,000	8,96,000
	12,96,000	13,20,000

**Cost of Machine**

Depreciation (per annum)  $24,00,000 + 12\% \text{ duty} = 26,88,000$   
 $\div \text{Life} = 3$   
 $\therefore \text{Depreciation per annum} = 8,96,000$

(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)	(2,88,000)	(24,000)	(2,88,000)
	$\left(\frac{3,000}{50} \times 400\right)$	$\left(\frac{3,600}{50} \times 400\right)$	$\left(\frac{3,000}{50} \times 400\right)$	$\left(\frac{3,600}{50} \times 400\right)$
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) =  $1,08,000 \div 80 = 1,350$  toys

Break Even Point (Box) =  $\frac{1,350}{50} = 27$  boxes =  $\frac{27 \times 400}{80} = 135$  toys

Break Even Point (Box) =  $\frac{135}{50} = 2.7$  boxes = 3 boxes

$3 \times 50 = 150$  toys we have 135 toys

$\therefore$  Balance = 15

Cost of 3 Boxes =  $\frac{3 \times 400}{80} = 15$  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) =  $12,96,000 \div 80 = 16,200$  toys.

$$\text{Break - even point(box)} = \frac{16,200}{50} = 324 \text{ boxes}$$

$$= \frac{324 \times 400}{80} = 1,620 \text{ toys}$$

Break Even Point (Box):

$$\frac{1,620}{50} = 3,204 \cong 33 \text{ boxes}$$

Capital :  $33 \times 50 = 1,650 (-) 1,620 = \text{Balance } 30$

$$\text{Cost} \left( \frac{33 \times 400}{80} \right) = 165 \text{ toys}$$

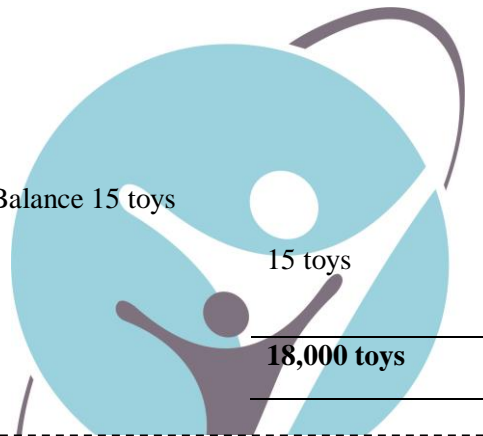
Pending toy

165 toys we have  $(-) 30 = 135$

$$\text{Box} : \frac{135}{50} = 2.7 \cong 3 \text{ boxes}$$

Capital :  $3 \times 50 = 150 (-) 135 = \text{Balance } 15 \text{ toys}$

$$\text{Cost} : \frac{3 \times 400}{80}$$



**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 II<sup>nd</sup> 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 (1 x 80)	80 (1 x 80)
Inclusive Cost (Box Cost) 1 - 50 Nos.	(400)	(400)
	(320) ÷ 80 = 4 toys	(320) ÷ 80 = 4 toys
∴ Break-Even-Point	= 1,500 + 1+4 = 1,505 toys	= 18,000+1+4 = 18,005 toy

**(iv) Comments:** The above break-even point is only possible if all the actual figures area same as per budget.

**Problem – 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**

<b>Accepting - the Special Order - 2,500 Nos.</b>	
	<b>(₹)</b>
Sales (2,500 Nos. x 100) =	2,50,000
<b>Variable Cost :-</b>	
<b>Direct Material =</b>	(87,500)
$\left(\frac{2,62,500}{7,500} \times 2,500\right)$	
Direct Manufacturing Labour Cost	(1,00,000)
$\left(\frac{3,00,000}{7,500} \times 2,500\right)$	
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)**

	<b>(₹)</b>
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)	
<b>Profit / Loss</b>	<b>4,87,500</b>	<b>4,22,500</b>	<b>65,000</b>

### Make or Buy

#### Problem – 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
<b>Fixed Overhead</b>		
Factory supervision	.....	₹ 35,000
Other fixed cost	.....	<b>₹ 65,000</b>
Total production costs	.....	<b>₹ 2,95,000</b>

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:

- 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.

$$\begin{aligned} \text{New Cost to Make} &= \text{₹ } 23.00 + \text{₹ } 4.50 \\ &= \text{₹ } 27.50 \end{aligned}$$

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
	<b>1,95,000</b>

**Fixed Overheads**

Factory Supervision	35,000 (Variable)
Other Fixed Cost	65,000 (Fixed)
	<b>1,00,000</b>

Ans No. (i)

**Statement Showing Analysis of Proposal**

₹	
Purchase Cost :-	2,50,000
(25 x 10,000)	
₹	
<b>Manufacturing :- Variable Cost</b>	
Direct Material (V)	75,000 ÷ 10,000 = 7.5
Direct Labour (V)	65,000 ÷ 10,000 = 6.5
Variable Overhead (V)	<u>55,000 ÷ 10,000 = 5.5</u>
Supervision	<u>35,000</u> <u>19.5</u>
	<u>2,30,000</u>
Loss on Purchase (2,30,000 - 2,50,000) = <b><u>20,000</u></b>	

**Problem – 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:**

- Which component, and in what quantities should be manufactured in the 20,000 hours of press time available?
- 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  $\therefore$  only product B needs to be looked into i.e. whether to buy or manufactured.

Ans (b)

**Statement Showing Analysis**

<p>Option I: B: 3,500 - 600 = 2,900 units Purchase x 59 Purchase Cost: 1,71,100</p>	<p>Option II: Mfg. 2,900 units</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Direct Material :</td> <td style="width: 20%;">27</td> <td style="width: 20%;"></td> </tr> <tr> <td>Direct Wages :</td> <td>10</td> <td>(8 + 25%)</td> </tr> <tr> <td>Direct Expenses:</td> <td>20</td> <td></td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black;"></td> <td></td> </tr> <tr> <td colspan="2">57 x 2,900 units</td> <td></td> </tr> <tr> <td colspan="2">= ₹ 1,65,300</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;">+</td> <td></td> </tr> <tr> <td colspan="2"><b>Total duets 2nd Shift</b></td> <td></td> </tr> <tr> <td colspan="2">100 hrs.</td> <td></td> </tr> <tr> <td colspan="2">₹ 500 worked</td> <td></td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">₹ 3,000</td> <td>6,000 hours</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right; padding-top: 20px;">2,900 units x 2 = 5,800 hrs. = 6,000 hours</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right;"><math>\therefore</math> Total Cost :</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right; border-top: 1px solid black;">1,65,300</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right;">+ 3,000</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right; border-top: 1px solid black;">1,68,300</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right;"><b><math>\therefore</math> we should manufacture</b></td> <td></td> </tr> </table>	Direct Material :	27		Direct Wages :	10	(8 + 25%)	Direct Expenses:	20					57 x 2,900 units			= ₹ 1,65,300			+			<b>Total duets 2nd Shift</b>			100 hrs.			₹ 500 worked			₹ 3,000	6,000 hours		2,900 units x 2 = 5,800 hrs. = 6,000 hours			$\therefore$ Total Cost :			1,65,300			+ 3,000			1,68,300			<b><math>\therefore</math> we should manufacture</b>		
Direct Material :	27																																																			
Direct Wages :	10	(8 + 25%)																																																		
Direct Expenses:	20																																																			
57 x 2,900 units																																																				
= ₹ 1,65,300																																																				
+																																																				
<b>Total duets 2nd Shift</b>																																																				
100 hrs.																																																				
₹ 500 worked																																																				
₹ 3,000	6,000 hours																																																			
2,900 units x 2 = 5,800 hrs. = 6,000 hours																																																				
$\therefore$ Total Cost :																																																				
1,65,300																																																				
+ 3,000																																																				
1,68,300																																																				
<b><math>\therefore</math> we should manufacture</b>																																																				

**Problem – 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, 0.826, 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.

### Problem – 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					<b>19,30,760</b>

**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
	<b>15.60</b>	<b>18.72</b>	<b>39.60</b>	<b>33.48</b>
Contribution	8.28	9.96	15.48	14.40

**Statement Showing Total Hrs. Required**

Products	Variable Overhead (P.U)	Units
P	$1.44 \div 120 = 1.20 \times 1,20,000 =$	1,44,000
Q	$1.44 \div 120 = 1.20 \times 1,86,000 =$	2,23,200
R	$2.40 \div 120 = 2.00 \times 1,71,000 =$	3,42,000
S	$2.16 \div 120 = 1.80 \times 99,000 =$	1,78,200
		8,87,400
	Hrs. Available	(8,15,000)
	Shortage	<b>72,400</b>

**Statement Showing Hrs. P.U/ Per Hr./ Rank**

	<b>P</b>	<b>Q</b>	<b>R</b>
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)
	<b>I</b>	<b>II</b>	<b>III</b>

Purchase 36,200 units of 'R' From Outside & Save  $(36,200 \times 2) = \underline{72,400}$

Purchase Cost =  $(8.400 \times 36,200) = \underline{304,080}$

**Problem – 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 ₹)			
	<b>A-1</b>	<b>B-2</b>	<b>C-3</b>	<b>D-4</b>
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.

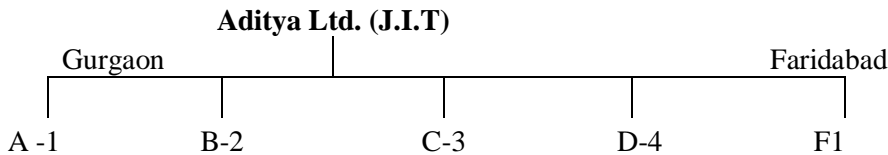
The Purchase manager has reported to the production manager that material M-1 and M-2 are in short supply in the market and only 6,50,000 Kg. of M-1 and 6,00,000 litre of M-2 can be purchased in a month.



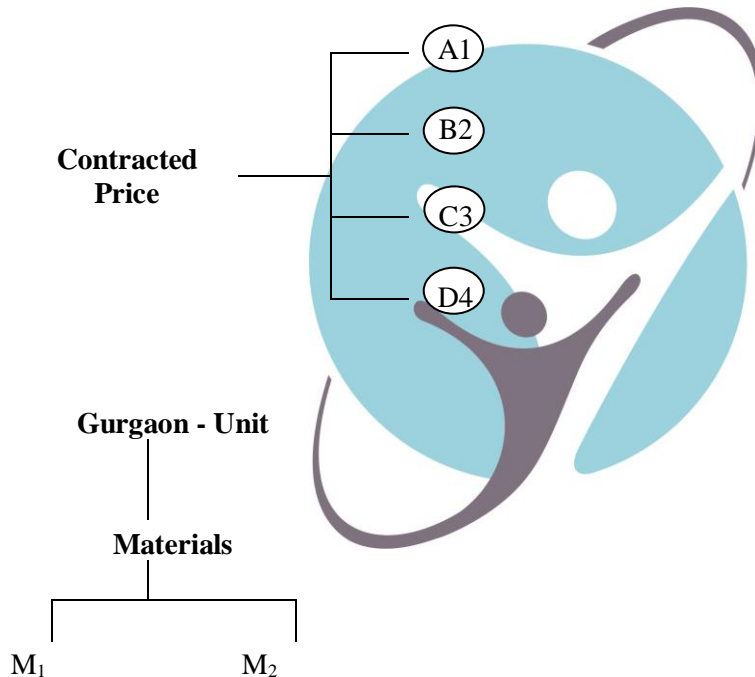
**Required:**

- (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.

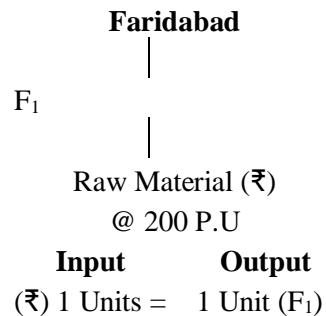
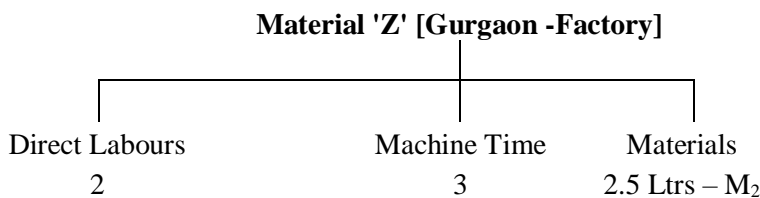
**Given:**

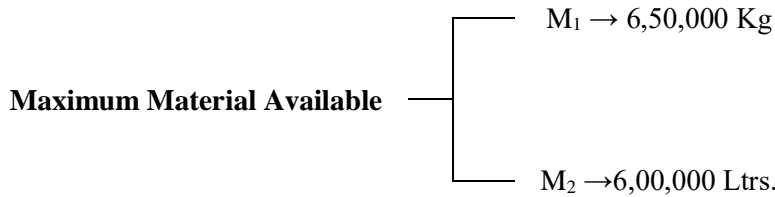


**Agreement –M Ltd. -10,000 Units -Gurgaon**



**Option 2**





**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
	<b>184</b>
Out -Sider -Price	<b>200</b>

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<sub>1</sub> –M<sub>2</sub>**

**For –Contracted Units**

	A <sub>1</sub>	B <sub>2</sub>	C <sub>3</sub>	D <sub>4</sub>
Units to be Supplied TOM -Ltd	10,000 Units (10,000 x 1)	10,000 Units (10,000 x 2)	10,000 Units –	10,000 Units (10,000 x 1.5)
Direct Material M <sub>1</sub> =	= 10,000 $\left(\frac{50}{50} = 1\text{Kg}\right)$	= 20,000 $\left(\frac{100}{50} = 2 \text{Kg}\right)$		= 15,000 $\left(\frac{75}{50} = 1.50\right)$
Direct Material – M <sub>2</sub> (Ltr)	(10,000 x 3) = 30,000 $\left(\frac{90}{30}\right) = 3 \text{ ltrs}$	(10,000 x 1.5) = 15,000 $\left(\frac{45}{30}\right) = 1.5 \text{ ltrs}$	(10,000 x 2) = 20,000 $\left(\frac{60}{30}\right) = 2 \text{ ltr}$	

**For Non –Contracted Units**

	<b>A<sub>1</sub></b>	<b>B<sub>2</sub></b>	<b>C<sub>3</sub></b>	<b>D<sub>4</sub></b>
Demands	90,000	95,000	80,000	75,000
Direct Material M <sub>1</sub> (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 <sub>2</sub>	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**

	<b>Direct Material M<sub>1</sub></b>	<b>Direct Material M<sub>2</sub></b>
	<b>(Kg)</b>	<b>Ltrs.</b>
<b>Contracted Units</b>		
A <sub>1</sub>	10,000	30,000
B <sub>2</sub>	20,000	15,000
C <sub>3</sub>	–	20,000
D <sub>4</sub>	15,000	–
<b>Non - Contracted Units</b>		
A <sub>1</sub>	90,000	2,70,000
B <sub>2</sub>	1,90,000	1,42,500
C <sub>3</sub>	–	1,60,000
D <sub>4</sub>	1,12,500	
<b>Available</b>	<b>4,37,500</b> <b>6,50,000 Kg</b>	<b>6,37,500</b> <b>6,50,000 Kg</b> <b>Shortage Limiting</b> <b>Factor M<sub>2</sub></b>

**Statement Showing Contribution Per Ltr - M<sub>2</sub>**

	<b>A<sub>1</sub></b>	<b>B<sub>2</sub></b>	<b>C<sub>3</sub></b>	<b>D<sub>4</sub></b>	<b>Z</b>	
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 <sub>2</sub> →	86	53	71	45	16	Saving
	÷ 3	÷ 1.5	÷ 2	÷	÷ 2.5	
	= 28.67	= 35.33	= 35.50	=	= 6.40	
	<b>III</b>	<b>II</b>	<b>I</b>		<b>IV</b>	

**Statement Showing Production Plan**

Qty Material 2-Available	Product	
60,000 (Kg)	90,000 units x 2	(6,00,000 + 80,000)
	$C_3 \rightarrow = 1,80,000 \text{ Kg}$	
		(4,20,000 - 1,57,500)
	$B_2 \rightarrow (105,000 \times 1.50) = 1,57,500$	
		(2,62,500 - 2,62,500)
	$A_1 \rightarrow (87,500 \times 3)$	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)	
$(28.67 - 6.40) \times 2.5 \text{ Ltrs}$	<u>55.68</u>
Minimum price =	<u><b>255.68</b></u>

**Problem – 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 .....	<u>27</u>
Total Costs .....	<b>117</b>

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) =  $(1,12,500 \div 1,50,000)$   
= 0.75

All Overheads -Per Cartoon = ₹ 27.00  
Per Can  $(27 \div 24)$  = 1.125

Fixed Per Can  
0.75

Variable  
0.375

Note No.2 Direct Wages  $(36 \div 24)$  = 1.50

Note No. 3 Direct Material  $(54 \div 24)$  = 2.25

**Statement Showing Cost of Making One Empty Can**

	Direct Material	Direct Wages	Variable Overheads	Total
Cost -Per Can	2.25	1.5	0.375	4.125
Cost % Empty Can	(0.45)	(0.15)	(0.375)	(0.6375)
	$(20 \% \times 2.25)$	$(10 \% \times 1.50)$	$(10 \% \times 375)$	
Cost of Per Can of Exe Without Can	<b>1.8</b>	<b>1.35</b>	<b>0.3375</b>	<b>3.4875</b>
Note No. 5				
Cost for 1,50,000 Nos.	67,500	22,500	5,625	95,625
If Empty Can Made	$(1,50,000 \times 0.45)$	$(1,50,000 \times 0.15)$	$(1,50,000 \times 0.375)$	
If Purchases				101,250 $(1,50,000 \times 0.6750)$

**Decision: - Manufacture**

Note -6	Fixed Overhead	Direct Materials	Direct Wages	Variable Overhead	Total
( $\frac{25,000}{\text{Nos.}}$ ) 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 (Make)	–	–	–	–	16,875.00 (0.6750 x 25,000)
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 InDiff Point****No. of units =  $x$** 

Manufacture Cost = Purchase

 $0.6375x + 7,500 = 0.6750x$  $0.0375x = 7,500$  **$x = 2,00,000$  (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**

	<b>1,50,000 (Cans)</b>	<b>1,75,000 (Cans)</b>	<b>2,25,000 (Cans)</b>
(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)
<b>Relevant Cost</b>			
(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 1.35)
(3) Variable Overhead	(50,625 (1,50,000 x 0.3375)	(59,062.50 (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)
<b>Net Gain</b>	<b>1,31,250</b>	<b>1,52,187.50</b>	<b>1,94,062.50</b>

**Determination of Production Mix/ Production Planning**

**Problem – 33**

A company is producing three products X, Y & Z. Relevant information is given below:

<b>Product</b>	<b>X</b>	<b>Y</b>	<b>Z</b>
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 :-



$$20 X + 12 Y = 27,500 \dots(i)$$

$$3X + 5Y = 6,200 \dots(ii)$$

Then,

$$30 X + 18 Y = 41,250$$

... equation (i) multiplied by 1.5

$$30 X + 50 Y = 62,000$$

... equation (ii) multiplied by 10

$$\begin{array}{r} - \quad - \quad - \\ \hline -32 Y = -20,750 \\ Y = 648.43 \text{ i.e. } 648 \text{ units} \end{array}$$

Putting the value of Y in equation (ii)

$$3 X + (5 \times 648) = 6,200$$

Or  $3X = 2,960$

Or  $X = 986 \text{ units}$

So the Product Mix is

$X = 986 \text{ units}$

$Y = 648 \text{ units}$

$Z = 750 \text{ units}$

### Problem – 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 <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>
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<sub>1</sub> and B<sub>2</sub> can be used for either crop, but not for A<sub>1</sub>&A<sub>2</sub>. The land that is being used for A<sub>1</sub>&A<sub>2</sub> can be used for either crop, but not for B<sub>1</sub> and B<sub>2</sub>. In order to

provide adequate market service, the company must produce each year at least 2,000 tons each of A<sub>1</sub>&A<sub>2</sub> and 1,800 tons each of B<sub>1</sub> and B<sub>2</sub>.

**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 <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>
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)
<b>Contribution (Per -Acre)</b>	<b>5,300</b>	<b>4,900</b>	<b>7,550</b>	<b>9,600</b>
<b>Rank</b>	<b>I</b>	<b>II</b>	<b>II</b>	<b>I</b>

**Step No. 2 Statement Showing Production Plan**

	Plant	Production	Balance
(Acres)	A <sub>1</sub>	2,000 Tons ÷ 50 = 40	(450 - 40)
(250 + 200)	A <sub>2</sub>	2,000 Tons ÷ 40 = 50	(410 - 50)
= 450	A <sub>1</sub>	18,000 Tons ÷ 50 = 360	(360 - 360)
(300 + 250)	B <sub>2</sub>	1,800 ÷ 60 = 30	(550 - 30)
= 550	B <sub>1</sub>	1,800 ÷ 45 = 40	(520 - 40)
	B <sub>2</sub>	28,800 ÷ 60 = 480	(480 - 480)

**Statement Showing Analysis of Profit / Loss**

	<b>Current Profit Ans No. (i)</b>	<b>Min - Profit Ans No. (ii)</b>
	<b>₹</b>	<b>₹</b>
A <sub>1</sub>	= 13,25,000 (250 Tons x 5,300)	= 21,20,000 (400 x 5,300)
A <sub>2</sub>	= 9,80,000 (200 Tons x 4,900)	= 2,45,000 (50 x 4,900)
B <sub>1</sub>	= 22,65,000 (300 Tons x 7,550)	= 302,000 (40 x 7,550)
B <sub>2</sub>	= 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)
<b>Profit / Loss</b>	<b>15,94,000</b>	<b>21,87,000</b>

**Break -Even Point = (560 Tons x 16,200)  
= 90,72,000**

**Problem – 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:

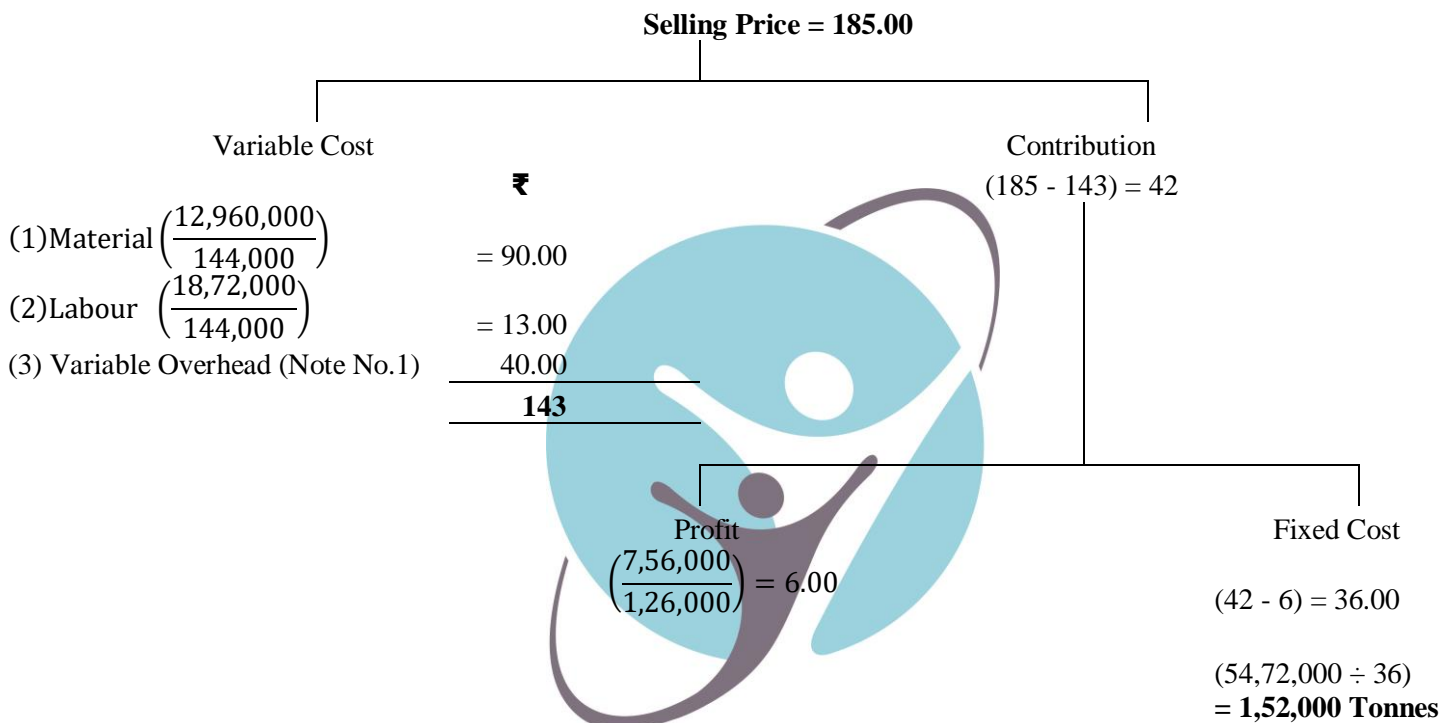
	<b>Year - I</b>	<b>Year - II</b>
Quantity Sold (tones)	1,26,000	1,44,000
Price per tone	₹ 185	₹ 185
<b>(₹ in thousands)</b>		
Sales Value	23,310	26,640
Raw Materials	11,340	12,960
Direct Labour	1,512	1,872
Factory, Administration and Selling Expenses	9,702	11,232
Profit	756	576

During the year II direct labour rates increased by  $8\frac{1}{3}\%$ . 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**



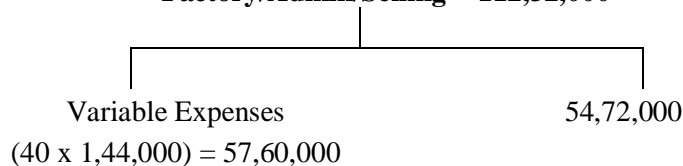
**Factory/Admin/Selling Expenses**

**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**



**Problem – 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 thought it would be prudent to have a look at the product –wise performance during the current year. The following information is furnished.

	<b>Tables</b>	<b>Chairs</b>	<b>Cabinets</b>
Unit Selling Price	80	60	36
Direct Material	28	24	16
Direct Labour	20	12	12
<b>Factory Overheads:</b>			
Variable	8	6	4
Fixed	8	6	1.28
<b>Selling, Distribution and General Administration Expenses :</b>			
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)
<b>Total Profit</b>	<b>80,000</b>		<b>60,000</b>		<b>(12,000)</b>		<b>12,80,000</b>

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.

**Problem – 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
<b>Rank</b>	<b>II</b>	<b>I</b>

**Ans No. (i) Option (I) Statement showing Production Plan**

Hrs.	Products	Units x hrs. (P.U)	Total	Balance
60,000	Surya	35,000 x 1	= 35,000	(3,500 - 35,000)
	(Balancing Figure)			
	Jaya	12,500 x 2	= 25,000	(60,000 - 25,000)
	(Minimum)			

**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
		<b>1,31,25,000</b>
	<b>Fixed Cost</b>	<b>(60,00,000)</b>
	<b>Net -Profit</b>	<b>71,25,000</b>

**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	<b>1,93,25,000</b>

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	<b>1,82,00,000</b>

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).

**Problem – 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 30<sup>th</sup> 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	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 Y. 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**

	₹
Incase Product Y is Discontinued Products X will have to Bear Expenses Previously Born By Product 'Y'	
The Final Position Will be As Follows	
	₹
Existing Net Profit 'X'	2,250
Fixed Expenses of Y	(1,250)
Final Net Profit	<b>1,000</b>

**Ans No. (ii) Statement Showing Analysis of Profit & Loss****(When the Price of Y Reduced By 20% & Demand Increase By 40%)**

	₹
<b>(A) Sales</b> $\left(4,000 \times \frac{80}{100} \times \frac{140}{100}\right)$	= 4,480
<b>(B) Direct Cost</b> $\left(2,000 \times \frac{140}{100}\right)$	(2,800)
<b>(C) Indirect Cost -Variable</b> (1,000 x 140 %)	(1,400)
Fixed Expenses	(1,250)
<b>Net Loss</b>	<b>(970)</b>
<b>Profit of X (Old)</b>	<b>2,250</b>
<b>Final New Profit</b>	<b>1,280</b>

**Ans No.(iii) Statement Showing Analysis of Revised Profit & Loss**

(When the Price of X is Doubled & Demand Will Remove by  $\left(\frac{3}{5}\right) = 60\%$ )

		₹
<b>(A) Sales</b>		
(10,000 x 2 x 40%)	=	8,000
<b>(B) Direct Cost</b> (4,500 x 40%)	=	(1,800)
<b>(C) Indirect Cost</b>		(1,400)
Variable Expenses (2,000 x 40%)		(800)
	<b>Contribution</b>	<b>5,400</b>
Fixed Expenses (Old)		<b>(1,250)</b>
	<b>Net Profit - 'X'</b>	<b>4,150</b>
	<b>Net Loss 'Y'</b>	<b>(250)</b>
	<b>Final Net -Profit</b>	<b>3,900</b>

The 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).

**Problem – 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:**

- Prepare a statement of profitability of products A, B and C in existing situation.
- Evaluate the above proposals independently and calculate the overall profitability of the company under each proposal.
- 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	<b>10,000</b>	<b>25,000</b>	<b>20,000</b>	<b>55,000</b>
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	<b>14</b>	<b>40</b>	<b>47</b>	
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)
<b>Profit/Loss</b>	<b>(20,000)</b>	<b>5,50,000</b>	<b>5,40,000</b>	<b>10,70,000</b>

**Ans No. (ii) Proposal –(a) Statement Showing Analysis of Proposal (Alternative Use of A's Capacity For Products B or C Equally**

$$\text{Hrs. Saved 'A'} \left( 10,000 \text{ units} \times \frac{8}{2} \right) = 40,000 \text{ hrs.}$$

**Statement Showing Possible Production**

$$\text{Product 'B'} \quad \left( \frac{40,000 \text{ hrs.}}{6 \text{ hrs.}} \right) = 6,666.666 \text{ units}$$

$$\text{Product 'C'} \quad \left( \frac{40,000 \text{ hrs.}}{5 \text{ hrs.}} \right) = 8,000 \text{ units}$$

$$\text{Product B \& C Equally} \quad \text{'B'} \left( \frac{20,000 \text{ hrs.}}{6 \text{ hrs.}} \right) = 3,333 \text{ units}$$

$$\text{'C'} \left( \frac{20,000 \text{ hrs.}}{5 \text{ hrs.}} \right) = 4,000 \text{ units}$$

**Statement Showing Revised Contribution Of Products B & C**

	<b>B</b>	<b>C</b>
Selling Price (P.U)	73.5 (75 x 98%)	80.75 (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)	<b>37.10</b>	<b>41.85</b>
÷ Hrs.	÷ 6	÷ 5
Contribution Per Hour	6.18	8.37

It's better to produce 'C'

**Statement Showing Analysis of Profit/Loss**

	<b>Option (I)</b>	<b>Option (II)</b>
	<b>Change for Entire Production</b>	<b>Change for Incremental Production</b>
Sales Volume	28,000 (20,000 + 8,000)	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	<b>7,71,800</b>	<b>3,34,800</b>
Existing Profit 'B'	5,50,000	5,50,000
Existing Profit 'C'	—	5,40,000
Total Profit	<b>13,21,800</b>	<b>14,24,800</b>

**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 =	<u>40,000 hrs.</u>
	<b><u>1,12,500 hrs.</u></b>

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)	<b>14</b>
Total Contribution (28,125 x 14) =	3,93,750
Fixed Cost	(105,500)
Profit 'D'	<b>2,88,250</b>
Existing Profit B & C (5,50,000 + 5,40,000)	10,90,000
Total Profit	<b>13,78,250</b>

**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
<b>Existing Profit</b>	<b>13,37,500</b>

**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**

- If price and cost under proposal (a) is for entire production of C: Proposal (b) of Export, should be accepted.
- If price and cost under proposal (a) is for incremental production C only: Proposal (a) –Option 2, should be accepted.

**Problem – 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.

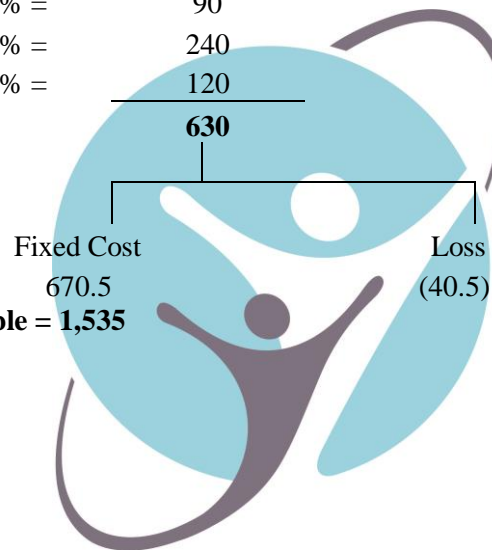
**Required:**

Set an optimal mix for 2010 and find the profitability.

**Given:**

<b>₹ - Lacs</b>	
E.B.I. Tax/Dep	300
(10% x 3,000)	
Interest	(225)
Depreciation	<u>(115.50)</u>
	<u><b>(40.5)</b></u>

	<b>Sales</b>	<b>Mix</b>	<b>P.V Ratio</b>	<b>Contribution</b>
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



**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)

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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	<b>38.5</b>	<b>44</b>	<b>55</b>	<b>66</b>
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
			<b>715.54</b>
Fixed Cost			670.50
Profit			45.04

**Problem – 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

### Problem – 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**

	<b>P</b>	<b>Q</b>
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**

	<b>Ans (i) Budgeted Profit</b>	<b>Ans (ii) Maximum Profit</b>
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'  
& Save the hours (30,000 units x 2 hours) [ minimum contribution per hour]  
→60,000 hours  
∴ Possible Production of C =  $\frac{60,000}{1.5}$  = 40,000 units

**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

**Problem – 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.

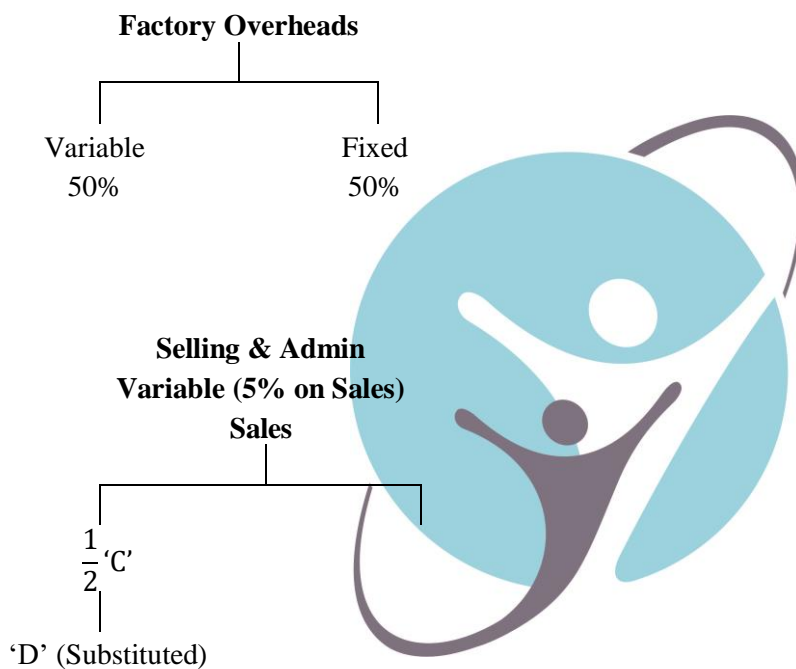
In the event of total discontinuance of product 'C', the fixed factory and selling and administration overheads will be reduced by ₹20 lakhs. Alternatively if the production and sales of product 'C' is

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**

<b>Factory Overheads = 444</b>	
Variable (50 % 444) = 222	Balancing figure (50 % 444) = 222

**Selling & Admin Overheads = 240**

<p>Variable (5% on Sales) (1,200 x 5%) = 60</p>	<p>Balancing figure = 180</p>
---	-----------------------------------

**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				
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>Total</b>
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)	(86)	(60)	(12)	(222)
	(50% 128)	(50% x 172)	(120 x 50%)	(24 x 50%)	
Variable					
Selling & Admin (5% on Sales)	(20)	(25)	(10)	(5)	(60)
	(400 x 5%)	(500 x 5%)	(200 x 5%)	(100 x 5%)	
<b>Contribution</b>	<b>164</b>	<b>214</b>	<b>38</b>	<b>58</b>	<b>474</b>
<b>Fixed Overheads</b> (Note No.1)					(450)
				<b>Profit</b>	<b>24</b>

**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

	<b>A</b>	<b>B</b>	<b>D</b>	<b>Total</b>
(A) Sales	350	500	200	1,050
	(400 - 50)		(100 + 100)	
(B) Variable Cost				
Direct - Material	(56)	(70)	(14)	(140)
	$\left(\frac{64}{400} \times 350\right)$		$\left(\frac{7}{100} \times 200\right)$	
Direct - Wages	(77)	(105)	(36)	(218)
	$\left(\frac{88}{400} \times 350\right)$		$\left(\frac{18}{100} \times 200\right)$	
Factory Overhead (Variable)	(56)	(86)	(24)	(166)
	$\left(\frac{64}{400} \times 350\right)$		$\left(\frac{12}{100} \times 200\right)$	
Selling Overhead	(17.50)	(25)	(10)	(52.50)
(Variable)	$\left(\frac{20}{400} \times 350\right)$		$\left(\frac{5}{100} \times 200\right)$	
Contribution	<b>143.50</b>	<b>214</b>	<b>116</b>	<b>473.50</b>
Fixed Overheads				(430.00)
				<b>43.50</b>

Saving in Fixed Overheads = 10

Revised Fixed Cost (450 - 10) = **440**

**Statement Showing Financial Implication Of Continuance of Product 'C' As Service of Product**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>Total</b>
Sales	400	500	50	200	1,150
			(200 x 25%)		
Variable Cost					
Direct - Material	(64)	(70)	(8)	(14)	(156)
			$\left(\frac{32 \times 50}{200}\right)$	$\left(\frac{7}{100} \times 200\right)$	
Direct - Wages	(88)	(105)	(15)	(36)	(244)
			$\left(\frac{60 \times 50}{200}\right)$	$\left(\frac{18}{100} \times 200\right)$	
(Variable) Factory Overhead	(64)	(86)	(15)	(24)	(189)
			$\left(\frac{60 \times 50}{200}\right)$	$\left(\frac{12}{100} \times 200\right)$	
(Variable) Selling Overhead	(20)	(25)	(2.5)	(10)	(57.50)
			$\left(\frac{10 \times 50}{200}\right)$	$\left(\frac{5}{100} \times 200\right)$	
Contribution	164	214	9.5	116	503.50
Fixed Overheads					(440)
				<b>Profit</b>	<b>63.50</b>



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'.

#### **Problem – 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)**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>Total</b>
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)	
<b>Contribution (P.U)</b>	<b>100</b>	<b>110</b>	<b>105</b>	
÷ Direct Labour	÷ 8	÷ 11	÷ 7	
Hrs. - P.U				
<b>Contribution Per Hour</b>	<b>12.5</b>	<b>10</b>	<b>15</b>	
<b>Rank</b>	<b>II</b>	<b>III</b>	<b>I</b>	
<b>General Overhead</b>				20,000
Specific Overhead		2,000	4,780	
Break -Even -Point (Units)				
For only one product At a Time	$\left(\frac{20,000}{100}\right)$ 200	$\left(\frac{22,000}{110}\right)$ 200	$\left(\frac{24,780}{105}\right)$ 236	
Possible Production	202.125	147	231	
	$\left(\frac{1,617}{8}\right)$	$\left(\frac{1,617}{11}\right)$	$\left(\frac{1,617}{7}\right)$	
<b>Contribution</b>	202 x 100 20,200	147 x 110 14,700	231 x 105 24,255	
Fixed Cost	(20,000)	(22,000)	(24,780)	
<b>Profit Loss</b>	<b>200</b>	<b>(7,300)</b>	<b>(525)</b>	

**Ans No. (ii) Statement Showing Contribution P.U/ P.H Rank For Production**

	<b>A</b>	<b>B</b>	<b>C</b>
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)
	<b>120</b>	<b>125</b>	<b>121</b>
	<b>III</b>	<b>I</b>	<b>II</b>
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.

**Problem – 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 quantity 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.

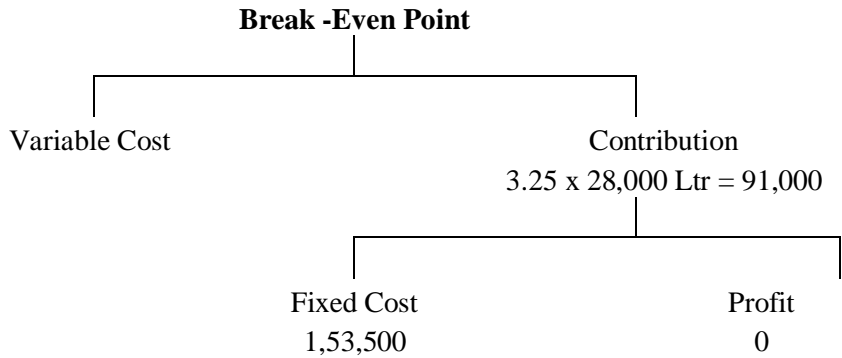
**Ans No. (i)**

**Statement Showing Contribution Per Unit**

	<b>Danida</b>	<b>Danima</b>
	<b>P.U</b>	<b>P.U</b>
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)	<b>4.02</b>	<b>3.25</b>

**Statement Showing Analysis of Proposals**

	<b>Danida</b>	<b>Danima</b>	<b>Danida</b>	<b>Danima</b>
Contribution	1,25,000 502,500 (1,25,000 x 4.02)	50,000 1,62,500 (50,000 x 3.25)	1,50,000 603,000 (1,50,000 x 4.02)	25,000 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	<b>3,29,000</b>	<b>71,500</b>	<b>4,19,500</b>	<b>(9,750)</b>
Total Profit				
Danida	3,29,000		4,19,500	
Danima	71,500		(9,750)	
	<b>400,500</b>		<b>409,750</b>	
Budget Profit	<b>401,250</b>		<b>401,250</b>	
	<b>(750)</b>		<b>8,500</b>	

**Ans No. (ii)****Statement Showing Analysis of Profit/Loss**

	<b>Danida</b>	<b>Danima</b>	<b>Total</b>
Contribution	1,47,000 5,90,940 (1,47,000 x 4.02)	28,000 91,000 (28,000 x 3.25)	1,75,000 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	<b>408,640</b>	—	<b>408,640</b>
Budget Profit	<b>(2,48,500)</b>	<b>(1,52,750)</b>	<b>(401,250)</b>
		<b>Inc -By</b>	<b>7,390</b>

**Problem – 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:**

- Determine the production and profits being earned at present.
- 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.
- 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

$$\text{Present Production} = \left( \frac{42,000}{15 + 25 + 20} \right) = 600 \text{ Batches}$$

$$\text{Present Fixed Cost} = (600 \times 1,100) = 6,60,000$$

$$\text{Demand (600 x 150 \%)} = 900 \text{ Batches}$$

$$(600 \times 175 \%) = 1,050 \text{ Batches}$$

**Statement Showing loss on purchase payback method, PH/Rank**

	P	Q	R
Purchase price (per batch)	555	700	0.84
	(5.55 x 100)	(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	<u>(6,60,000)</u>
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)
<b>Demand 900 Batches</b>			
	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 (900 x 1,675)	17,58,750 (1,050 x 1,675)
(-) Fixed Cost	(6,60,000)	(6,60,000)
Additional Purchase Cost Q	(2,10,000) (250 x 840)	(2,62,500) (250 x 1,050)
P		(63,000) (350 x 180)
Profit/Loss	<u>6,37,500</u>	<u>7,73,250</u>

**900 Batches**

Sales Price	3,750	3,750	
P	(375)	(375)	
Q	(700)	(450)	
R	(450)	(450)	
Assembly	(800)	(800)	
	<u>1,425</u>	<u>1,675</u>	
	x 840	x 60	
	11,97,000	+ 100,500	= 12,97,500
Fixed Cost			<u>(6,60,000)</u>
			6,37,500

**Problem – 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:

	<b>Method A</b>	<b>Method B</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			Method - B		
	Level Of Activity			Level Of Activity		
x Contribution P.U (Note - A)	5,00,000 x 3	4,00,000 x 3	6,00,000 x 3	5,00,000 x 4	4,00,000 x 4	6,00,000 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)
<b>Net Profit</b>	<b>5,00,000</b>	<b>2,00,000</b>	<b>8,00,000</b>	<b>5,00,000</b>	<b>1,00,000</b>	<b>9,40,000</b>

(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**

	<b>Method A</b>	<b>Method B</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)
<b>Contribution (P.U)</b>	<b>3.00</b>	<b>4.00</b>

**Note No.1****Analysis of Semi –Variable Cost****Method –A**

$$\begin{array}{l} \text{Variable Cost (P.U) = } x \quad \text{Fixed Cost = } y \\ 3,50,000 x + y = 5,50,000 \\ 4,50,000 x + y = 6,50,000 \\ 1,00,000 x = 1,00,000 \end{array}$$

$$x = 1.00$$

$$(3,50,000 \times 1) + y = 5,50,000 \quad y = 2,00,000$$

**Note No. 2 Method –B**

$$\begin{array}{l} \text{Variable Cost (P.U) = } x \quad \text{Fixed Cost = } y \\ 3,50,000 x + y = 4,75,000 \\ 4,50,000 x + y = 5,25,000 \\ 1,00,000 x = 50,000 \end{array}$$

$$x = 0.50$$

$$(3,50,000 \times 0.5) + y = 4,75,000 \quad y = 3,00,000$$

**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
<b>Total</b>	<b>10,00,000</b>	<b>15,00,000</b>

**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	=	<u>(3.50)</u>
Contribution	=	5.00
		÷ 10
Contribution Cost	=	<b>0.50</b>

**Problem – 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:**

- Calculate the quantities of P and Q in the best product mix to achieve the maximum profit and compute the maximum profit.
- What will be the opportunity cost of meeting P's demand fully?

**Statement Showing Contribution PB/P.H Rank**

	<b>P</b>	<b>Q</b>
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)
<b>Rank</b>	<b>I</b>	<b>II</b>

**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
			<b>42,16,000</b>

**Statement Showing "Incremental Fixed Cost"**

	<b>'P'</b>	<b>'Q'</b>
	<b>(₹)</b>	<b>(₹)</b>
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

**Problem – 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:

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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
	<b>II</b>	<b>(Sub Contract)</b>	<b>III</b>	<b>I</b>

**Note No.1 Hrs. Per Unit**

<b>Product</b>	<b>Machine Cost P.U</b>	<b>hrs. P.U</b>
A	48 ÷ 8 =	6
B	32 ÷ 8 =	4
C	64 ÷ 8 =	8
D	24 ÷ 8 =	3

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Selling Price (P.U)	162	156	173	118
Sub Contract (Price)	(146)	(126)	(155)	(108)
Contribution P.U	<b>16</b>	<b>30</b>	<b>18</b>	<b>10</b>
	÷ 6	Purchase / Subcontract	<b>÷ 8</b>	÷ 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
			<b>33,24,000</b>
<b>Fixed Cost</b>			<b>(10,00,000)</b>
			<b>23,24,000</b>

<b>Hrs.</b>	<b>Sub Contract V/s Manufacture</b>
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
		<b>46,000</b>

Additional -Fixed Cost (11,00,000 - 10,50,000)	(50,000)
Profit/Loss	<b>(4,000)</b>

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)
			<b>(12,500)</b>

➤ **Advice – Do Not –Expand –Capacities**

**Add –Contribution Per Unit = (Contribution On Production –Contribution on Subcontract)**

**Statement Showing Analysis of Profit / Loss**

	A	A	B	C	D	Total
	(Sub Contract)	(Produce)	(Sub Contract)	(Sub Contract)	(Produce)	
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
					<b>Fixed Cost</b>	<b>(10,00,000)</b>
					<b>Profit / Loss</b>	<b>23,24,000</b>

**Problem – 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 is dependent on the output level and is tabulated below at different levels of output:

<b>Production units (any combination of one or more of any A, B, C or D)</b>	<b>Total Fixed Cost (₹)</b>
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:

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Sub - contract Price (₹ / unit)	85	94	101	100

**Required:**

- 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?
- What is the minimum number of units to be produced to achieve break –even point?
- 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**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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)
<b>Contribution P.U</b>	<b>21</b>	<b>15</b>	<b>18</b>	<b>26</b>
Hrs. P.U	÷ 1.5	÷ 2	÷ 1.50	÷ 2
<b>Contribution P.H</b>	<b>14</b>	<b>7.5</b>	<b>12</b>	<b>13</b>
<b>Rank</b>	<b>I</b>	<b>IV</b>	<b>III</b>	<b>II</b>

<b>Products</b>	<b>Variable Overhead ÷ 4 =</b>	<b>hrs. / P.U</b>
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**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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	<b>(6)</b>	<b>(1)</b>	<b>(2)</b>	<b>(2)</b>
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>B</b>	<b>C</b>
Selling Price (P.U)	109	121
Material (Sub Contribution)	(95)	(101)
Contribution P.U	14	20

**Statement Showing Analysis of Profit / Loss**

	<b>A</b> (Produce)	<b>B</b> (Produce)	<b>D</b> (Produce)	<b>B</b> (SubCont)	<b>C</b> (SubCont)	<b>Total</b>
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
	<b>Fixed Cost</b>					<b>(12,50,000)</b>
				<b>Net Profit</b>		<b>19,10,000</b>

**Decision**

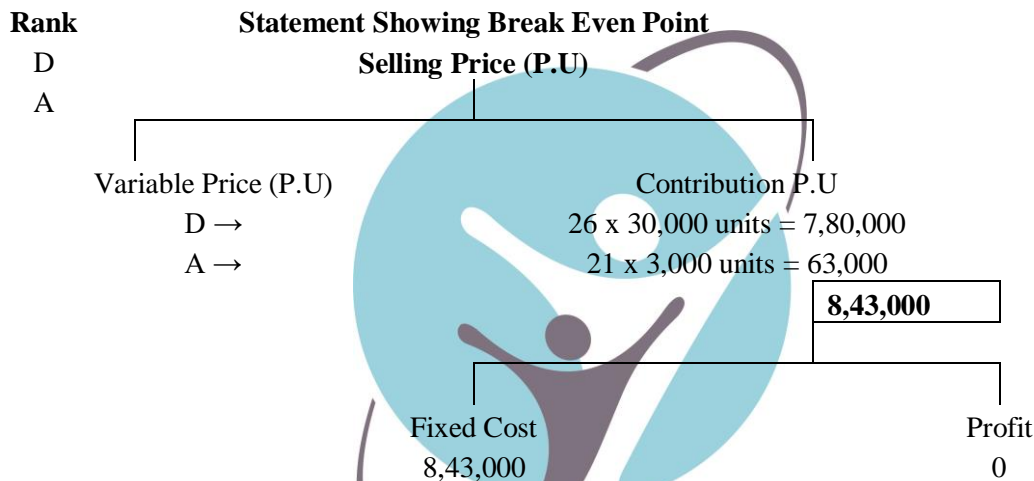
However AXE Ltd. can save fixed cost of ₹ 4,07,000 (₹ 12,50,000 – ₹ 8,43,000) if it keeps its production limited to 1,00,000 units. But in this case AXE Ltd. has to subcontract 20,000 units of B to fulfill maximum market demand. Contribution Lost from subcontracting of 20,000 units is amounting to ₹

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
	<b>Fixed Cost</b>			<b>Net Profit</b>		<b>(8,43,000)</b> <b>22,97,000</b>

Ans No. (ii)



**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)	-	-	-	-
<b>Contribution (P.U)</b>	<b>21</b> <b>(II)</b>	<b>15</b> <b>(III)</b>	<b>18</b>	<b>26</b> <b>(I)</b>	<b>15</b>	<b>14</b>	<b>20</b> <b>(Sub Cont)</b>	<b>24</b>

**Problem – 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 be 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 =	<u>(0.50)</u>
Contribution =	<u><b>0.30</b></u>
Toy =	3.00 Per Toy (Selling Price)
	<u>(2.40) Variable Price</u>
	<u><b>0.60</b> Contribution</u>
Mould =	<u><b>20,000</b></u>

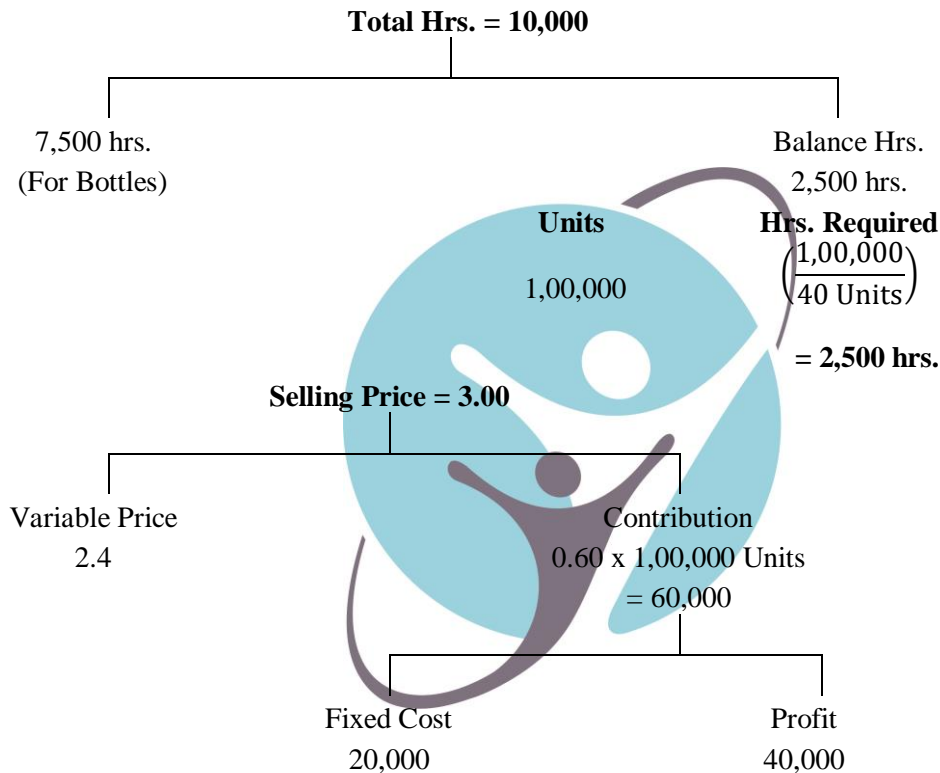
**Moulding Machine**

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**

Decision = Accept

**Ans No. (ii) Statement Showing Contribution P.U/P.H Rank**

	<b>Bottle</b>	<b>Toys</b>
Selling Price	50 (100 x 0.50)	120 (40 x 3)
Variable Price	(20 (100 x 0.20))	(96 (40 x 2.40))
<b>Contribution (P.U)</b>	<b>30</b>	<b>24</b>
÷ hrs.	÷ 1	÷ 1
<b>Contribution per hr.</b>	<b>30</b>	<b>24</b>

If Should Not Accept the Special Order For Toys.

**(iii) Statement Showing Indifference Point**

$$\begin{aligned} \text{No. of units} &= x \\ 20,000 + 2.4x &= 2.80x \\ 0.40x &= 20,000 \end{aligned}$$

$$x = 50,000 \text{ units}$$

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 from 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)
<b>Contribution</b>	<b>2,97,600</b>	<b>2,52,000</b>	<b>38,400</b>	<b>7,200</b>
Fixed Cost	(2,20,000)	(2,00,000)	(20,000)	(-)
<b>Profit/Loss</b>	<b>77,600</b>	<b>52,000</b>	<b>18,400</b>	<b>7,200</b>

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)
<b>Contribution</b>	<b>2,90,000</b>	<b>2,70,000</b>	<b>20,000</b>
<b>Fixed Cost</b>	<b>(2,00,000)</b>	<b>(2,00,000)</b>	<b>-</b>
	<b>90,000</b>	<b>70,000</b>	<b>20,000</b>

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	<u>₹ 12,400</u>

## Decision on Capacity Utilization

### Problem – 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	<b>600</b>	<b>720</b>	<b>1,200</b>

**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	<b>500</b>	<b>300</b>	<b>400</b>

**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		= 1,80,00,000
	(10 % x 18,00,00,000)		
			<b>1,89,96,000</b>

Rate of Interest =  $\left(\frac{1,89,96,000}{1,80,00,000}\right) \times 100 = 10.553\%$

**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 %	$\left(\frac{2,400 \times 12,000}{9,000}\right)$	$\left(\frac{2,400 \times 70}{100}\right)$	$\left(\frac{2,400 \times 50}{100}\right)$
	1,800 hours	= 3,200	= 1,680	= 1,200
	$\left(\frac{1,800}{9,000 \text{ hours}} \times 12,000\right)$	$\frac{(2,400)}{800 \text{ hours}}$	$\left(\frac{1,680 \times 12,000}{9,000}\right)$	$\frac{1,200 \times 12,000}{9,000}$
	= 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	=	<u>12,88,000</u>
					<b>15,68,000</b>

<b>Cost</b>			<b>Cost</b>		
C	160	x	1,500	=	(2,40,000)
D	800	x	1,200	=	<u>(9,60,000)</u>
					<b>3,68,000</b>

**Revenue From Additional –Units**

(3,000 x 1,600)	48,00,000
Present Income	1,80,00,000
(18,00,00,00 x 10 %)	

$$\left( \frac{2,31,68,000}{22,00,00,000} \times 100 \right) = 10.53 \%$$

2,31,68,000

**Decision on Choice of Supplier / Customer****Problem – 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

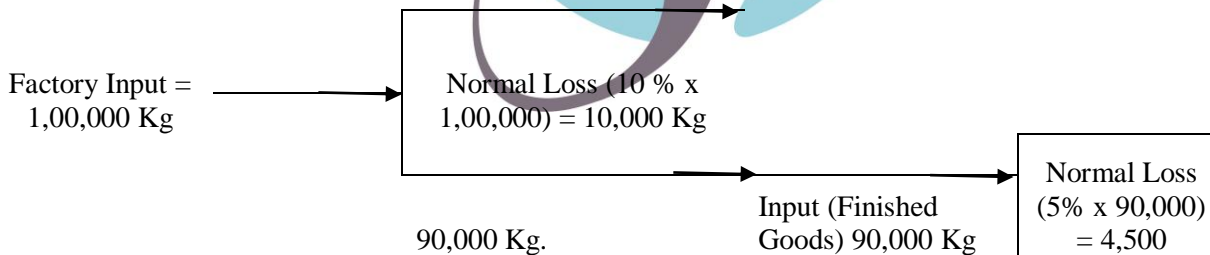
In case of supplies to customers A and B, the fixed delivery costs will be ₹ 1,500 per month and the variable delivery costs will be 65 paise and 36 paise per kg. respectively.

Customer C will collect the entire output from the warehouse of the company.

**Required:**

Indicate with reasoning –

- Choice of supplier with comparative cost tables.
  - Choice of customer with comparative tables of net realization.
- Also prepare the statements showing process costs and overall results.



	₹
Wages	6,00,000
Overheads	<u>2,28,000</u>

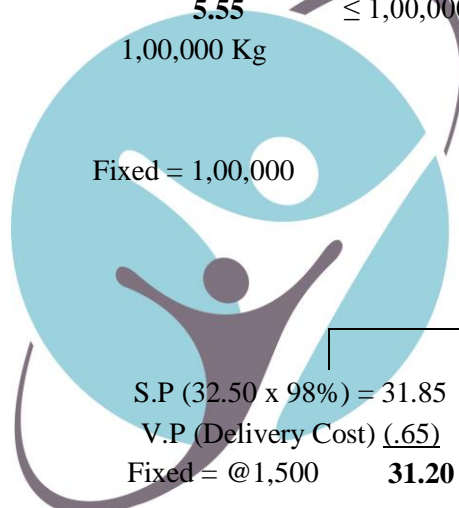
**Output**  
**85,500 Kg**

Wages =5,50,000  
Overhead =4,22,900

**Material**  
**1,00,000 Kg**



Price =	5.00	5.6	5.3	<u>0.25</u>
Variable Price =	<u>0.30</u>	<u>0.25</u>	<u>0.25</u>	<u>6.05</u>
	<b>5.30</b>	<b>5.85</b>	<b>5.55</b>	≤ 1,00,000
≤ 60,000 Kg		≤ 80,000 Kg		



Customer		
A ≤ 40,000 Kg	B ≤ 80,000 Kg	C =85,500
S.P (32.50 x 98%) = 31.85	(32 x 98%) = 31.36	30.90
V.P (Delivery Cost) (.65)	<u>(0.36)</u>	<u>-</u>
Fixed = @1,500	@ 1,500	<b>31</b>
<b>31.20</b>	<b>31</b>	<b>30.90</b>

**Ans No.1**

**Statement Showing Purchase Analysis**

<b>Option (I)</b>	₹
'Z' (1,00,000 kg x 5.55) =	5,55,000
 <b>Option (II)</b>	 ₹
'X' (60,000 kg x 5.30) =	3,18,000
'Y' (40,000 kg x 5.85) =	<u>2,34,000</u>
	<u><b>5,52,000</b></u>



**Problem – 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:**

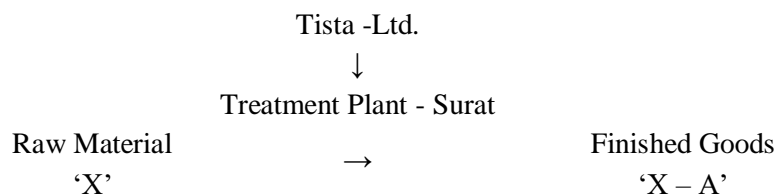
	Source of Procurement		
	Town A	Town B	Town C
Quantity Available (tonnes p.a.)	9,000	8,000	45,000
Distance from Surat (Kms.)	300	250	500
Price Offered (per tonne) (₹)	90	110	78

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**

**Capacity = 60,000 Tonnes**

Variable Cost	=	5.00 Per -Tonne
Fixed Cost	=	<u>7,50,000</u>

Own Fleet Vehicles = 260 lacs (Tonne –Kms.)

Fixed Cost	=	₹ 10,40,000 (p.a)
Variable Cost	=	0.08 Per Tonne/Km
Minimum Payment	=	<u>1,25,000</u>

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.)	<u>0.04</u>
Cost per tonne -km (by using own vehicle)	<u>0.12</u>

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'**

	<b>Town - A</b>	<b>Town - B</b>	<b>Town - C</b>
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 =	<b>114</b>	<b>130</b>	<b>118</b>
Minimum Selling Price (Per Tonne) (By - 0)	150	150	150
Contribution (Per Tonne)	(150 - 114)	(150 - 130)	(150 - 118)
	36	20	32
Kms.	÷ 300	÷ 250	÷ 500
Contribution (Per Km.)	0.12	0.08	0.064
	<b>I</b>	<b>II</b>	<b>III</b>

**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	–	–
	<b>59,600</b>		<b>6,50,000</b>

**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)
	$\frac{2,13,00,000}{500}$	Maximum Capacity	<b>260</b>

**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
	<b>59,600</b>		<b>11,318,000</b>

**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
<b>Material Cost</b>	<b>(5012.8)</b>
<b>Tonnes</b>	
A 9,000 x 90 = 8,10,000	
B 8,000 x 110 = 8,80,000	
C 42,600 x 78 = 33,22,800	
<b>50,12,800</b>	
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)
	<b>2,020.20</b>

**Problem – 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%
<b>Details of Fixed Costs :</b>		
– 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**

- Expected Demand is to be 50% of 25,000 units i.e. 12,500 units.
- Working Efficiency (of installed capacity) required for independent operation to produce 12,500 units:

A	B
$\left[ \left( \frac{12,500 \text{ units}}{20,000 \text{ units}} \times 100 \right) = 62.5 \% \right]$	$\left[ \left( \frac{12,500 \text{ units}}{15,000 \text{ units}} \times 100 \right) = 83.33 \% \right]$

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

### Problem – 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 31<sup>st</sup> December is being reviewed by the Board of Directors.

Sales @ ₹ 10 per unit	10,00,000
<b>Cost of Sales :</b>	
Direct materials	2,50,000
Direct labour	1,50,000
<b>Production overheads:</b>	
Variable	30,000
Fixed	2,30,000
<b>Administrative overheads:</b>	
Fixed	1,00,000
<b>Selling and distribution overhead :</b>	
Variable	50,000
Fixed	1,50,000



- The Production Director proposed to reduce selling price to ₹ 9 in order to utilize full capacity.
- 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.
- 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.
- 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.

	<b>Proposal (I)</b>	<b>Proposal (II)</b>	<b>Proposal (III)</b>	<b>Proposal (IV)</b>
(A) Sales	1,50,000 (Units) 13,50,000 (1,50,000 x 9)	1,20,000 (Units) 14,40,000 (1,20,000 x 12) (10 x 120%)	1,20,000 Units 13,20,000 (1,20,000 x 11) (10 x 110%)	1,20,000 (Note a) 12,00,000 (1,20,000 x 10)
(B) Relevant Cost (Variable)				
(1) Materials	(3,75,000) $\left(\frac{2,50,000}{1,00,000} \times 1,50,000\right)$	(3,00,000) $\left(\frac{2,50,000}{1,00,000} \times 1,20,000\right)$	(3,00,000) $\left(\frac{2,50,000}{1,00,000} \times 1,20,000\right)$	(3,00,000) $\left(\frac{3,75,000}{1,50,000} \times 1,20,000\right)$
(2) Labour	(2,25,000) $\left(\frac{1,50,000}{1,00,000} \times 1,50,000\right)$	(1,80,000) $\left(\frac{1,50,000}{1,00,000} \times 1,20,000\right)$	(1,98,000) (Note No. 1)	(1,80,000) $\left(\frac{2,25,000}{1,50,000} \times 1,20,000\right)$
(3) Production Overhead	(45,000) $\left(\frac{30,000}{1,00,000} \times 1,50,000\right)$	(36,000) $\left(\frac{30,000}{1,50,000} \times 1,20,000\right)$	(36,000) $\left(\frac{30,000}{1,00,000} \times 1,20,000\right)$	(36,000) $\left(\frac{45,000}{1,50,000} \times 1,20,000\right)$
(4) Selling Overhead	(75,000) $\left(\frac{50,000}{1,00,000} \times 1,50,000\right)$	(60,000) $\left(\frac{50,000}{1,00,000} \times 1,20,000\right)$	(60,000) $\left(\frac{50,000}{1,00,000} \times 1,20,000\right)$	(60,000) $\left(\frac{75,000}{1,50,000} \times 1,20,000\right)$
Packing				(24,000)
<b>Contribution</b>	<b>6,30,000</b>	<b>8,64,000</b>	<b>7,26,000</b>	<b>6,00,000</b>
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				
<b>Profit/Loss</b>	<b>(1,50,000)</b>	<b>1,59,000</b>	<b>86,000</b>	<b>1,20,000</b>

**Note No. (1) Wages -**

(1,20,000 - 1,00,000) = 20,000

20%

2%

10 %

1%

(2,000 units x 50 weeks) = 1,00,000

(20% Target Production)

P.U = (1.5 x 1.10) = 1.65 x 1,20,000 = **1,98,000**



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:**

Present an Income Statement for 2013 -14.

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.

Evaluate the four alternative proposals put –forth by the Vice –President –Marketing.

Determine the best output level to be budgeted and prepare and over –all Income Statement for 2013 -14 at that level of output.

**Problem – 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

- The expenses are constant and common to both the States. They stand allocated on the basis of sales.
- 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

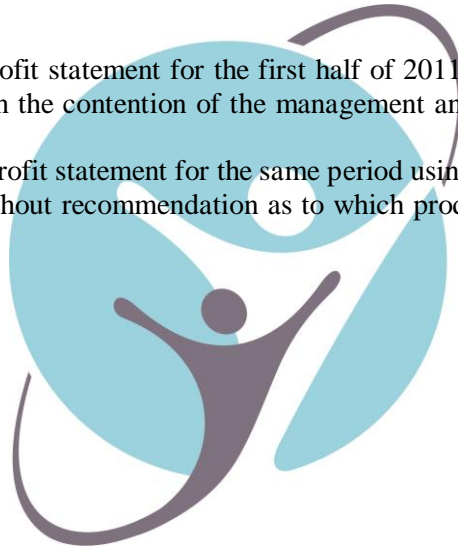
the State of Rajasthan is contributing profits. For the next half year he expects no increase in demand in Haryana while for Rajasthan he anticipates to sell B or C more by 50% of existing sales. This will utilize the idle capacity in full.

**The product wise relevant details for the first half of 2011 – 12 are:**

	<b>A</b>	<b>B</b>	<b>C</b>
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)**

	<b>Haryana</b>	<b>Rajasthan</b>	<b>Total</b>
(A) Sales	3,000	900	3,900
(B) Variable Cost			
<b>Product</b>			
<b>Man -Cost</b>			
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)
	<b>1,065</b>	<b>315</b>	
<b>Selling Cost :-</b>			
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)
	<b>72</b>	<b>21</b>	
Contribution	1,863	564	2,427
<b>Specific Cost</b>			
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 (Admin Overhead Common Fixed)	<b>485</b> -	<b>32</b> -	<b>517</b> <b>(156)</b>
<b>Net Profit</b>			361
<b>P.V. Ratio</b>	$\left(\frac{1,863}{3,000} \times 100\right)$ = 62.1 %	$\left(\frac{564}{900} \times 100\right)$ = 62.67 %	$\left(\frac{2,427}{3,900} \times 100\right)$ = 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 incharge 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)**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>Total</b>
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	<b>855</b>	<b>756</b>	<b>816</b>	<b>2,427</b>
Specific -Cost				
Manufacturing Cost	(570)	(470)	(610)	(1,650)
Selling Cost				(260)
Sales -Ratio (15 : 12 : 12)	(100)	(80)	(80)	(353 - 93)
Common Fixed Expenses	<b>185</b>	<b>206</b>	<b>126</b>	<b>517</b>
Net Profit				156
P.V Ratio	$\left(\frac{855}{1,500} \times 100\right)$ = 57%	$\left(\frac{756}{1,200} \times 100\right)$ = 63%	$\left(\frac{816}{1,200} \times 100\right)$ = 68%	$\left(\frac{2,427}{3,900} \times 100\right)$ = 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).

**Labour Related Decisions****Problem – 61**

MFG Ltd. is producing a component called 'KDK'. Estimated costs are:

	<b>Fixed Cost per year</b>	<b>Variable Cost per 'KDK'</b>
	<b>(₹ '000)</b>	<b>(₹)</b>
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.

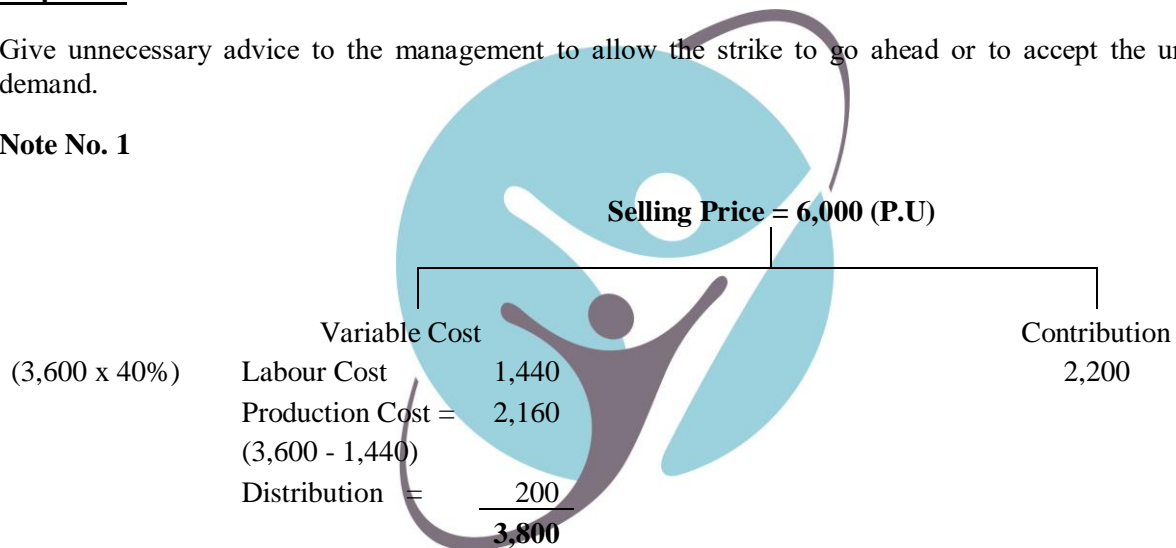
MFG Ltd. has been facing industrial relations problem as the workers of company have a very strong union. Company is faced with the possibility of a strike by direct production workers engaged on the assembly of 'KDK'. The trade union is demanding an increase of 15%, back –dated from the beginning of 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**



**Note No. 2**

<b>Labour Cost</b>	
Labour Cost = 1,440	1,440
(40% x 3,600)	144
Inc -By 216	
<u>(1,440 x 15%)</u>	<u>(1,440 x 10%)</u>
<b>= 1,656</b>	<b>= 1,584</b>

**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	<u>(30 minutes)</u>
	<b>Productive Time Per Day</b> <u><b>360 minutes</b></u>
$\left(\frac{90 \text{ men} \times 300 \text{ days} \times 360 \text{ minutes}}{180 \text{ minutes}}\right)$	= <b>54,000 Units</b>

**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) = <u>(1,300)*</u>	
<b>52,700 x 144</b>	
Labour Cost (1,440 x 10%) = 144	
<b>Loss of Contribution Due to Sales</b>	28,60,000
(1,300 x 2,200)	
Overtime Premium	
(25 days x 90 men x 2 units) = 4,500	
Loss of Sales = <u>(1,300)</u>	
<b>3,200</b>	
(3,200 x 1,584 x 0.50)	25,34,400
<b>Payment For Efficiency</b>	
$\left(3,200 \times \frac{100}{90} \times 1,584 \times 1.5\right)$	8,44,800
<b>Fixed Cost</b>	1,00,000
	<b><u>1,39,28,000</u></b>

**Problem – 62**

The details of the output presently available from a manufacturing department of Hitech Industries Ltd. are as follows:

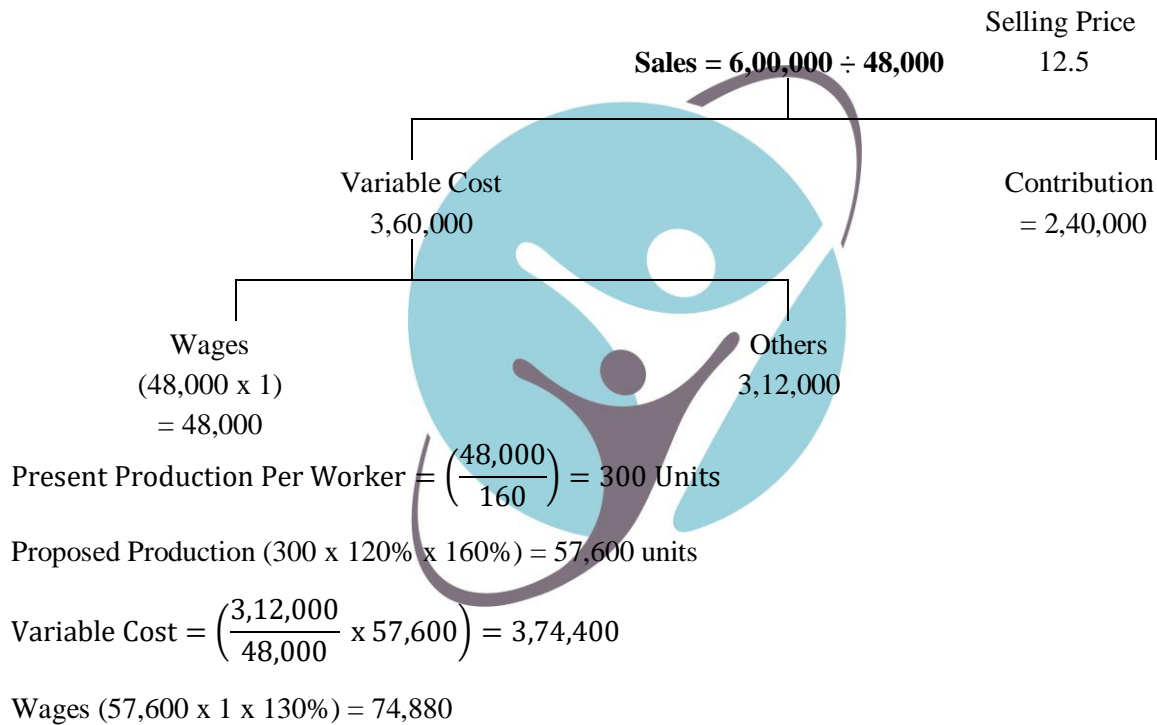
Average output per week 48,000 units from 160 employees

Saleable value of output	.....	₹ 6,00,000
Contribution made by the output towards fixed expenses and profit	.....	₹ 2,40,000

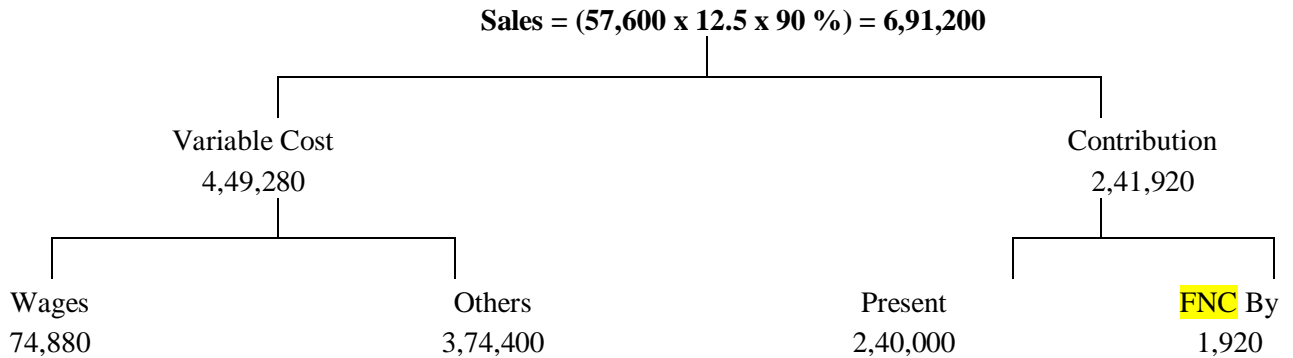
The Board of Director plans to introduce more automation in the department at a capital cost of ₹1,60,000. The effect of this will reduce the number of employees to 120, but to increase the output per individual employee by 60%. To provide necessary incentive to achieve the increased output the Board 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.



Efficiency	Bonus
60%	30%
2%	1%

**Problem – 63**

In its round of talks with the representatives of the 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 output produced. 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 =	20,70,000			
(18,00,000 + 15% 18,00,000)				
(3) Variable Production Overhead	3,00,000			
(4) Variable Sales Overhead	3,00,000			
(5) Variable Distribution Overhead	1,00,000			
	<b>39,70,000</b>			
			Fixed Cost	
			₹	Profit
(1) Fixed Production Overhead =	10,00,000			1,30,000
(2) Fixed Sales Overhead =	6,00,000			
(3) Fixed Distribution Overhead =	1,00,000			
(4) Fixed Admin Overhead =	2,00,000			
	<b>19,00,000</b>			

**Ans No. (ii)**

**Statement Showing Revised Budget If Proposal Of the Management is Accepted**

Sales (1,50,000 x 110 %)		₹	
$\left(\frac{60,00,000}{15,00,000}\right) = 4.00 \text{ P. U} = (16,50,000 \times 3.90)$			= 64,35,000
(2.5 % 4) = (0.10)			
<b><u>3.90</u></b>			

Variable Cost	₹		Contribution	
(1) Direct -Material = $\left(\frac{12,00,000}{15,00,000 \text{ units}} \times 16,50,000\right)$	13,20,000		22,15,750	
(2) Direct Wages <b>Wages</b> (18,00,000 x 1.05) = (16,50,000 x 0.15) =	20,70,000 18,90,000 <u>2,47,500</u>		Fixed Overhead	Profit
	<b>21,37,500</b>		19,00,000	3,15,750
(3) Variable Overhead $\left(\frac{3,00,000}{15,00,000} \times 16,50,000\right)$	3,30,000		(Ans No.1)	
(4) Variable Overhead (Selling) = (5 % 64,35,000)	3,21,750			
(5) Distribution Overhead $\left(\frac{1,00,000}{15,00,000} \times 16,50,000\right)$	= <u>1,10,000</u> <b>42,19,250</b>			

### Preventive Maintenance Vs Break –Down Maintenance

#### Problem – 65

A company has continuous manufacturing process involving an output of 6 tonnes 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****Problem – 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.

**Given** Expected 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)

**OptionII if Shut Down**

Profit/Loss	(88,000)
(b) Shut down point	$\left( \frac{2,00,000 - 88,000}{8} \right)$
	= 14,000 units

**Problem – 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 level of production of shut-down point?

Given Fixed Cost 3,50,000



Normal Production capacity at 80% = 95,000 units

$$\text{At 100\%} = \frac{95,000}{80\%} = 1,18,750 \text{ units}$$

Selling Price = 8

	Shut down cost	
Variable Cost	Contribution	= 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)
	<hr/>
	(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

### Problem – 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	<hr/> 7
	<b>135</b>

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**

Variable Price	Selling Price = 200	Contribution
Direct Material =	65	86.00
Direct Labour =	Fixed	
Variable Overhead =	33	
Selling Overhead =	16	
(65 + 33 + 16) =	<u>114</u>	
<b>Labour Hr.</b>	<b>Production</b>	
1	1 Unit	

	(₹)	
Shutdown Cost =	1,25,000	(Manufacturing Fixed -Overheads)
Shutdown Cost =	50,000	
Re-opening Cost =	<u>1,00,000</u>	
(1,25,000 + 50,000 + 1,00,000) =	<u><b>2,75,000</b></u>	

**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	<u>(2,75,000)</u>
<b>Net -Savings</b>	<u><b>51,25,000</b></u>

$$\text{Shutdown Point} = \left( \frac{51,25,000}{86} \right) = 59,594.02 = 59,594 \text{ units}$$

**Problem –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)

**Problem –73**

SFM Ltd. wants to evaluate the potential elimination of Division 'Z'. The basic information regarding cost and revenue is given below:

	<b>Division X and Y</b>	<b>Division Z</b>	<b>Total</b>
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:**

- 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?
- 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?
- 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)

	<b>If Eliminates 'Z'</b>	<b>If -Keeps 'Z'</b>	<b>If Eliminates 'Z'</b>
Sales	1,20,000	1,35,000	15,000
Variable Cost	(60,000)	(68,000)	(8,000)
<b>Contribution</b>	<b>60,000</b>	<b>67,000</b>	<b>7,000</b>
Fixed Cost	(48,000)	(60,000)	12,000
	(42,000 + 6,000)	(42,000 + 12,000 + 6,000)	
	<b>12,000</b>	<b>7,000</b>	<b>(5,000)</b>

<b>Advantages to Eliminate Division Z</b>	<b>(₹)</b>
Reduction in Variable Expenses	8,000
Reduction in Fixed Expenses (₹ 12,000 - ₹ 6,000)	6,000
<b>Total Benefit</b>	<b>14,000</b>

<b>Disadvantages to Eliminate Division Z</b>	<b>(₹)</b>
Reduction in Sales	15,000
Decrease in Profit by Eliminating Division Z	1,000

₹ 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.

### **Problem -74**

TQM Limited makes engines for motor cars for its parent company and for two other motor car manufactures.

On 31<sup>st</sup> 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:**

	<b>At 75% (₹)</b>	<b>At 25% (₹)</b>	<b>Idle (₹)</b>
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 be relevant to the discussion.

**Statement Showing Analysis of Cost**

	<b>Option (I)</b>	<b>Option (II)</b>
	<b>75% In Feb</b>	<b>At -25 Each</b>
	<b>And Close In March &amp; April</b>	<b>From Feb March/April</b>
	<b>(₹)</b>	<b>(₹)</b>
<b>(A) Direct Cost</b>		
(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>(B) Indirect Cost Factory Overheads</b>		
(1) Indirect Material Idle	8,400	14,700
	9,800 (4,900 x 2 months)	(4,900 x 3)
(2) Indirect Labour	101,500	1,78,500 (59,500 x 3)
(3) Training Cost	65,800	–
<b>(C) Indirect Expenses</b>		
(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 (26,600 x 2)	(34,300 x 3)
<b>(D) Office Overheads</b>		
(1) Staff Salaries	1,48,400	2,94,000
Two Months Idle	1,35,100 (67,550 x 2)	(98,000 x 2)
(2) Other Overheads	28,000	59,850
	22,400	(19,950 x 3)
(3) Two Month Idle	(11,200 x 2)	
<b>Total Cost</b>	<b>17,15,700</b>	<b>17,78,700</b>

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.

### **Problem –76**

A manufacturing unit of ABC Co. Ltd. has presented the following details:

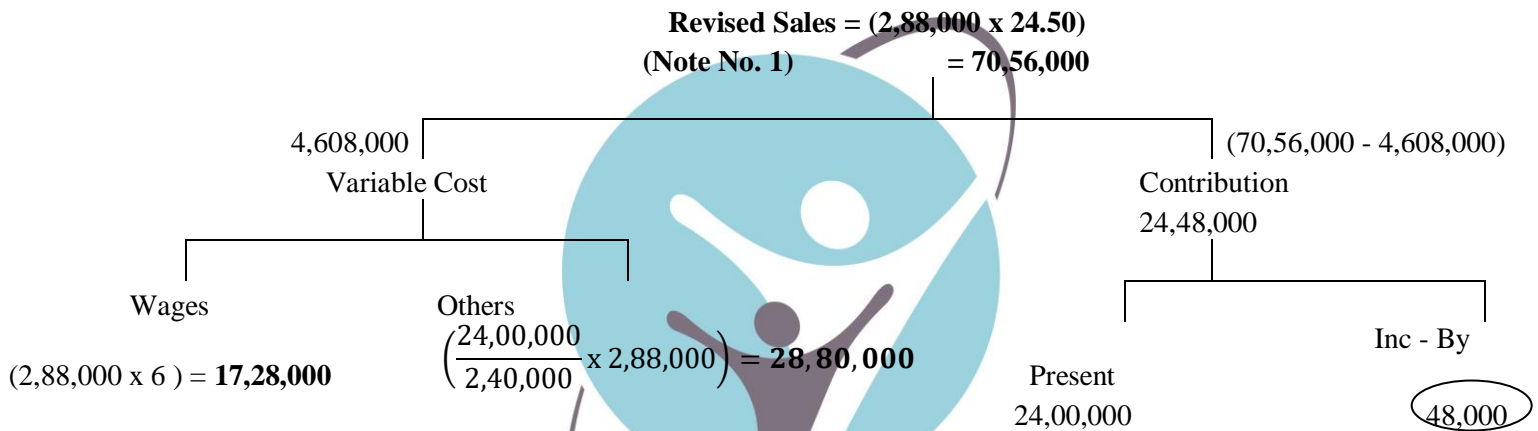
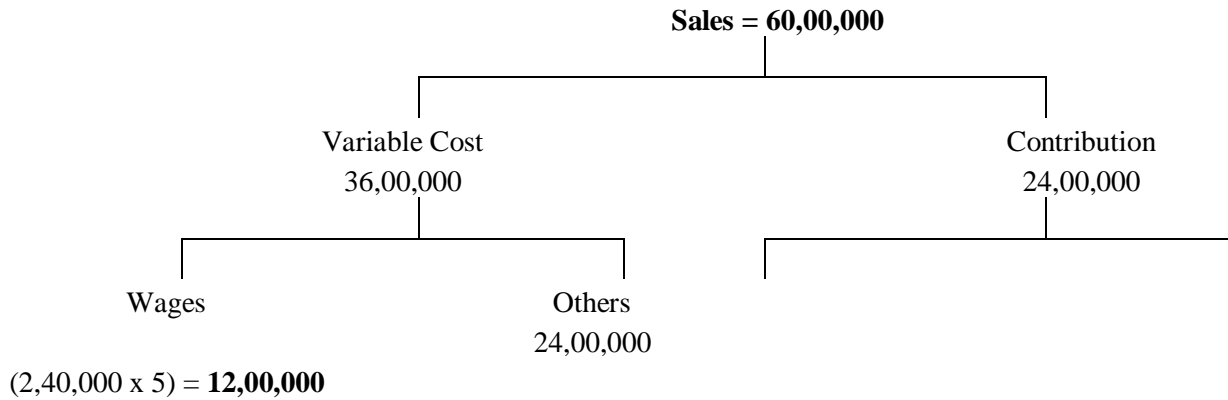
Average units produced and sold per month .....	2,40,000
No. of workers .....	80
Sales value .....	₹ 60 Lacs
Contribution .....	₹ 24 Lacs
Wage rate .....	₹ 5 per unit

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****Note No.1**

$$\text{Selling Price (P. U)} = \left(\frac{60,00,000}{2,40,000}\right) = \mathbf{25.00}$$

$$\text{Present - Production (per worker)} = \left(\frac{2,40,000}{80}\right) = 3,000 \text{ units}$$

$$\text{Proposed Production} = (2,40,000 \times 120\%) = \mathbf{2,88,000 \text{ units}}$$

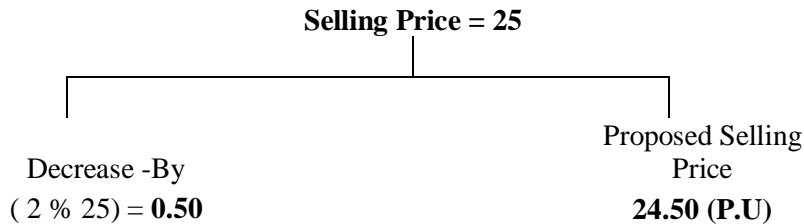
$$\text{Future Output} = 2,40,000 \times 120\% = 2,88,000$$

$$(2,88,000 \div 60 \text{ Employee}) = \mathbf{4,800 \text{ units}}$$

	₹
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%
<hr/>	
<b>6.00</b>	

**Problem -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:**

	<b>Year 2</b>	<b>Year 1</b>
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		4,00,000	
	(30,000 x 8)		(50,000 x 8)	
Fixed	1,50,000		2,50,000	
(30,000 x 5)	<b>3,90,000</b>		<b>(50,000 x 5)</b>	
Opening Stock	1,30,000			
	(10,000 x (8 + 5))			
Closing Stock			(2,60,000)	
			$\left(\frac{6,50,000}{50,000} \times 20,000\right)$	
	<b>5,20,000</b>		<b>3,90,000</b>	
Under Recovery Fixed Overhead	50,000		(50,000)	
(2,00,000 - 1,50,000)			(2,00,000 - 2,50,000)	
			Over Recovery	
Cost of Goods Sold	5,70,000		<b>3,40,000</b>	
Selling Exp (Fixed)	<b>1,40,000</b>	(7,10,000)	<b>1,40,000</b>	
				(4,80,000)
<b>Profit</b>		<b>90,000</b>	<b>4,80,000</b>	<b>1,20,000</b>

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.