

Basic Marginal Cost

QUESTION 1:- A company has an opening stock of 6,000 units of output. The production planned for the current period is 24,000 units and expected sales for the current period amount to 28,000 units. The selling price per unit of output is Rs.10. Variable cost per unit is expected to be Rs. 6 per unit while it was only Rs. 5 per unit during the previous period. What is the Break Even volume for the current period if the total fixed costs for the current period is Rs. 86,000? Assume that the first In first out system is followed. Assume that the Last in first out system is followed.

SOLUTION:-

Statement of Break Even Point (FIFO)

Nature	Quantity	contribution per unit	Total contribution
Opening stock	6000	5/-	30,000
Current production	14,000	4/-	56,000 (B.f.)
∴ Break event point	20,000 unit	fixed cost	86,000

Hence, Under FIFO System is covered by selling of 20000 units. There fore. The sale of 20,000 units is the break even point.

Statement of break event point (LIFO)

Nature	Quantity	Contribution per unit	Total contribution
Current	21,500	4/-	4/-
Opening stock	-	5/-	-
	21,500		86,000

∴ Break Even Point = 21,500 units

QUESTION 2:- Lucy & Co. has given the following data;

Selling price per unit	Rs. 20
Direct material cost per unit	Rs. 8
Direct labour cost per unit	Rs. 2
Variable overhead per unit	Rs. 2
Fixed overhead (Total)	Rs. 20,000

Find out :

- P/V ratio. (b) Break-even sales.
- Margin of safety at a sale level of Rs. 1,00,000.
- Profit, if sales are 20% above the break-even sales.
- Sales to make a profit of Rs. 5,000
- P/V ratio if the selling price is increased by 10%.
- Break-even sales, if the selling price is increased by 10%.
- Break-even sales, if the fixed overhead is increased by 20%.

SOLUTION:-

$$\begin{aligned}
 \text{(a) P.V. Ratio} &= \left(\frac{\text{Contribution}}{\text{Sales}} \times 100 \right) \% \\
 &= \left(\frac{20-12}{20} \times 100 \right) \% \\
 &= \left(\frac{8}{20} \times 100 \right) \% \\
 &= 40\%
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) Break Even Sales} &= \frac{\text{Fixed cost}}{\text{P.V. cost}} \\
 &= \frac{20,000}{40\%} \\
 &= \text{Rs. } 50,000
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Margin of safety} &= \text{Total sale} - \text{Break even sale} \\
 &= \text{Rs. } (1,00,000 - 50,000) \\
 &= \text{Rs. } 50,000
 \end{aligned}$$

$$\begin{aligned}
 \text{(d) Sale x P.V. Ratio} - \text{Fixed cost} &= \text{Profit} \\
 50,000 \times 120\% \times 40\% - 20,000 &= \text{Profit} \\
 \therefore \text{Profit} &= 4000 \\
 \text{Sales x P.V. Ratio} - \text{fixed cost} &= \text{Profit} \\
 \text{Sales} \times 40\% - 20,000 &= 5000 \\
 \text{Sales} \times 40\% &= 5000 + 20,000 \\
 \therefore \text{Sales} &= \frac{25,000}{40\%} \% \\
 &= 62,500 \text{ Ans}
 \end{aligned}$$

$$\begin{aligned}
 \text{(f) P.V. Ratio} &= \frac{\text{Contribution}}{\text{Sales}} \\
 &= \frac{20 \times 110\% - 12}{20 \times 110\%} \\
 &= \frac{22 \times 12}{22} = \frac{10}{22} \\
 \therefore \text{P.V. Ratio} &= \left(\frac{10}{22} \times 100 \right) \% \\
 &= 45.45\%
 \end{aligned}$$

$$\begin{aligned}
 \text{(g) Break Even Sales (At increase S.P.)} &= \frac{\text{Fixed cost}}{\text{P.V. cost}} \\
 &= \frac{20,000}{45.45} \% \\
 \therefore \text{Required sales} &= 40,004
 \end{aligned}$$

$$\begin{aligned}
 \text{(h) Break Even Sales} &= \frac{\text{Fixed cost (Increased)}}{\text{P.V. Ration}} \\
 &= \frac{20,000 \times 20\%}{40\%} \\
 &= \frac{24,000}{40\%} = 60,000
 \end{aligned}$$

$\therefore$ Required Sales = 60,000 Ans

QUESTION3:- The following data are obtained form the records of company :

	First year	Second year
Sales (Rs.)	80,000	90,000
Profit (Rs.)	10,000	14,000

Calculate :

- P/V ratio,
- Break-even point .
- Profit or loss at Sales of Rs. 50,000.
- Sales required to earn a profit of Rs. 19,000

(e) Margin of safety, if sale is Rs. 60,000.

Solution

$$(a) \text{ P.V. Ratio} = \frac{\text{Change in profit}}{\text{Change in sales}} \\ = \frac{14,000 - 10,000}{90,000 - 80,000} = \frac{4000}{10,000}$$

$$\therefore \text{ P.V. Ratio} = \left(\frac{4}{10} \times 100 \right) \% = 40\%$$

(b) Calculation of Break Even Point

Sales x P.V. Ratio – Fixed cost = Profit

80,000 x 40% – Fixed cost = 10,000

$\therefore$ Fixed cost = 80,000 x 40% – 10,000 = Rs. 22,000

$$\text{Break Even Sale} = \frac{\text{Fixed cost}}{\text{P.V. Ratio}} \\ = \frac{22,000}{40\%} = 55,000$$

(c) Sales x P.V. Ratio – Fixed cost = Profit (loss)

50,000 x 40% – 22,000 = Profit (loss)

$\therefore$ Profit = 20,000 – 22,000

$\therefore$ (loss) = 2,000

Therefore when sales is 50,000 then loss of Rs. 2,000 is incurred.

(d) Sales x P.V. Ratio – Fixed cost = Profit

Sales x 40% – 22,000 = 19,000

Sales x 40% = 19,000 + 22,000

$$\therefore \text{ Sales} = \frac{41,000}{40\%} = 102,500$$

Hence,

Required Sales = 102,500 Ans

(e) **Margin of Safety = Total sale – Break even**

= 60,000 – 55,000

= Rs. 5,000 Ans.

QUESTION 4:- A newspaper presently sells 1,00,000 copies of its morning daily. It wants to publish evening daily. Particulars are:

	Actual for morning	Estimates for Evening
Sales price	Rs.2 per paper	Rs.0.50 per paper
Variable cost	Rs. 1.20 per paper	Rs.0. 22 per paper
Fixed cost	Rs. 2.4 lack per week	Rs.10, 000 per week

Sale of morning daily will fall @ 1 copy for every 10 copies sold of evening daily.

Calculate Break-even sales for evening daily per week.

SOLUTION:-

Fixed cost for evening newspaper = Rs. 10,000

Variable cost: Rs.

Cost to be incurred 0.22

Benefit lost due to 10

= Contribution from 1 morning paper i.e. Rs. 0.80

$$\therefore \text{ Contribution lost in 1 evening newspaper} = \frac{\text{Rs.0.80}}{10} = \underline{0.80}$$

Relevant Variable cost

0.30

$$\begin{aligned}\text{Break Even Point} &= \frac{\text{Fixed cost}}{\text{Contribution}} \\ &= \frac{10.000}{0.50 - 0.30} = \frac{10.000}{0.20} \\ &= 50.000 \text{ copies}\end{aligned}$$

Hence, Required Break Even Point = 50.000 copies.

QUESTION 5:- PV Ratio of a business is 30 per cent. BER is 40 per cent of the capacity. Capital turnover is 2.5 and profit is 15 per cent on capital employed. At what level (per cent of the capacity) the business is operating ? (Turnover = sales / C.E)

SOLUTION:-

$$\begin{aligned}\text{Let sales} &= \text{Rs. } 100 \\ \text{Contribution} &= 30\% \text{ of sales} \\ &= 30\end{aligned}$$

$$\begin{aligned}\text{Capital Turn over Ratio} &= \frac{\text{Turnover (Sales)}}{\text{Capital Employed}} \\ 2.5 &= \frac{1.0}{\text{Capital Employed}}\end{aligned}$$

$$\therefore \text{Capital Employed} = \frac{100}{2.5} = \text{Rs. } 40$$

We have,

$$\begin{aligned}\therefore \text{Profit} &= 15\% \text{ of capital Employed} \\ &= \frac{15}{100} \times 40 = \text{Rs. } 6 \\ &= \text{Rs. } 6\end{aligned}$$

Now,

Contribution – Fixed Cost = Profit

Rs. 30 – fixed cost = Rs. 6

$$\begin{aligned}\therefore \text{Fixed cost} &= \text{Rs. } 30 - \text{Rs. } 6 \\ &= \text{Rs. } 24\end{aligned}$$

$$\begin{aligned}\text{Break Even Ratio} &= \frac{\text{Fixed cost}}{\text{P.V. Ratio}} \\ 40\% \text{ of capacity} &= \frac{24}{30\%}\end{aligned}$$

$$\therefore \text{Capacity} = \frac{24 \times 100 \times 100}{30 \times 40}$$

= Rs. 200

Hence, It indicates we are operating at 50% of capacity.

QUESTION 6:- If M.S. Ratio is changed from 30 per cent to 60 per cent how will the profitability be affected taking 20 per cent PV Ratio?

SOLUTION:-

Let Total Sale = Rs. 100

$$\begin{aligned}\text{Margin of Safety Sale} &= 100 \times 30\% \\ &= \text{Rs. } 30\end{aligned}$$

$$\begin{aligned}\therefore \text{Profit} &= 20\% \text{ of Rs. } 30 \\ &= \text{Rs. } 6\end{aligned}$$

Revised,

$$\begin{aligned}\text{Margin of Safety Sale} &= 60\% \text{ of } 100 \\ &= \text{Rs. } 60\end{aligned}$$

$$\therefore \text{Profit} = \text{Rs. } 60 \times 20\% = \text{Rs. } 12$$

Hence, As the margin of safety sale increase from 30% to 60% then profit is increased with double

QUESTION 7:-

	1year	II year
Sales	Rs. 2,00,000	Decrease in sales Price and Decrease in Fxed cost, no change in variable cost.Slab value reamin same.
M/s Ratio	25%	40%
P/V Ratio	33.50%	30%

Find sales, Profit, Fixed cost and BEP in II year

SOLUTION:-

Contribution in Ist year = Sales x P.V. Ratio

= Rs. 2,00,000 x 33.50%

∴ Contribution = 67,000

Now

Sales – Variable cost = Contribution

∴ Variable cost = Sales – Contribution

= 2,00,000 – 67,000

= 1,33,000

It is given in the question that

Variable cost of I year = Variable cost of II year

∴ Variable cost of IInd year = Rs. 1.33.000

Hence,

P.V. Ratio = 30% (In II Year)

Then

∴ Variable cost = 70% of sales

1.33.000 = 70% x sales

∴ Sales = $\frac{1,33,000}{70\%}$

∴ Sales = 1,90,000

	I year	II Year
Margin of safety ratio	25%	40%
∴ Margin sale (Total sale x m/s Ratio)	2,00,000 x 25%	1,90,000 x 40%
	50,000	76,000
∴ Profit (= Margin Sale x P.V. Ratio)	50,000 x 33.50% =16,750	76,000 X 30% = 22,820
∴ Break Even Sale (Total Sale – Margin Sale)	1,50,000	114000
Fixed cost (Sale Variable cost – Profit)	2,00,000 – 1,33,000 -16,750	1,90,000 – 133,000 –22800
	= 50,250	34,200

QUESTION 8:- In 1991. The turnover of a company, which operated at a margin of safety of 25% amounted to Rs. 9,00,000 and its profit volume ratio was 33-1/3% During 1992 the company estimated that although the same volume of sales as in 1991 would be maintained, the sales value would go down due to decrease in selling price. There will be no change in variable costs. The company proposes to reduce its fixed costs through an intensive cost reduction programme. These changes will alter the profit volume ratio and margin of safety to 30% and 40% respectively in 1992.

Even if the company closed down its operations in 1992, it would incur a minimum fixed cost of Rs. 50,000.

SOLUTION:-

Statement of comparative profit and loss

Year — 1991		Year — 1992	
	Rs.		Rs.
Sales Revenue	9,00,000	Sales (W.N. 3)	8,57,143
(-) Variable cost (B.f.)	6,00,000	(-) Variable cost	6,00,000
Contribution (S.V x P.V. Ratio)	3,00,000	Contribution	2,57,143
(-) Fixed cost (B.f.)	2,25,000	(-) fixed cost (B.f.)	1,54,286
Profit (W.N. 2)	75,000	Profit (W.N. 4)	102857

(2) Calculation of minimum sale

$$\text{Sales} \times \text{P.V Ratio} = 164286 \quad (154286 - 50,000)$$

$$\text{Sales} \times 30\% = 104256$$

$$\therefore \text{Sales} = \frac{104289}{30\%} = 347620$$

Hence,

$$\text{Required Minimum Sales} = \text{Rs. } 3.47.620$$

W.N-1 Calculation of contribution in 1991

$$\begin{aligned} \text{Contribution} &= \text{Sales} \times \text{P.V. Ratio} \\ &= 900000 \times 100/3\% \\ &= 3,00,000 \end{aligned}$$

W.N-2

Calculation of profit in 1991.

$$\text{Margin of Safety Sale} \times \text{P.V. Ratio} = \text{Profit}$$

$$\therefore \text{Profit} = (9,00,000 \times 25\%) \times 30/3\%$$

$$\therefore \text{Profit} = 75,000$$

W.N-3

Calculation of Sale in 1992

$$\text{P.V. Ratio} = 30\%$$

$$\therefore \text{Variable cost Ratio} = 70\%$$

$$\text{i.e. } 70\% \text{ of Sale} = 6,00,000$$

$$\therefore \text{Sale} = 857143$$

W.N.-4

Calculation of profit in 1992

$$\text{M/S/S} \times \text{P.V. Ratio} = \text{Profit}$$

$$\begin{aligned} \therefore \text{Profit} &= (857143 \times 40\%) \times 30\% \\ &= 102857 \end{aligned}$$

QUESTION 9:- Find cost Break even points between each pair of plants whose cost functions are Plant A: Rs. 600,000 + Rs. 12 X; Plant; B: Rs. 900,000 + Rs. 10 x; Plant C: Rs. 1500,000 + Rs. 8 x; (Where X is the number of units sold)? Which plant should be purchased?

SOLUTION:-

Calculation of cost break even point between A & B.

$$\begin{aligned} \text{T.C.}_A &= \text{T.C.}_B \\ 6,00,000 + 12x &= 9,00,000 + 10x \end{aligned}$$

$$12x - 10x = 9,00,000 - 6,00,000$$

$$\therefore x = \frac{3,00,000}{2} = 1,50,000 \text{ unit.}$$

Hence cost break even' point between A and B = 1,50,000 units

Calculation of break even' point between A and C.

$$T.C._A = T.C._C$$

$$6,00,000 + 12x = 15,00,000 + 8x$$

$$12x - 8x = 15,00,000 - 6,00,000$$

$$\therefore x = \frac{9,00,000}{4} = 2,25,000 \text{ units}$$

Hence, cost break even point between A and C = 2,25,000 units.

Calculation of break even point between 'B and C'

$$T.C._B = T.C._C$$

$$9,00,000 + 10x = 15,00,000 + 8x$$

$$10x - 8x = 15,00,000 - 9,00,000$$

$$\therefore x = \frac{6,00,000}{2} = 3,00,000$$

Hence, Cost break even point between B and C is 3,00,000 units.

Statement of Range

Level (unit)	Preference
0-14,9999	A
1,50,000	A or B
150,001 to 2,99,999	B
More than 3,00,000	C

QUESTION 10:- The product of a company is as under:

	Products	
	A	B
Units	36,000	12,000
Selling Price	Rs. 5	10
Variable cost	Rs. 4	3
Fixed Costs	Rs. 30,000	

You are required to calculate the break-even point in units.

Find the shift in the break-even point in units, if the company discontinues product A and substitutes products C in its place. The quantity of products C is 6000 units and its selling price and variable costs respectively are Rs. 12.00 and 6.00.

SOLUTION:-

Statement of Break Even Point (Unit) [between A and B]

Product	Quantity	Selling price	Variable cost	Contribution per unit	Contribution (Rs.)	Break Even Point
A	36,000	5	4	1	36,000	9000
B	12,000	10	3	7	84,000	3000
	48,000			Contribution	1,20,000	12000

$$\text{Group Break Even Sale (Unit)} = \frac{\text{Fixed cost}}{\text{Group contribution per unit}^*}$$

$$\begin{aligned} \text{* Group contribution per unit} &= \frac{\text{Total contribution}}{\text{Total Qty gold}} \\ &= \frac{1,20,000}{48,000} \end{aligned}$$

$$\therefore \text{Group Break Even Point} = \frac{30,000}{2.5} = 12,000 \text{ units}$$

Statement of Break Even Point [between C and B]

Product	Quantity	Selling Price	Variable cost	Total Contribution	Break Even Point
C	6000	12	6	36,000	1500
	12000	10	3	84,000	3000
	18,000			1,20,000	4500

$$\begin{aligned} \text{Group contribution per unit} &= \frac{\text{Total contribution}}{\text{Total Quantity}} \\ &= \frac{1,20,000}{18,000} \\ &= 6.66 \end{aligned}$$

$$\begin{aligned} \text{Group Break Even Point} &= \frac{\text{Fixed cost}}{\text{Group contribution per unit}} \\ &= \frac{30,000}{6.6} \\ &= 4500 \text{ units} \end{aligned}$$

QUESTION 11:- From the following data, calculate composite P/V ratio, composite contribution per unit of mix and break –even point by using P/V ratio and contribution per unit:

Fixed cost:

Answer.

Sales of Sales

Products	Units	Selling price per unit Rs.	Variable cost per unit Rs.
A	2,000	10	6
B	4,000	15	12
C	6,000	20	10

Rs. 50,000.

of A: Rs. 12,500
A: 1,250 units
of B: Rs. 37,500
B: 2,500 units

Sales of C: Rs. 75,000
Rs. 1,25,000

C: 3,750 units
7,500 units

QUESTION 12:-The budgeted results of A Ltd. are as under:

Product	Sales Values	P/V Ratio	Sales Mix
	(Rs.)	(%)	(%)
X	2,50,000	50	20
Y	4,00,000	40	32
Z	<u>6,00,000</u>	30	<u>48</u>
	<u>12,50,000</u>		<u>100</u>

Fixed overheads for the period Rs. 5,02,200.

The management is worried about the results.

You are required to prepare

- A statement showing the amount of loss, if any, being incurred at present and recommend a change in the sale value of each product as well as in the total sales value maintaining same sales-mix, which will eliminate the said loss.
- Recommend the additional sales of any individual product to recover the loss.

SOLUTION:-

Statement showing profit and loss

Product	Sales	P.V. Ratio	Contribution	Break Even Sale (Rs.)	Additional Sale
X	2,50,000	50E%	1,25,000	2,70,000	20,000
Y	4,00,000	40%	1,60,000	4,32,000	32,000
Z	6,00,000	30%	1,80,000	6,48,000	48,000
Total	12,50,000		4,65,000	13,50,000	1,00,000
		(-) Fixed cost	502200		
		profit	(37,200)		

$$\begin{aligned}\text{Group P.V. Ratio} &= \frac{\text{Total contribution}}{\text{Total sales}} \\ &= \left(\frac{465,000}{12,50,000} \times 100 \right) \% \\ &= 37.2\%\end{aligned}$$

$$\text{Break Even Sales (Rs.)} = \frac{502200}{37.2\%}$$

Existing Sale = 12,50,000

∴ Addition at Sale = 1,00,000

(b) Individual sale to be increased.

$$\begin{aligned}\text{For x} &= \frac{\text{Additional contribution}}{\text{P.V. Ratio}} = \frac{37,200}{50\%} \\ &= \text{Rs. 74,400}\end{aligned}$$

Or

$$\begin{aligned}\text{For Y} &= \frac{\text{Additional contribution}}{\text{P.V. Ratio}} = \frac{37,200}{40\%} \\ &= \text{Rs. 93,000}\end{aligned}$$

$$\begin{aligned}\text{For Z} &= \frac{\text{Additional contribution}}{\text{P.V. Ratio}} = \frac{37,200}{30\%} \\ &= 1,24,000\end{aligned}$$

QUESTION 13:- Hewtax manufactures two products- tape recorder and electronic calculators- and sell them nationally. The Hewtax management is very pleased with the company's performance for the current fiscal year. Projected sales through January 1,1987, indicate that 70,000 tape recorders and 1,40,000 electronics calculators will be sold this year. The projected earning statement, which appears below shows that Hewtax, will exceed its earning goal of 9 per cent on sales after taxes.

Hewtax Electronics Projected Earnings Statement for the year ended December 31, 1987.

	Tape recorder		Electronic		
	Calculator				
	Total Amount(000)	Per Unit	Total Amount (000)	Rs. Per unit	Total amount (000)
Sales	Rs. 1050	Rs.15.00	Rs. 3150	22.50	Rs. 4200.00
Production Cost					
Material	280	4.00	630	4.50	910.00
Direct labour	140	2.00	420	3.00	560.00
Variable Overhead	140	2.00	280	2.00	420.00
Fixed Overheads	70	1.00	210	1.50	280.00
Total production Cost	630	9.00	1540	11.00	2170.00
Gross margin	420	Rs.6.00	Rs.1610	Rs. 11.50	Rs. 2030

Rs.					
Fixed selling and Administrative					1040.00
Net income before Income taxes					990.00
Income Taxes (55%)					544.50
Net Income					Rs. 445.50

The tape recorder business has been fairly stable the last few years and the company does not intend to change the tape recorder price. However the competition among manufactures of electronic calculators has been increasing. Hewtax's calculators have been popular with consumers. In order to

sustain the interest in their calculators and to meet the price reductions expected from competitions management has decided to reduce the wholesale price of its calculator from 22.50 to 20.00 per unit effective January 1,1988. At the same time the company plans to spend an additional Rs. 57,000 on advertising during fiscal year 1988. As a consequence of this action, management estimates that 80 per cent of its total revenue will be derived from Calculators sales as compared to 75 per cent in 1987.

The total fixed production overhead costs will not change in 1988 nor will the variable overhead cost rates (applied on a direct labour hour base). However, the cost of material and direct labour is expected to change. The cost of solid state electronic components will be cheaper in 1988. Hewtax estimated that material costs will drop by 10 per cent for the tape recorders and 20 per cent for the calculators in 1988. However direct labour costs for both products will increase by 10 per cent in the coming year.

Required A. How many tape recorder and electronic calculator units did Hewtax Electronic have to sell in 1987 to break even?

Required B. What value of sales i.e. required if Hewtax Electronics is to earn a profit in 1988 equal to 9 per cent on sales after taxes?

Tutorial Notes: -

B.E.P. of a multiple product firm:

1. If break Even Point is to be calculate in units, find weighted average contribution per unit. Weights being ratio between units sold.
2. If break Even point is to be calculate in amount, find weighted average of P.V. Ratio: Weights being ratio between amount of sales.

SOLUTION:-

(A) Statement of Break Even in 1987.

Product	Quantity	Contribution	Total Contribution	Break Even Sale
Tape Recorder	70,000	7	4,90,000	40,000
Electronic calculator	1,40,000	13	18,20,000	80,000
	2,10,000		23,10,000	1,20,000

$$\begin{aligned}\text{Group contribution per unit} &= \frac{\text{Total contribution}}{\text{Total quantity}} \\ &= \frac{23,10,000}{2,10,000} = \text{Rs. } 11\end{aligned}$$

$$\begin{aligned}\text{Group Break Even Pint (unit)} &= \frac{\text{Fixed cost}}{\text{Group contribution per unit}} \\ &= \frac{2,80,000 + 10,40,000}{11} = \frac{13,20,000}{11} \\ &= 1,20,000 \text{ unit}\end{aligned}$$

(B) Let X be required Sales
then

$$\text{Sales} = \frac{\text{Fixed cost} + \text{Profit}}{\text{P.V. Ratio (W.N- 2)}}$$

$$X = \frac{13,77,000 + 20\% \text{ of } x}{54\%}$$

$$54\% \times X = 13,77,000 + 20\% \text{ of } X$$

$$54\% X - 20\% \times X = 13,77,000$$

$$\therefore X = \frac{13,77,000}{34\%}$$

$$\therefore X = 40,50,000$$

Hence Required Group Sales = Rs. 40,50,000/-

W.N-1

Calculation of profit before Tax. Rate

$$\text{PBT} - \text{Tax Ant.} = \text{PAT}$$

$$\text{PBT} - \text{PBT} \times \text{Rate} = \text{PAT}$$

$$\therefore \text{PBT} = \frac{\text{PAT}}{1 - \text{Rate}}$$

$$= \frac{9\%}{1 - 0.55\%} = \frac{9\%}{45}$$

$$= 20\%$$

W.N - 2

Calculation of Group P.V. Ratio

Product	Selling price	Variable cost	Contribution	P/V	Sales value Ratio
Tape Recorder	15	7.80	7.2	48%	20%
Electronic Calculator	20	8.90	11.1	55.5%	80%

$$\therefore \text{Group P.V. Ratio} = \frac{20\% \times 48\% + 80\% \times 55.5\%}{20\% + 80\%}$$

$$= 54\%$$

QUESTION 14:- The Columbus Hospital operates a general hospital but rents space and beds to separate entities for specialized areas such a skin, pediatrics, maternity, psychiatric, and so on. Columbus charges each separate entity for common services to its patients such as meals and laundry and for administrative services such as billing, collections and so. Space and bed rentals are fixed for the year. For the entire year ended June 30,1983, the Skin Department at Columbus Hospital charged each patient an average of Rs. 65 per day, had a capacity of 60 beds, operated 24 hours per day for 365 days and revenue of Rs. 11,38,800.

Expenses charged by the hospital to the Skin Department for the year ended June 30, 1983 are in Table A.

The only personnel directly employed by the Skin Department are supervising nurses, nurses and assistant. The hospital has minimum personnel requirements based on total annual patient days. Hospital requirements of personal are given in Table B.

[Table A : Expenses (Skin Department)]

	Basis of allocation	
	Patient days Rs.	Bed Capacity Rs.
Dietary	42952	
Janitorial		12800
Laundry	28000	
Laboratory	47800	
Pharmacy	33800	

Repairs	5200	
General services		131760
Rent		275320
Billing & collections	87000	
Other expenses	18048	80,120
	262800	5,00,000

[Table B: Expected Level of operation Data]

Annual patient days	Assistants	Nurses	Supervising Nurses
10,000-14,000	21	11	4
14001- 17,000	22	12	4
17001- 23725	30	16	10
23726- 25550	35	18	15
25,551-27,375	40	18	15
27,376-29,200	40	20	15

Annual salaries for each class of employee follow: -

Supervising nurses—Rs. 20,000 nurse---Rs. 10,000 and Assistants—Rs. 5,000

Calculate: BEP in terms of patient's days)

SOLUTION:-

Statement of Break Even Point (SKIN)

Range	Fixed cost	S.F.C.	Total	contribution per patient	Break Even point
10,000- 14,000	5,00,000	2,95,000	7,95,000	50	15900 (1083)
14001 – 17,000	5,00,000	3,10,000	8,10,000	50	16,200 B.E. Pt.
17001 – 23725	5,00,000	5,10,000	10,10,000	50	20,000 B.E. Pt.
23726 – 25550	5,00,000	6,55,000	11,55,000	50	23,100 (profit)
25551- 27375	5,00,000	6,80,000	11,80,000	50	23,600 (profit)
27376 - 29,200	5,00,000	7,00,000	12,00,000	50	24,000 (profit)

For the first range the management of Skin department always suffer loss because the maximum contribution form the first range

$$= 14000 \times 50$$

$$= 7,00,000$$

and the cost for range = 7,95,000

For the second range,

$$\text{B.E. pt} = 16,200$$

Such break event point is restricted to 17,000 patient days.

For third range,

The break even point comes to 20,200 unit. Such break even point is restricted upto 29,200 due to profit exist in the subsequent range.

W.N.-1

Calculation of per patient per day contribution

Here, Revenue = Rs. 11,38,800/65 = 17520 per day

Patient days =

Total variable cost = 262800

Patient days = 17,520

Variable cost/patient per day = $\frac{262800}{17,520}$ = Rs. 15/-

∴ contribution/patient per day = 65 – 15 = 50/-

Question 15: -Navbharat Commerce College, Bombay has six sections of B.Com and two sections of M.Com with 40 and 30 students per section respectively. The college plans one day pleasant trip around the city for the students once in an academic session during winter break to visit park, Zoo. Planetarium and aquarium.

A Transporter used to provide the required number of buses at a flat rate of Rs. 700 per bus for the aforesaid purpose. In addition a special permit fee of Rs. 50 per bus is required to be deposited with city Municipal Corporation. Each bus is 52 seater. Two seats are reserved for teachers who accompany in each bus. Each teacher is paid daily allowance of Rs. 100 for the day, No other costs in respect of teachers are relevant to the trip.

The approved caterers of the college supply breakfast, lunch and afternoon tea respectively at Rs. 7, Rs. 30 and Rs. 3 per student.

No entrance fee is charged at the park. Entrance fees come to Rs.5 per student both for the Zoo and the aquarium. As regards planetarium the authorities charge block entrance fee as under for group of students of educational institutions depending upon the number of students in group:

Number of Students in a Group	Block Entrance Fee Rs.
Upto 100	200
101-200	300
201 & above	450

Cost of prizes to be awarded to the winners in different games being arranged in the park depend upon the strength of students in a trip. Cost of prizes to be distributed are:

Number of Students in a Trip	Cost of Prizes Rs.
Upto 50	900
51-125	1,050
126-150	1,200
151-200	1,300
201-250	1,400
251 & above	1,500

To meet the above costs the college collects Rs. 65 from each student who wish to join the trip. The college release subsidy of Rs. 10 per student the trip towards it.

You are required to: -

- Prepare tabulated statement total costs at the levels of 60,120,180,240 and 300 students indicating each item of cost.
- Compute average cost per student at each of the above levels.
- Calculate the number of students to break even for the trip as the college suffered loss during the previous year despite 72% of the students having joined the trip.

SOLUTION:-

(a) Statement showing total costs indicating each item of cost

No.of students	60	120	180	240	300
	R.s	R.s	R.s	R.s	R.s

Variable costs :					
Breakfast	420	840	1,260	1,680	2,100
Lunch	1,800	3,600	5,400	7,200	9,000
Tea	180	360	540	720	900
Entrance fee for					
Zoo & Aquarium	300	600	900	1,200	1,500
Total (A)	2,700	5,400	8,100	10,800	13,500
Semi variable costs					
Rent of buses (Refer to working note 1)	1,400	2,100	2,800	3,500	4,200
Special permit fee (Refer to working note 2)	100	150	200	250	300
Daily allowance paid to teacher (Refer to working note 3)	400	600	800	1,000	1,200
Block intrence fee (Refer to given table)	200	300	300	450	450
Cost of prizes (Refer to given table)	1,050	1,050	1,300	1,400	1,500
Total :(B)	3,150	4,200	5,400	6,600	7,650
Grand Total (A)+(B)	5,850	9,600	13,500	17,400	21,150

(B) Average cost per student at each of the above levels

No. of student (a)	60	120	180	240	300
Total Costs (R.s):(B)	5,850	9,600	13,500	17,400	21,150
[Refer to (a) part]					
Average cost (R.s):(B)-(A)	97.50	80	75	72,50	70.50

(C) Statement Showing number of student to break even

No.of students In the trip:	51-100	101-125	126-150	151-200	201-250	251-300
No. of buses	2	3	3	4	5	6
Semi-variable costs						
Bus rent (R.s)	1,400	2,100	2,100	2,800	3,500	4,200
Permit fee (R.s)	100	150	150	200	250	300
Block entrance fee(R.s)	200	300	300	300	450	450
Daily allowance Paid to teacher	400	600	600	800	1,000	1,200
Cost of prizes	1,050	1,050	1,200	1,300	1,400	1,500
Total cost (R.s)	3,150	4,200	4,350	5,400	6,600	7,650
No. of student to Break even :	105	140	145	180	220	255
(Total semi- variable cost / contribution per student)	(R.s 3,150/ R.s30)	(R.s. 4,200/ R.s30)	(R.s.4,350/ R.s 30)	(R.s5,400/ R.s 30)	(R.s 6,600/ R.s 30)	(R.s 7,650/R.s 30)

- please refer to note 5.

It is clear from the table given above that figure of 105 and 140 students fall outside the limit . i.e., number of student in the trip . Therefore ,it is a situation where there are four break-even points i.e., 145 ,180,220, and 225 students. The collage authorities should bear this in mind while hiring 3,4,5 and 6 buses respectively to above losses .

The collage incurred loss during previous year as they hired 5 buses and 72% of the total student (i.e.,216 out of 300 students) joined the trip .the break-even point. When collage authorities hire 5 buses .in 220 students.

Working Notes :

(1) Number of buses required and rent of buses @ Rs. 700 per bus .

Number of students						
Number of buses						
Rent of buses @						
Rs. 7,00 per bus						

(2) Special permit fee

(No of buses × Rs. 50)						
------------------------	--	--	--	--	--	--

(3) Allowance paid to teachers

No of buses × Rs. 200						
-----------------------	--	--	--	--	--	--

(4) Contribution per student towards semi – variable Overheads

Collection from each student			Rs. 65			
Subsidy from collage			10			
Total			75			
Less: Variable cost per student (from the table)			45			
Contribution per student			30			

(5) Readers should note that in part (a) and (b) ,total cost and average cost on particular levels have been asked . For answering facts are to be remembered :

(a) Student (not teachers) range from 60 to 300.

(b) Bus requirement based on no of student in a trip (given in the last table in question) is calculate as follow :

Number of students in a trip		Bus requirement
Up to 50	(full)	2*
51 – 100	(Break—even number may range between 51 and 100 only)	
101 -- 125	(Break ---even number may range between 101 and 125 in third bus only because first two buses will be full)	3
126 – 150		3
151 – 200		4
201 – 250		5
251 – 300		6

* Because there are 60 students.

Question16:- A hospital operates a separate department for private patients. The department has 60 beds and the hospital charges a fee of Rs. 170 per day per patient. The patients will however make their own arrangement for payments of physician's fees. During 1998 the hospital collected total revenue by way of fees of Rs. 28,12,650. The actual expenses incurred were as under:

	Allocation basis	
	Patient days Variable	Bed Capacity Fixed
	Rs.	Rs.
Food	4,40,000	----
Staff other than nurses	---	24,000
Laundry	2,40,000	----

Laboratory & Pharmacy	5,20,000	----
Maintenance	74,000	----
General Admn.	----	4,74,000
Others	49,600	----
Total	13,23,600	4,98,000

Besides, rent of premises in which the department is Rs. 8,00,000 per annum. During next year it is expected that the aforesaid fixed and variable expenses will go up by 10%. The rent will increase to Rs. 10,00,000.

The requirement of nursing staff is as under:

Annual patient days	No. of nurses
Less than 8000	3
8000-10000	4
10000-12000	5
Over 12000	8

The average salary of nursing staff, which was Rs. 13,000 per nurse per annum in 1998, will increase to Rs. 14,000 per nurse per annum in 1999.

Because of the insufficient demand, the hospital is contemplating to close the department.

Required:

- Present a statement of
 - Actual profitability for 1998.
 - Projected profitability or 1999.
- Calculate the break-even patient days of occupancy for 1999.
- What increase in fees is required to break-even at 1998 patient days of occupancy in 1999?

Question17:- The Woodland General Hospital operates a separate department specifically for private health patients. In 1990 the patients paid a fixed fee of Rs. 85 per day for the use of hospital facilities and this fee is expected to remain unchanged for 1991. In addition, the patient pays an extra fee to the physicians for their services. This is a private arrangement between the patient and the physician and has no effect on the finances of the hospital. For the year ending 31st December, 1990 the department received revenue of Rs. 13,96,125 for private health care. Actual expenditure charged to the department for 1990 was as follows:-

Basis of Allocation		
	Patient days	Bed capacity
	Rs.	Rs.
Meals	2,20,000	-----
Porter's Salaries	---	12,000
Laundry	1,20,000	---
Laboratory	2,60,000	
Maintenance	37,000	---
General Adm. Services	----	2,37,000
Other Expenses	20,000	----
	<u>6,57,000</u>	<u>2,49,000</u>

It is estimated that all the costs will increase by 10 per cent in 1991. In addition, rent of Rs. 4,00,000 was charged directly to the department, as it is the sole occupier of a building within the hospital grounds. This figure is expected to increase to Rs. 5,00,000 for 1991. The salaries of the nursing staff are charged to the department at the end of the year according to the following schedule;

Annual patient days	Nurses required to be On duty (assumed)
Less than 7,000	3
7,000- 10,000	4
10,000- 13,000	5

The average salary of the nursing staff for 1991 is estimated at Rs, 7,000 per annum (actual for 1990 Rs. 6,500 p.a.). The department has a maximum capacity Of 60 beds but in 1990 a number of beds were unoccupied because of insufficient demand and there have been demand from a number of parties that the department is losing money and should be closed down. BEP for 1991?

Answer:- Basic Calculations

- (i) Maximum patient days = Rs.21,900(i.e. 365X 60 maximum patients)
- (ii) Number of Patients days for 1990= 16,425(i.e. Rs/ 13, *96125/ Rs, 85 per day)
- (iii) Unit variable cost per patient day for 1990 =Rs. 40(i.e. Rs. 6,57,000/16,425)
- (iv) Unit variable cost per patient day for 1991- Rs. 44(i.e. 40/10% of 40)

Computation of Rprofit for 1990

		Rs.
Contribution from patients		
16,425 patinet-days @Rs. 45 (i.e. Rs. 85 – Rs.40)		7,39,125
Less: Fixed Costs		
Porter's Salary and General Administration Services	2,49,000	
Nurshing Staff(6,500 X 8)	52,000	
Rent and Rates	4,00,000	7,01,000
Profit		38,125

**Computation of Estimated Profit
For 1991 Assuming 1990 Demand**

		Rs.
Contribution from patients		
16,425 patinet-days @Rs. 41 (i.e. Rs. 85 – Rs.44)		6,73,425
Less: Fixed Costs		
Porter's Salary and General Administration Services (2,49,000+10% of 2,49,000)	2,73,900	
Rentand Rates	5,00,000	
Nurshing Staff(7,000 X8)	56,000	8,29,000
Loss		(1,56,475)

Computation of Break-even point to cover all fixed costs based on a fee of Rs. 85 per day:

Minimum Fixed Costs: (2,73,900 + 5,00,000 + 21,000 for three nurses) = Rs. 7,94,900

Hence BEP = 7,94,900/ Rs. 41 = 19,388 patient days

This exceeds 13,000 patients days. Hence 8 nurses must be employed to breakeven.

Recvised Fixed Costs: 2,73,900 + 5,00,000 + (8 nurses X 7,000) = 8,29,900.

BEP – 8,29,900/41 = 20,241 patient days or 55,46(i.e.20,241/365) Patients daily on an average throughout the year.

Break-even point to cover fixed costs specified to private department.Relevant fixed Costs are Rs. 5,00,000(assuming other fixed costs to continue).The BEP to cover specific fixed costs will be 5,00,000/41= 12,195 patient days or an average 33 patients (i.e. 12,195/365) per dya throughout the year.

Required fee per day to breakevenin 1991(assuming 1990 demands). A contribution of Rs.50353 (i.e. 8,29,900/16,425) per patient day will ve requiredto break-even. In order to obtain this contribution of Rs. 50353, it is necessary to add the variable cost of Rs. 44. This given a fee per patient day of Rs. 94.53.

The following information must be presented to management:

- (a) in order that there is sufficient revenue to cover a fair share of fixed costs. On an average of 55 patients are required daily throughout the year for 1991 as compared to average 45 patientsin 1990.
- (b) In order to cover the short-term relevant costs, the department requires on an average only 33 patients daily presuming that other costs will continue even if the department is closed.
- (c) The department provided an estimated contribution of Rs. 6,76,425 towards meeting the fixed costs of the hospital. In case the department's facilities cannot provide any alternative revenue if the department

is closed down, keeping the department open will be greatly beneficial since it will provide a contribution of Rs. 6,73,425 which would not otherwise be available.

Question18:- S. P. Rs. 245 per unit

Production cost per unit

Material	70
Labour (10 Hrs @ Rs. 8)	80
Variable production overhead	50
Fixed Production overhead	<u>10</u>
	Rs. <u>210</u>

Installed capacity 20,000 units. Normal capacity 10,000 units. Selling overhead (fixed) Rs. 1,00,000. Under an agreement with union. Labour has to be paid for minimum 1,00,000 hours. For labour hours in excess of 1,50,000 hours, labour has to be paid at the rate of Rs. 12 per hour .

1. Find BEP,
2. Find BEP if fixed selling overhead to Rs. 3.95,000
3. Find BEP if fixed selling overhead increases to Rs. 6,00,000.

SOLUTION:-

(i) Statement of Break Event Point (for first 10,000 unit)

Qty	Contribution per unit (W.N 1)	Total Fixed Cost
8000	125	<u>10,00,000</u>
	Total Fixed cost (W.N 2)	<u>10,00,000</u>

(ii) Statement of break even point (for next 5000 unit)

Qty	contribution per unit (W.N –1)	Total fixed cost
10,000	125	12,50,000
1000	45	45,000
		12,95,000

(iii) Statement of Break Even Point

Qty	Contribution Per Unit	Total Fixed cost
10,000	125	12,50,000
5000	45	2,25,000
5000	5	25,000
	Fixed cost (W.N – 2)	15,00,000

W.N-1

Calculation of contribution per unit

	For first 10,000	For Next 5000	For Next 5000
Selling price	245	245	245
Less: Material cost	70	70	70
Labour cost	-	80	120
Variable	cost	50	50
Contribution	125	45	5

W.N 2

Calculation of fixed cost

	I case	II case	III case
Production over Selling	1,00,000	1,00,000	1,00,000
Selling over head	1,00,000	3,95,000	6,00,000
Labour cost	8,00,000	8,00,000	8,00,000

Total fixed cost	10,00.000	12,95.000	15,00.000
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Question No: 19

$$\begin{aligned}
 \text{(i) Break Even Point (only including fixed cost)} &= \frac{\text{Fixed cost}}{\text{Contribution}} \\
 &= \frac{2000}{50 - 25} = \frac{2000}{25} \\
 &= 80 \text{ Unit}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) Semi variable cost for 80 units} &= \frac{80}{20} \times 50 \\
 &= 200
 \end{aligned}$$

$$\begin{aligned}
 \text{Again, Break Even Pint (Including S.V.C)} &= \frac{\text{Fixed cost} + \text{Semi variable cost}}{\text{Contribution/Unit}} \\
 &= \frac{2000 + 200}{25} \\
 &= 88 \text{ units}
 \end{aligned}$$

At the level of 88 units

Semi variable cost to be incurred

$$\begin{aligned}
 &\frac{80}{20} = 50 \text{ (Approx.)} \\
 &= 5 \times 50 \\
 &= \text{Rs. } 250
 \end{aligned}$$

Question 19:- From the following data, calculate the Break-Even point:

Fixed cost	Rs. 2,000
Semi-variable cost for every 20 units	Rs. 50
Variable cost per unit	Rs. 25
Revenue per unit	Rs. 50

Question20:- SP = 50, VC = Rs. 40, FC = 2,000

SVC For Every 20 Unit Rs. 50.

Question21:- FC = Rs.108000, SP = 200, VC = 120, SVC = Rs. 400 for each 50 Units.

$$\begin{aligned}
 \text{(1) Break Even Point (only including fixed cost)} &= \frac{\text{Fixed cost}}{\text{Contribution per unit}} \\
 &= \frac{108000}{80} \\
 &= 1350 \text{ units}
 \end{aligned}$$

(2) Semi-variable cost at that point (i.e. 1350 units)

$$\begin{aligned}
 &= \frac{1350}{50} \times 400 \\
 &= 27 \times 400 \\
 &= 10,800
 \end{aligned}$$

(3) Again,

$$\text{Break Even Point (Including S.V.C)} = \frac{108000 + 10.800}{80} = \frac{\text{F.C.} + \text{S.V.C}}{\text{Contribution/Unit}} = 1485 \text{ units}$$

At the level of 1485 units

$$\begin{aligned}
 \text{Semi-variable cost to be incurred} &= \frac{1480}{50} = 30 \text{ (approx.)} \\
 &= 30 \times 400 \\
 &= 12,000
 \end{aligned}$$

Semi – variable cost covered = 10.800

Statement of Break Even point

Range	1401-1450	1451-1500	1501-1550
Fixed cost	1,08,000	1,08,000	1,08,000
Semi-Variable cost	29 x 400	30 x 400	31 x 400
	=11,600	=12,000	= 12,400
Cost	1,19,600	1,20,000	1,20,400
Contribution/unit	80	80	80
Break Even Point	1495	1500	1505
Remark	loss		profit

In the first range management will suffer loss.

For the second range 1500 units can't be termed as final break even point because semi variable cost of the next range will not over from surplus contribution in the range along with one unit of next range.[i.e. Rs. 80 does not cover the S.V.C. of Rs. 400 due to one surplus unit]

For third range,

1505 to be termed as final break and point, because semi variable cost of the forth range to be covered from surplus contribution of third range.

Question22:- An institution conducts an entrance examinations for admission to a course. Each candidate is charged a fee of Rs. 50. The relevant costs of the entrance examination are: F.C. Rs. 20,000, V.C. Rs. 30 per candidate. Besides these costs, one more cost is there and that is supervision cost @ Rs. 200 for every 100 candidates. Find B.E.P.

Question23:- Vivek School has a total of 150 students. The school plans a picnic to places such as Zoo. Planetarium etc. A private bus operates has come forward to lease out the bus(es) for taking the student. Each bus will have 50 seats for the students (besides 2 seats reserved for the teachers). The School will employ two teachers for each bus, paying them an allowance of Rs. 50 per teacher. The following are cost estimates;

Cost per Student

Break Fast	Rs. 5
Lunch	Rs. 10
Tea	Rs. 3
Entrance at Zoo	Rs. 2

Rent per bus Rs. 650. Special permit fee Rs. 50 per bus (to be paid by the school) Block entrance fees at planetarium Rs. 250. Prizes to students for games Rs. 250. No costs are incurred in respect of the accompanying teachers (except the allowance of Rs. 50 per teacher). Find B.E.P. (in terms of no. of students). The school charges Rs. 45 per students.

$$\begin{aligned}\text{Break Even point (only for fixed cost)} &= \frac{\text{Fixed cost}}{\text{Contribution per student}} \\ &= \frac{500}{25} \\ &= 20 \text{ Students}\end{aligned}$$

Semi variable cost for x student = For of 1 bus

$$\begin{aligned}&= \text{Teacher Allowance} + \text{Rent (bus)} + \text{permit fee} \\ &= 100 + 650 + 50 \\ &= \text{Rs. 800}\end{aligned}$$

$$\text{Break Even point (Including S.V.C)} = \frac{\text{Fixed cost} + \text{Semi-variable cost}}{\text{Contribution per student}}$$

$$= \frac{500 + 800}{25}$$

$$= 52 \text{ Students}$$

At the level of 52 Students,

$$\text{Contribution} = 52 \times 25 = 1300$$

Which cover 500 fixed and semi variable cost of bus.

But at the level of 52 Student we will incurred

Fixed Cost = Rs. 500

Semi-variable cost (2 bus fare) = Rs. 1600

= Rs. 2100

Statement of break even point

Range 0-5	51-100	101-150	Range 0-5
Fixed cost	500	5000	500
Semi-variable cost	800	1600	2400
Cost	1300	2100	2900
Contribution	25	25	25
Break Even point	52	84	116

For the first range the maximum contribution comes to 50 student

$$= 50 \text{ Student} \times 25$$

$$= \text{Rs. } 1250$$

But the cost for the range comes to Rs. 1300

Hence, contribution is not sufficient to cover the cost. There fore this range is always provide the loss.

For the second range (i.e. 57-100)

The break even point comes to 84 student 84 Student may be the final break even when

$$\left(\begin{array}{l} \text{upper limit of the range} \\ - \\ \text{Break Even point} \\ + \\ \text{1 Unit of next range} \end{array} \right)$$

X contribution per student

is greater than fore of 1 Bus

$$\text{i.e. } [(100 - 84) + 1] \times 25 = 7800$$

$$425 > 800 \text{ (not satisfy)}$$

Hence, It indicates at the level of 10% the management suffer loss. $(101 \times 25 = 2900)$

Hence, 84 Students cann't be termed as final break even point

For third range

$$[(150 - 116) + 1] \times 25 > 800$$

$$875 > 800$$

It indicates this range provide the surplus contribution to cover semi-variable cost of next range. (157-200)

We can say 116 students to be termed as final break even point.

Question24:- Satish Enterprises are leading exporters of Kid's toys J Ltd. of U.S.A. have 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:

	Rs.
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 Rs. 400 per box.

Satish Enterprises will also have to import a special machine for making the toys. The cost of the machine is Rs. 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 Rs. 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 Rs. 50 per \$.

You are required to:

1. Prepare monthly and yearly profitability statements for the first year and second year assuming the production at 3,000 toys per month.
2. Compute monthly and yearly break-even units in respect of the first year.
3. In what contingency can there be a second break-even point for the month and for the year as a whole?
- 4: Have you any comments to offer on the above?

Solution:-

Solution:-

Profit Statement of M/s Satish Enterprises for first and second year on monthly and yearly basis

	First year		Second year	
	Monthly	Yearly	Monthly	Yearly
Sales Revenue(A)	Rs. 6,00,000	Rs.72,00,000	Rs. 6,00,000	Rs. 72,00,000
Material Cost	1,80,000	21,60,000	1,80,000	21,60,000
Labour cost	75,000	9,00,000	75,000	9,00,000
Variable cost	60,000	7,20,000	60,000	7,20,000
Primary packing	45,000	5,40,000	45,000	5,40,000
Boxes cost	24,000	2,88,000	24,000	2,88,000
Fixed overhead(Note 1)	1,08,000	12,96,000	1,10,000	13,20,000
Total cost (B)	4,92,000	59,04,000	4,94,000	59,28,000
Profit (A) – (B)	1,08,000	12,96,000	1,06,000	

Workings: Sales revenue = 3,000 X Rs. 200; Materials cost= 3,000 X Rs. 60; Labour cost = 3,000 X Rs. 25; Variable cost = 3,000 X Rs. 20; Primary packing = 3,000 X Rs. 15; Boxes = (3,000 / 50) X Rs. 400.

Statement of monthly break-even point in units for the first year

Fixed cost for the month Rs. 1,08,000

For recovery of this fixed cost 1,350 units(i.e. Rs. 1,08,000 / 80) are required. For 1,350 units 27 boxes are required and the cost of boxes will also have to be recovered.

Total cost to be recovered = (Rs. 1,08,000 / 10,800) / Rs. 80 = 1,485 units

1,485 units require 29.7 boxes or 30 boxes

Total monthly fixed cost to be recovered to break even

Fixed Cost (given) = Rs. 1,08,000

Cost of 30 boxes (30X Rs. 400) = 12,000

1,20,000

Contribution per unit = Rs. 200 – 120 = Rs. 80
 Monthly break-even point = Rs. 1,20,000/ Rs. 80 = 1,500 units.
 It will fall in range of 1,450 to 1,500 units
 27 boxes X Rs. 400

Statement of yearly BEP for the First year

Fixed cost for the year = Rs. 1,08,000 X 12 = Rs. 12,96,000

For recovery of this cost alone, 16,200 units are required. For 16,200 units, 324 boxes are required and the cost of boxes will also have to be required.

Total cost to be recovered = Rs. 12,96,000 + (324 X Rs . 400) = Rs. 14,25,600

For this 17,820 units (i.e. Rs. 14,25,600) requiring 356.4 or 357 boxes are required.

Total cost to be recovered = Rs. 12,96,000 + 357 x Rs. 400 (i.e. Cost of boxes) = Rs. 14,38,000

For fixed cost recovery of Rs. 14,38,800, BEP be:

= RS. 14,38,800 / 80 = 17,985 units or 359.7 boxes(i.e. 17,985 / 50) or 360 boxes

Therefore, yearly BEP

Fixed cost Rs. 12,96,000

Cost of 360 boxes 1,44,000

Contribution required to break-even 14,40,000

Yearly BEP = Rs. 14,40,000 / 80 = 18,000 units or 360 boxes and this point will fall between the range of 17,951 to 18,000.

For the month:

(iii) If the number of toys is more than 1,500 then one more box will be required and additionally cost of Rs. 400 for one more box will have to be recovered to break-even. New BEP will be 1,505 units i.e. (Rs. 1,08,000 + (3) X Rs. 400) / 80} . Thus 1,505 units can be another break even point if one more unit is produced during the month.

For the year: If number of toys goes beyond 18,000 one more box will be required and additional cost of box of Rs. 400 will also have to be recovered to break-even . Now new break –even point will be 18,005 units for the year. i.e. (Rs. 12,96,000 + (361 Boxes X RS. 400)) / Rs. 80. Thus 18,005 units can be another break-even point for the year, if one more unit is produced during the year.

(iv) For the month BEP is 1,500 units and for the year. It is 18,000 units i.e. just 12 times because monthly and yearly break-even points fell within upper limit of respective range.

In the second case, it is not so because of change of respective range.

Working Notes:

Fixed Overhead	First year(rs.)	Second Year (Rs.)
Depreciation	8,96,000	8,96,000
Other overhead	4,00,000	4,24,000
Total fixed overhead	12,96,000	13,20,000

(Rs. 24,00,000 + 2,88,000) / 3

2:- Monthly break-even point:

Fixed overhead for first year = Rs. 12,96,000

Monthly fixed overhead = RS. 12,96,000 / 12 = Rs. 1,08,000

Contribution per unit = Rs. 200 – 120 = Rs. 80

Break-even (units) Rs. 1,08,000 / 80 = 1,350 units.

But at 1,350 units, cost of boxes is not recovered and 27 boxes are required for just 1,350 units. Therefore one more box at least is required to cover the cost of boxes. Therefore, 28 boxes will be required at least and cost of one box will be added.

Question25:- A Company manufactures two products namely product A and product B. The Price and cost data are as under for 1991 :

	A (Rs.)	B (Rs)
--	---------	--------

Selling Price	200	100
Variable Costs	120	40

Total fixed costs are Rs. 23,00,000 per annum.

The company sells the two products in the sales value ratio of 7 : 3 and is operating at a margin of safety of 20%, during the next year, 1992 the company anticipates that the variable costs of product A and B will go up 5% and 2 ½% respectively. The fixed expenses will also go up by 5%.

Required:

- (i) Find the quantity of products A and B sold in 1991.
- (ii) Evaluate the following proposals which are under consideration for implementation in 1992
 - (a) If the company desires to sell the same quantity of product A as in 1991, how many Units of product B should be sold to earn the same profit as in 1991 ?
 - (b) If the selling price of product A is reduced by 5% as compared to 1991, and the Quantity sold is increased to 24,000 units, how many units of product B should be sold to earn the same profit as in 1991.
 - (c) If product A is discontinued, how many units of product B should be sold to earn the same profit as in 1991.
 - (d) If product A is discontinued and the quantity of product B is to be restricted to 37,375 units what percentage increase in selling price of product B is necessary to earn the same profit as in 1991.

SOLUTION:-

Computation of Sales for the Year 1901

	Product A (Rs.)	Product B (Rs.)
Selling Price	200	100
Less: Variable Costs	120	40
Contribution	80	60
P/V Ratio	40%	60%
Sales volumeRatio	70%	30%
	40X70	60X30
Weighted Profit Volume Ratio	----- = 28%	----- = 18%
	100	100

Composite Profit Volume Ratio 46%

Fixed Expenses Rs. 23,00,000 per annum.

Fixed expenses 23,00,000

BEP= ----- = ----- X 100 = Rs. 50,00,000 (Sales Value)
Composite P/Vratio 46

Margin of Safety is 20%

Hence Break-even Sales are equivalent to 80% of total Sales

Bep Sales of Rs. 50 Lakhs = 80%

50,00,000

Hence Total Sales = ----- X 100 = Rs.62,50,000

80

Sales of A : 70% of 62,50,000 =Rs. 43,74,000/ Sp 200=21,875 units

Sales of B: 30% of 62,50,000 = Rs.18,75,000/ Sp100=18,750 units.

Computation of Contribution and Profit in 1901

	Rs.
Product A (21,875 X 80)	17,50,000
Product B (18,750 X 60)	<u>11,25,000</u>
Total Contribution	28,75,000
Less: Fixed Cost	<u>23,00,000</u>
Profit	<u>5,75,000</u>

Evaluation of Different Proposals

Statement of Projected Cost Data for 1902

	Product A Rs.	Product B Rs.
Selling Price	200	100
Variable Cost:		
A: 120 + 5% increase	126	
B: 40 + 2 ½% Increase		41
Contribution	74	59
Fixed Expenses 23,00,000 + 5% increase = Rs. 24,15,000.		

(b) Computation of Qty to be sold of B to keep same profit

Product A	=	Sales 21,875 units
Contribution From A	=	21,875 X 74
	=	Rs. 16,18,750
Contribution required to earn same profits in 1901 =	Fixed Cost + Profits	
	=	24,15,000 + 5,75,000
	=	Rs. 29,90,000
Balance Contribution	=	29,90,000 – 16,18,750
	=	Rs. 13,71,250
Contribution per unit of B	=	Rs. 59
Hence, number of units of B to be sold	=	13,71,250/59
	=	23,242 units.

(c) Computation of Quantity of B to sold as per Proposal B

Selling Price of A is reduced by 5%	
Revised Selling Price of A	= 200 X 95/100
	= Rs. 190
Variable Cost	= Rs. 126
Contribution per unit	= Rs. 74
Units Sold	= 24,000
Contribution earned from A (24,000 X 74)	= Rs. 15,36,000
Balance contribution required from B	= Rs. 29,90,000 – Rs. 15,36,000
	= Rs. 14,54,000
Number of units of B to be sold	= Rs. 14,54,000/59 = 24,645 units

Computation of Units of B to be sold to earn the same profits under Proposal C

Contribution required	=	Rs. 29,90,000
Number of units of B to be sold	=	37,375
Contribution per unit required	=	29,90,000/37,375
	=	Rs. 80 per unit
Selling Price	=	Variable Cost per unit + Contribution
	=	41 + 80 = Rs. 121.
		21
Hence percentage increase in contribution	=	----- X 100 = 21%
		100

Question 26:- (P/V Ratio – Sales required to meet the target profit.) Titan Engineering is operating at 70% per cent capacity and presents the following information:

Break –even point	Rs. 200 Crores
P/V Ratio	40 per cent
Margin of safety	Rs. 50 Crores

Titan's management has decided to increase production to 95 per cent capacity level with the following modifications:

- i) The selling price will be reduced by 8 per cent.
- ii) The variable cost will be reduced by 5 per cent on sales.
- iii) The fixed cost will increase by Rs. 20 Crores, including depreciation on additions, but excluding interest on additional capital.
- iv) Additional capital of Rs. 50 Crores will be needed for capital expenditure and working capital.

Required:

- a) Indicate the sales figures, with the working, that will be needed to earn Rs. 10 Crores over and above the present profit and also meet 20 per cent interest on the additional capital.

- b) What will be the revised?
- i) Break –even point
- ii) P/V Ratio
- iii) Margin of safety

Answer:

Basic Calculations

Computation of Present Sales and Profit

Total Sales = Break –even Sales + Margin Of Safety
 = Rs.200Crores + Rs. 50 Crores
 =Rs.250Crores,

P/V ratio = 40% ,

Variable cost = 60% of Sales
 = Rs. 250 Crores X 60%
 = RS. 150 Crores,

Fixed Cost = Break – even Sales X P/V Ratio
 = Rs. 200 Crores X40%
 = 80 Crores,

Total cost = Variable Cost + Fixed Cost
 = Rs. 150 Crores + Rs. 80 Crores
 = Rs. 230 Crores,
 = Total Sales – Total Cost
 = Rs. 250Crores – Rs. 230 Crores
 = Rs. 20 Crores,

(a) Computation of Revised Sales for Profit of Rs. 30 Crores (i.e. 20 +10)

(Rs. In Crores)

(i)	Revised Fixed cost	
	Present Fixed Cost	80
	Add: Increase in Fixed Cost	20
	Interest at 20% on additional capital (Rs. 50 Crores X 20%)	<u>10</u>
	Total Revised Fixed Cost	<u>110</u>
(ii)	Revised Contribution	
(iii)	Presuming that the present selling prices Rs.100	Rs. P.V.
	Revised selling price will be (100 – 8)	92.00
	New Variable Cost (60 – 5 = 55%of Sales) = 92 X55% =	<u>55.00</u>
(iii)	Contribution per unit(i)-(ii)	<u>37.00</u>
	37	
(iv)	New P/V Ratio -----X 100= 40.21%	
	92	

Revised Sales for Desired Profit =
$$\frac{\text{Revised Fixed Cost + Desired Profit}}{\text{P/V Ratio}}$$

 =
$$\frac{\text{Rs. 110 Crores + Rs. 30 Crores}}{40.21\%}$$

 = Rs. 348 Crore

(b)(i) Revised Break-even Point =
$$\frac{\text{Fixed Cost}}{\text{P/V ratio}}$$

 =
$$\frac{\text{Rs. 110 Crores}}{40.21\%}$$

 = Rs. 273.56 Crore

- (ii) P/V Ratio = 40.21%
- (i) Revised Margin of Safety = Revised Sales – revised Break – even Sales
 = Rs. 348 Crores – Rs. 273.56 Crores
 = Rs. 74.43 Crores

Question27:- A company manufactures two types of herbal. Product. A and B. Its budget shows profit figures after apportioning the fixed joint cost of Rs. 15 lacs in the proportion of the number of units sold. The budget for 2002, indicates:

	A	B
Profit (Rs.)	1,50,000	30,000
Selling Price/unit (Rs.)	200	120
P/V Ratio (%)	40	50

You are required to advise on the option among the following if the company expects that the number of units to be sold would be equal:-

1. Due to change in a manufacturing process, the joint fixed cost would be reduced by 15% and the variable would be increased by 7 –1/2 %
2. Price of A could be increased by 20% as it is expected that the price elasticity of demand would be unity over the range of price;
3. Simultaneous introduction of both the option, viz, (i) and (ii) above

Answer:-

Number of units to be sold:

Total Contribution – Fixed cost = Profit

Let X be the number of units of each product sold, therefore

$$(80X + 60X) - \text{Rs. } 15,00,000 = \text{Rs. } 1,50,000 + \text{Rs. } 30,000$$

$$X = 12,000 \text{ units}$$

Option (i) Increase in Profit when due to change in a manufacturing process there is reduction in joint fixed cost and increased in variable costs:

	Rs.
Revised contribution from 12,000 units of A due to 7.5% increase	
In variable Cost (12,000 units X (Rs. 200 – Rs. 129))	8,52,000
Revised Contribution from 12,000 units of B due to 7.5% increase	
In variable Cost (12,000 units X (Rs. 120 – Rs. 64.50))	<u>6,66,000</u>
Total Revised Contribution	15,18,000
Less: Fixed Cost (Rs. 15,00,000 – (15% X Rs. 15,00,000))	<u>12,75,000</u>
Revised Profit	2,43,000
Less: Existing Profit	<u>1,80,000</u>
Increase in Profit	<u>63,000</u>

Option (ii) increase in Profit when the price of Product A is increased by 20% and the price elasticity of its demand would be unity over the range of Price:

	Rs.
Budgeted Revenue from Product A (12,000 units X Rs. 200)	24,00,000
Revised Demand (in units) (Rs. 24,00,000/ Rs. 240)	10,000
Revised Contribution (in Rs..) (10,000 units X (Rs. 240 – Rs. 120))	12,00,000
Less: Existing Contribution (12,000 units X Rs. 80)	9,60,000

Increase in Profit (Contribution) 2,40,000

Note: Since Price elasticity of demand is 1, therefore the revenue in respect of products will remain same.

Option (iii) Increase in Profit on the simulation introduction of above two options:

Rs.

Revised Contribution from Product A

(10,000 units X (Rs. 240 – Rs. 129) 11,10,000

Revised Contribution from Product B

(12,000 units X (Rs. 120 – Rs. 64.50) 6,66,000

Total Revised Contribution 17,76,000

Less: Revised Fixed Cost 12,75,000

Revised Profit 5,01,000

Less: Existing Profit 1,80,000

Increase in Profit 3,21,000

Advice: A Comparative study of increase in profit figures under above three options clearly indicates that the option (iii) is the best since it increase the profit of the concern by Rs. 3,21,000 being the maximum.

Note: The budgeted profit (loss) for 2002 in respect of products A and B should be 2,10,000 AND (Rs. 30,000) respectively instead of Rs. 1,50,000 and Rs.30,000.

Question 28:- 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 Rs. 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:

Between 600 to 900 components per month at a selling price of Rs. 250 per components.

Between 901 to 1,250 components per month at a selling price of Rs. 220 per. Component for the entire lot.

The costs of the parts required would be Rs. 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 costs would be Rs. 60,000 per month upto 750 components .Beyond this level of activity assembly costs would increase to Rs.70,000 per month.

Your friend has already spent Rs. 30,000 on development ,which he would write-off over the first five years of the venture.

Required: Calculate for each of the possible sales levels at which your Friend could expect to benefit by going into the venture on his own.

Calculate the break-even point of the venture for each of the selling price.

Advise your Friend as to the viability of the venture.

SOLUTION:-

Statement of Break Even Point

Range	600-750	757-900	901-1000	1001-1250
	Rs.	Rs.	Rs.	Rs.
Cost	60.000	70.000	70.000	701.000
Opportunity cost	14.800	14.500	14.800	14.800
Relevant cost	74.800	84.800	84.800	84.800
Selling price	250	250	220	220
Variable cost	(140)	(140)	140)	(133)
Contribution	110	110	80	87

Break Even Point	680	771	1060	975
------------------	-----	-----	------	-----

Recommendation:-

(i) If you are interested to incur assembly cost (fixed cost) upto Rs. 60,000 with selling price Rs. 250 then your forget output should be atleast 680 units.

(ii) If you are interested to incur assembly cost upto Rs. 70,000 then your forget output should be atleast 771 unit (Along with selling price Rs. 250)

(iii) For third and fourth range the above break even does not provide the correct result because at the level of 1060 units, we are eligible to avail the benefit for discount but we have not consider the benefit of discount invariable cost.

(iv) At the level of 975 units we are not eligible to avail the benefit of discount but we have consider variable cost with discount

Now we can say for the third range the maximum contribution would be Rs. 80,000, but the cost for the range comes to 84,800.

Hence, the third range always provide the loss.

At fourth range At the level of 1001 unit he will be in a position to active the benefit due to benefit of discount.

Level 1001

$$= 1001 \times 220 - 1001 \times 133 - 84,800 <$$

Profit 2287

Level 1000

$$= 100 \times 220 - 100 \times 140 - 84,800$$

$$= \text{loss} - 4800$$

Hence, we can say the target output should be 1001 unit (i.e. the level availing discount).

Decision Making

Question1:- Paramount 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 wrapping aluminum foil and packed in attractive cartons, containing 50 bars. A carton is therefore, considered the basic sales unit. Although management had made detailed estimates 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 quarter are each thought to be representing of the costs and productive efficiency we can expect in the next few quarter. There were virtually no inventories on hand at the end of each quarters. The income statements reveal the following:

	First Quarter Rs.	Second Quarter Rs.
Sales:		
50,000 * Rs. 24	12,00,000	-
70,000 * Rs. 24	—	16,80,000
Cost of Goods Sold	<u>7,00,000</u>	<u>8,80,000</u>
Gross Margin	5,00,000	8,00,000

Selling and Administration	<u>6,50,000</u>	<u>6,90,000</u>
Net Income(Loss) before taxes	(1,50,000)	1,10,000
Tax (negative)		
	<u>(60,000)</u>	<u>44,000</u>
Net Income (Loss)	<u>(90,000)</u>	<u>66,000</u>

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

Required:

- Management would like to know the breakeven point in terms of quarterly carton sales for the chocolates.
- Management estimates that there is an investment of Rs. 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?
- The firm's marketing people predict that if the selling price is reduced by Rs. 1.50 per carton (Re. 0.03 off per chocolate bar) and a Rs. 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?

Solution:-

(a) We need to estimate the fixed & variable cost. The variable manufacturing cost per carton:-
Change in costs/Change in Activity = Rs. (88000 – 7,00,000)/(70,000 – 50,000) cartoons
Rs. 1,80,000/20,000 Cartoons Rs. 9 per cartoon

Fixed manufacturing costs:

Cost of Goods Sold = Fixed manufacturing cost + Variable manufacturing cost
Rs. 7,00,000 = Fixed manufacturing + (50,000 Cartoons X Rs. 9)
Fixed manufacturing cost = Rs. 7,00,000 – Rs. 4,50,000
= 2,50,000

Variable Selling and Administration cost per carton:

= Rs. 6,90,000 – Rs. 6,50,000/70,000 cartoons – 50,000 cartoons
= Rs. 40,000/20,000 cartoons
= Rs. 2 per cartoon.

Fixed Selling & administration Costs

Total Selling & administration costs

Total Selling & administration costs = Fixed selling & administration cost + Variable Selling & admin. Cost
Rs. 6,50,000 = Fixed selling & admin. Cost + (50,000 cartoons X Rs. 2)
Fixed selling & admin. Cost = Rs. 6,50,000 – Rs. 1,00,000
= Rs. 5,50,000.

So the total variable costs per cartoon is Rs. (9 + 2) = Rs. 11 per cartoon.

Total Fixed costs are Rs. (2,50,000 + 5,50,000) or Rs. 8,00,000 per quarter.

Given sale price of Rs. 24 per carton and variable costs of Rs. 11 per carton, the contribution per cartoon is Rs. 13 (Rs. 24 – Rs. 11)

Break even terms of carton units:

Fixed costs per quarter/Contribution per cartoon = Rs. 8,00,000/Rs. 13
= 61,539 cartons.

(b) If we want to earn an after tax return of 20% on Rs. 30,00,000 the desired annual after tax net income is Rs. 30,00,000 X 20/100 = Rs. 6,00,000. The quarterly after tax net income will be Rs. 1,50,000. Given the tax rate of 40% the pre-tax return will be Rs. 1,50,000 X 100/60 = Rs. 2,50,000.

The quarterly sales units required:-

$$\begin{aligned}\text{Fixed Cost} + \text{Desired return/Contribution per carton} &= \text{Rs. } (8,00,000 + 2,50,000)/\text{Rs. } 13 \\ &= \text{Rs. } 10,50,000/\text{Rs. } 13 \\ \text{Quarterly sales revenue} &= 80,769 \text{ cartons Rs. } 24 \\ &= 19,38,456.\end{aligned}$$

© The proposal involves reducing selling price from Rs. 24 to Rs. 22.50 Hence the contribution per cartoon will be:

$$\text{Rs. } (22.50 - 11.00) = \text{Rs. } 11.50$$

The increase in advertising costs will push fixed costs up by Rs. 1,50,000 to Rs. A 20% increase over second quarter's sales would increase sales from 70,000, 84,000 cartoons.

The expected earnings before taxes will be:

$$\begin{aligned}&= \text{Contribution} - \text{Fixed cost} \\ &= 184000 \times \text{Rs. } 11.51 = 950,000 \\ &= \text{Rs. } (966000 - 950,000) = 16,000\end{aligned}$$

After deduction tax at 40% the net Income will be Rs. 9600 (16000 - 6000).

Since we earned Rs. 66000 before the change this plan should not be implemented.

Question2:- The management of Kabra Limited is alarmed at the high under utilization of installed capacity. The workers of Kabra Ltd. have a very strong union. Any attempt by management to increase production is opposed by the union on the ground that the workers are working as per normal standards and that extra unit produced does not fetch any rewards to workers. The management having realized that there is capacity puts forth incentive scheme, which rewards the workers, staff as well as management.

As per the proposed scheme, the after-tax incremental profit will be shared by all as follows:

- 30% to be ploughed back.
- 40% to be shared by workers, and
- 30% to be shared by staff.

In case there is a loss, no reward will be given to anyone. The changes in capacity due to off. Loading, make or buy decision, replacement of conventional machines by highly productive machine etc. will be adjusted for calculating excess production during the currency of the scheme.

Presently the company is producing 1 lakh units. The current cost structure is as follows:

	Rs. Per 1,000 units
Prime Cost	15,003
Works Overheads	7,490
Administrative overhead	2,650
Selling overheads	99
Sale value	25,150

The above figures include fixed cost to the extent of 20% works overheads. 30% administration overheads and 100% selling expenses.

The Company pays 50% tax. However the reward under the scheme given to workers (not staff) is tax deductible.

You are required to calculate the annual share in absolute amounts for each of the beneficence at various levels at an interval of 1% from 1% to 8% increase in production over present target.

Solution2:-

Statement of allocation of profit

Level	PBT (W.N 2)	Tax (W.N 3)	Worker	Management	Staff
-------	----------------	----------------	--------	------------	-------

		37.5%	25%	18.75%	18.75%
1,05,000	2300	862.5	575	431.25	431.25
106000	4600	1725	1150	862.5	862.5
10700	6900	2300	1725	1093.75	1383.75
10800	9200	3450	2300	1725	1815

Working notes:

Breakeven point = Fixed cost/Contribution P.V

Statement of cost

			Per 1000
	Total (Rs.)	Variable (Rs.)	Fixed (Rs.)
Prime cost	15003	15003	--
Works overhead	7490	5992	1498
Administration overhead	2650	1855	795
Selling overhead	99	--	99
		22850	2392

Fixed cost per unit = Rs. 2392/1000 = Rs. 2.392 P.U

Total fixed cost = Rs. 2.392 x 1,00,000
= 2,39,200

Variable cost = Rs. 22850/1000 = Rs. 22.85 Per Unit

BEPT (Unit) = (FC)/Contribution P. V

= 239200/25.15 – 22.83 = 1,04,000 units

(2) For PBT

Contribution – Fixed cost = PBT

2.3 x 105000 unit – 239200 = 2300 Rs.

OR

2.3 x 1000 = Rs. 2300

(105000 - 104000)

(3)

Income tax Act		Company Act	
PBT	2300	PBT	2300
- Worker	0.4 x	Income tax PAT	(2300 – 0.4X) x 5/X
Taxable profit	2300 – 0.4x	Worker 40%	
-Tax 50%	½ (2300 – 0.4x)	Staff 30%	
PAT	XXX	Management 30%	

PBT – tax = PAT

Or 2300 – (2300 – 0.4x) X 1/2 = x

∴ x = 1437.5

As per Co. Act.

PBT 2300

- Tax amount 2300 – (0.4 x 1437.5)1/2

= 862.5

PAT = 1437.5

Worker 40% 575

Management 30% 431.25

Staff 30% 431.25

OR

$\text{Tax} = (\text{PBT} - \text{Worker})50\% \text{ --- (I)}$
 $\text{Worker} = (\text{PBT} - \text{tax}) \times 40\% \text{ --- (II)}$
 Putting the value of eaⁿ (I) in (II)
 $\text{Worker} = [2300 - (\text{PBT} - \text{Worker}) 50\%] 40\%$
 $\therefore \text{Worker} = 575.$

Question3:- A manufacturing company produces a chemical product which passes through two processes factory and finishing. It has the capacity to process an input of 1,00,000 kgs. Of raw material. Normal scrap will be 10% and 5% input in factory and finishing processes respectively. The 33ackson33ti value of such scrap is Rs.4 and 8 per kg. Respectively for factory and finishing processes to be credited against the cost of respective process.

Relevant cost data for the coming year are:

	Factory Process	Finishing Process
Direct Wages	Rs. 6,00,000	Rs. 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
X	Rs. 5.00	60,000 kgs.
Y	Rs. 5.60	80,000 kgs.
Z	Rs. 5.30	Provide the entire quantity of 1,00,000 kgs. Is ordered, otherwise at Rs. 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 as under:

Supplier	X	Y	Z
Transport cost (per kg.)	30 paise	25 paise	25 paise

Fixed transport cost would be Rs. 1,00,000 per annum irrespective of the supplier to be contracted. The output of the finishing process can be sold to there prospective customers, their offer being as follows:

Customer	Price per kg. Of output	Trade discount (%)	Conditions
A	Rs. 32.50	2	Maximum quantity 40,000 kgs.
B	Rs. 32.00	2	Maximum quantity 80,000 kgs.
C	Rs. 30.90	-	Provide for entire output is sold to him.

In case of supplies to Customer A and B, the fixed delivery costs will be Rs. 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.

You are required: to indicate with reasoning:

1. Choice of supplier with comparative cost tables.
2. Choice of customer with comparative tables of net 33ackson33tion.

Also prepare the statement showing prices costs and overall results.

Solution . Choice of suppliers :

Comparative Cost Table of Suppliers

Particulars	X	Y	Z	
Quantities to be supplied	Up to 60,000 Kg.	Up to 80,000kg.	Less than 1,00,000 kg.	1,00,000kg
Purchase (price)				
Variable transport cost (per kg)	Rs. 5.00 0.30	Rs. 5.60 0.25	Rs. 5.80 0.25	Rs. 5.30 0.25

	5.30	5.85	6.05	5.55
--	------	------	------	------

Alternative available

First – To purchase 6,000 kg . form X and balance 40,000 kgs form Y

Second – To purchase 1,00,000 kg form Z.

Cost of purchase for above alternatives:

<i>Supplier</i>	<i>Quantity (kg.)</i>	<i>Rate</i>	<i>First alternative</i>	<i>Second alternative</i>
X	60,000	Rs. 5.30	Rs. 3,18,000	---
Y	40,000	0.85	2,34,000	---
Z	1,00,000	5.55	-	<u>5,55,000</u>
Total			<u>5,52,000</u>	<u>5,55,000</u>

Recommendation : First alternative should be opted i.e., purchase 60,000 kg form X and 40,000 kgs. Form Y , as the cost of purchase of first alternative is less then the cost of purchase of second alternative .

Note: Fixed transportation cost of Rs. 1,00,000 as to be ignored because it is not influenced by any alternative

(ii) Choice of Customer

Output to be sold:	
Input in factory process	1,00,000 kg.
Less normal scrap 10% of input	<u>10,000 kg.</u>
Output of factory process	90,000 kg.
Less normal scrap in finishing process	<u>4,500 kg.</u>
	<u>85,500 kg.</u>

Relevant Cost Data of selling price

<i>Customers</i>	<i>A</i>	<i>B</i>	<i>C</i>
Quantities	Up to 40,000 kg.	Up to 80,000 kg.	Up to 85,500 kg.
Selling price per kg.	32.50	32.00	30.90
Less trade discount (2%)	0.65	0.64	-----
Net price	31.85	31.36	30.90
Less: variable cost of delivery per kg.	0.65	0.36	-----
Net realisation except fixed cost of A and B	31.20	31.00	30.90

Alternative available : Rates of A and B are favourable when compared to C , but selling to A and B will result in fixed cost . Therefore , following two alternative are available :

First:-- 40,000 kg. to A and 45,000 kg to B

Second :-- 85,000 kg to C

Net realisation based on above prices.

First alternative

<i>Customer</i>	<i>Quantity kg.</i>	<i>Rate (Rs.)</i>	<i>Amount (Rest.)</i>
A	40,000	31.20	Rs. 12,48,000
B	45,500	31.00	<u>14,10,500</u>
			26,58,500
Less fixed delivery cost(Rs. 1,500 × 12)			<u>18,000</u>
Net realisation			<u>26,40,500</u>
Second alternative			
Customer	Quantity kg.	Rate (Rs.)	Amount (Rs.)
C	85,500	30.90	26,41,950

Recommendation :-- Entire output should be should to C as the net realisation as per second alternative is better than that under the first alternative .

(iii) Statement showing the process cost

Factory process:

	Quantity (Kg.)	Rate (Rs.)	Amount (Rs.)
Raw material	1,00,000		5,52,000
Direct wages			6,00,000
Overheads			2,28,000
Fixed overheads			<u>1,00,000</u>
			14,80,000
	<u>1,00,000</u>		<u>40,000</u>
Less wastage 10% @ Rs. 4 per kg.	<u>10,000</u>		14,40,000
Cost of factory process transferred to finishing process	<u>90,000</u>	16.00 **	
*As per decision ; ** Rs. 14,40,000 ÷ 90,000 = Rs. 16.00			
<i>Finishing process :</i>	Quantity (Kg.)	Rate (Rs.)	Amount (Rs.)
Transfer form factory process	90,000	16.00	14,40,000
Direct wages			5,50,000
Overheads			<u>4,22,000</u>
	<u>90,000</u>	<u>16.00</u>	24,12,900
Less wages 5% @ Rs. 4 per kg.	4,500	--	<u>36,000</u>
Cost of output	85,500	<u>27,80*</u>	<u>23,76,000</u>
*Rs. 2376,990 ÷ 85,500 kg. = Rs. 27.80			
(iv) Statement showing overall result for 85,500 kgs			
	Rate (Rs.)	Amount (Rs.)	
Sale to customer C (as per decision)	30.90		
Less cost of output	<u>27.80</u>		26,41,950
Net result (profit)	<u>3.10</u>		<u>23,76,900</u>
			<u>2,65,050</u>

Author ' Comments – Reader should note that in this question identification of alternatives and determination of impact of best decision is the main point .

[Answer:] (i) Total = 5,52,000, 5,55,000; (ii) Net Realisation= Rs. 26,40,500

Net Results (profit) = Rate (Rs.)= 3.10, Amount (Rs.) = 2,65,050)

Question4:- A paint manufactures 2,00,000 per annum medium-sized tins of “Spray Lac Paints” when working at normal capacity. It incurs the following costs of manufacturing per unit:

	Rs.
Direct Material	7.80
Direct Labour	2.10
Variable Overhead	2.50
Fixed Overhead	4.00
Product cost(per unit)	<u>16.40</u>

Each unit(tin) of the product is sold for Rs.21 with variable selling and administration expenses of 60 paise per tin.

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 Rs. 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 Rs. 14,000.

You are required:

To express your opinion, along with the calculations as to whether the plant should be shut down during the quarter, and

To calculate the shut-down point for quarter in units of products (i.e., in terms of number of tins).

Solution:-

Statement of Comparative Result

I: Contribution	Rs.	II. Shut Down	Rs.
Contribution (8 X 10,000)	80,000	Contribution	--
Fixed Cost(Average)	1,26,000	- Fixed Cost Extra	14,000
Loss	46,000	Loss	14,000

Decision: It is better to discontinue of business for next quarter.

Let x be the level of out put where total loss in both are same.

Shut down point = Total cost_I = Total cost_{II}

or $8x - 12600 = 0 - 14000$

or $8x = 126000 - 14000$

∴ $x = 14,000$ units

Working notes:

Total Fixed cost = 4 x 2,00,000

= 8,00,000 P.A

Fixed per quarter = 800,000/12 x 3

= 2,00,000

Un Avoidable = 74000

Avoidable = 126000

Extra = 14000.

Question5:- A company owns a large number of hardware stores located throughout the country. In one provincial town, there are 2 stores; the accounts of one show a modest profit, but the other Reports a loss as shown by the accounts for the year 1971:

			Rs.
Sales			4,00,000
Opening Stock	65,000		
Purchases	<u>3,32,000</u>		
	3,97,000		
Closing Stock	<u>69,000</u>		<u>3,28,000</u>
Gross profit			72,000
Assistant's Salary		55,000	
Drivers wages		3,000	
Manager's Wages		8,000	
Staff Bonus		4,000	
Rent		13,000	
Heating & Lighting		2,000	
Postage		1,300	
Wrapping Material		2,000	
National Advertising		4,000	
Motor running expenses		1,600	

Depreciation on Motor van		1,600	
Regional office charge		<u>3,000</u>	<u>98,500</u>
Net Loss			<u>-26,500</u>

Additional information :

- 1: There are two motor vans and drivers for the delivery of goods to customers of the two stores and the total costs of this service are apportioned between the stores on the basis of turnover.
- 2: one manager is responsible for the both the stores and this salary Rs. 16,000 is apportioned equally.
- 3: The staff bonus is calculated for each store as a percentage on its turnover.
- 4: The charge for national advertising is allotted to the stores by the H.O.

Give the recommendation either to Discontinue the shop forever or not.

Ans. Net saving in shut down Rs. 6,900 (sales foregone 4,06,900 avoidable cost)

Question6:- Fitwell Ltd. manufacturing company has three factories namely factory “A”, factory”B”, factory “C” . All the three factories produce the same product which is sold at RS. 375 per unit. The factory wise estimates of operating results for 1998 are as under:

(Rs. In lacs)

	A	B	C	Total
Sales	300	1,200	600	2100
Costs:				
Raw materials	75	350	145	570
Direct Labour	75	280	140	495
Factory overheads				
Variable	20	110	55	185
Fixed	40	120	60	220
Selling & distribution overheads				
Variable	23	70	40	133
Fixed	15	50	30	95
Adm. O.head	20	90	40	150
Head office exp	<u>12</u>	<u>50</u>	<u>30</u>	<u>92</u>
Total	<u>280</u>	<u>1,120</u>	<u>540</u>	<u>1,940</u>
Profit	<u>20</u>	<u>80</u>	<u>60</u>	<u>160</u>

When the above estimates were under finalisation the company’s legal department advised that the lease of factory ‘A’ was due to expire on 31st December, 1997 and that it could be renewed by enhancing the lease rent by Rs. 12 lacs per annum. Since this enhancement will have a heavy impact on the profitability of the company, the management is constrained to examine the proposals, which are as under:

1:- Renew the lease and bear the impact.

2:-Close down factory ‘A’ sell off the plant, machinery and stocks and liquidate all liabilities including the staff and workers retrenchment compensation from the sale proceeds which are sufficient for this purpose. In order to maintain the customer relations the total planned output of the factory ‘A’ will be transferred to either factory ‘B’ or factory ‘C’. Plant capacity is available at both the factories to take over the manufacture. The additional cost involved in the manufacture of the extra output so transferred in factories ‘B’ and ‘C’ are estimated as under:

	Factory A	Factory B	Factory C
(a) Additional fixed overhead due to Increased capacity 37ackson37tio (per annum)		Rs. 50 lacs	Rs. 40 lacs
(b) Additional freight, selling and Other overheads to produce and			

Distribute the output to the
Present customers of factory
“A”

Rs. 25 per unit Rs. 35 per unit

You are required to prepare comparative statement of profitability in the aforesaid alternative courses of action and give your recommendations.

Answer:-

(i) Impact on Profit of Continuance of Production by renewing the lease.

(Rs. Lacs)

	Factories			
	A	B	C	Total
Sales(A)	300	1200	600	2100
Costs				
Raw Material	75	350	145	570
Direct Labour	75	280	140	495
Factory Overheads(Variable)	20	110	55	185
Selling & Distribution Overheads (Variable)	23	70	40	133
Total Variable Costs (B)	193	810	380	1,383
Contribution (C) (A) – (B)	107	390	220	717
Factory Overheads (Fixed)	40	120	60	220
Selling & Distribution Overheads (Fixed)	15	50	30	95
Administrative Overheads	20	90	40	150
Head Office Expenses	12	50	30	92
Additional Lease Rent	12	--	--	12
Total Fixed Overheads(D)	99	310	160	569
Profit © - (D)	8	80	60	148

The above statement shows that transfer of Production of factory A to Factory C yields higher profit i.e. Rs. Lacs. Hence this course may be adopted.

(ii) Comparative Statement of Profitability:

Rs. Lacs

	When production of Factory A is Transferred to Factory B			When production of Factory A is Transferred to Factory C		
	B	C	Total	B	C	Total
Sales						
Variable Costs	1,032.50	380	1,412.50	810	598	1,400
Contribution	467.50	220	687.50	390	302	692
Fixed Costs	360.00	260	520.00	310	200	510
Profits	107.50	60	167.50	80	102	182

The above statement shows that as a result of renewal of lease of factory A the total profit gets reduced from Rs. 160 lacs to Rs. 148 lacs. However factory A is still contributing towards meeting the head Office Expenses. Hence it may not be advisable to discontinue the lease.

Working Notes:

(a) Fixed and variable costs when the production of Factory A is transferred to Factory B:

(Rs. Lacs)

	Sales		Variable Costs	Fixed Costs
--	-------	--	----------------	-------------

B	1,200		810,00	310
A	300	810 X Rs. 300	202.50	--

		1200		
Additional costs		(80,000 X Rs. 25)	20.00	50
Total	1,500		1,030.50	360

Rs. 3,00,00,000/Rs. 375 = 80,000 units.

**(b) Fixed and Variable Costs When the Production of Factory A is Transferred To Factory C:
Transferred To Factory B**

Rs. Lacs

	Sales		Variable Costs	Fixed Costs
C	600		380.00	160
A		(380/600 X Rs. 300)	190.00	--
Additional Costs		(80,000 X Rs. 35)	28.0	40
Total	900		598	200

Statement showing the contribution and the profit for Danida, Danima and for the company C when Danima's production is cut by 25,000 litres. Danida's production is increased by 25,000 litres.

	Danida	Danima	Total
Production (litres)	1,25,000	50,000	1,75,000
	Rs.	Rs.	Rs.
Production (liters)	1,25,000	50,000	1,75,000
	Rs.	Rs.	Rs.
Contribution per litre	4.02	3.25	--
Total contribution	5,02,500	1,62,500	6,65,000
Less: Group incentive payable	10,000	----	10,000
	4,92,500	1,62,500	6,65,000
Less: Fixed Costs	1,53,500	91,000	2,44,500
	3,39,000	71,500	4,10,500
Less: Transport Cost	10,000	---	10,000
Profit	3,29,000	71,500	4,00,500
Budgeted Profit	2,48,500	1,52,750	4,01,250

Comment: The proposal if implement if implemented will result in a drop in overall profit by 750 (Rs. 4,01,250 – Rs. 4,00,500).

- (a) (ii) **Proposal 2:-** Statement showing the contribution and the profit for Danida Danima and for the company as a whole when Danima's production is cut by 50,000 litres and Danida's production is increased by 50,000 litres.

	Danida	Danima	Total
Production (litres)	1,50,000	25,000	1,75,000
	Rs.	Rs.	Rs
Contribution per	4.02	3.25	--

litre			
Total Contribution	6,03,000	81,250	6,84,250
Less: Group incentive payable	20,000	20,000	20,000
	5,83,000	81,250	6,64,250
	4,29,500	(9,750)	4,19,750
Less: Transport Cost	10,000	----	10,000
Profit	4,19,500	(9,750)	4,09,750
Budgeted Profit	2,48,500	1,52,750	4,01,250

Comments: The implementation of the proposal will increase profits for the company as a whole by Rs. 8.500 (ie Rs. 409,750 – Rs. 4,01,250) though Danima will be reporting loss.

(b) (i) Contribution per litre for Danima Rs. 3.25
Total Fixed costs of Danima Rs. 91,000
Break even production for Danima
Fixed costs/Contribution per litre = Rs. 91,000/Rs. 3.25
= 28,000 litres

The Production that could be transferred from Danima to Danida, retaining break-even production in Danima is 47,000 litres (i.e. 75,000 litres – 28,000 litres)

(i) Statement showing the contribution and the profit for Danida, Danima and the company as a whole when break-even production is retained and the balance is transferred Danida.

	Danida	Danima	Total
Production (litres)	1,47,000	28,000	1,75,000
	Rs.	Rs.	Rs.
Contribution per litre	4.02	3.25	--
Total contribution	5,90,940	91,000	6,81,940
Less: Group incentive payable	18,800	---	18,800
	5,72,140	91,000	6,63,140
Less: Fixed Costs	1,53,500	91,000	2,44,500
	4,18,640	---	4,18,640
Less: Transport Cost	10,000	---	10,000
Profit	4,08,640	---	4,08,640
Budgeted Profit	2,48,500	1,52,750	4,01,200

The overall profit will increase by Rs. 7,390 (i.e. Rs. 4,08,640 – Rs. 4,01,250) transferring 47,000 litres of production of Danida.

Working note:

	Danida	Danima
	Rs.	Rs.
Sales price computation per litre.	Rs. <u>7,00,000</u>	Rs. <u>5,25,00</u>
	1,00,000 litres 7.00	75000 litres 7.00
Less: Variable costs	Rs. <u>2,98,000</u>	
	1,00,000 litre 2.98	Rs. <u>2,81,250</u>
		75000 litres 3.75
Contribution per litre	4.02	3.25

Question7:- Dinesh Dairies Ltd. Has two processing and bottling plants, Danida and Danima, in adjoining districts. The comparative cost and revenue data budgeted per month are as below:

	Danida	Danima
Production (Litres)	1,00,000	75,000
	Rs.	Rs.
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
	<u>2,98,000</u>	<u>2,81,250</u>
Fixed Costs:		
Electricity	13,500	11,000
Salaries and Wages	90,000	60,000
Depreciation	50,000	20,000
	<u>1,53,500</u>	<u>91,000</u>
Total Costs	<u>4,51,500</u>	<u>3,72,250</u>
Sales Realisation	<u>7,00,000</u>	<u>5,25,000</u>
Profit	<u>2,48,500</u>	<u>1,52,750</u>

Danima's high cost, low margin status draws management's attention. It is also observed that Danida can increase its production by 50 percent with the existing plant capacity and without additional manpower.

Two proposals are under consideration:

- (1) Cut down Danima's production by 25,000 litres and increase Danida's production by 25,000 litres.
- (2) Cut down Danima's production by 50,000 liters and increase Danida's production by 50,000 litres.

For the additional quantity produced in excess of 1,00,000 liters, Danida will incur Rs. 0.40 per liter towards group incentive. Transporting the additional output from Danida to Danima's region for sale will cost Rs. 10,000 in both cases.

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.

(B) The management is keen that the cut in Danima's production should not result in its reporting loss, as that would affect 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.

Answer:- Statement showing the contribution and the profit for Danida, Danima and for the company A/C when Danima's production is cut by 25,000 litres. Danida's production is increased by 25,000 litres.

	Danida	Danima	Total
Production (litres)	1,25,000	50,000	1,75,000
	Rs.	Rs.	Rs.
Contribution per litre	4.02	3.25	--
Total Contribution	5,02,500	1,62,500	6,65,000
Less: Group incentive payable	10,000	---	10,000
	4,92,500	1,62,500	6,55,000
Less: Fixed Costs	1,53,500	91,000	2,44,500
	3,39,000	71,500	4,10,500
Less: Transport cost	10,000	---	10,000
Profit	3,29,000	71,500	4,00,500
Budgeted Profit	2,48,500	1,52,750	4,01,250

Comment: The proposal if implemented will result in a drop in overall profit by 750 (Rs. 4,01,250 – Rs. 4,00,500).

(a) (ii) **Proposal 2:-** Statement showing the contribution and the profit for Danida and for the company as a whole when Danima's production is cut by 50,000 litres and Danida's production is increased by 50,000 litres.

	Danida	Danima	Total
Production (litres)	1,50,000	25,000	1,75,000
	Rs.	Rs.	Rs.
Contribution per litre	4.02	3.25	--
Total Contribution	6,03,000	81,250	6,84,250
Less: Group incentive payable	20,000	--	20,000
	5,83,000	81,250	6,64,250
Less: Fixed costs	1,53,500	91,000	2,44,500
	4,29,500	(9,750)	4,19,750
Less: Transport cost	10,000	----	10,000
Profit	4,19,500	(9,750)	4,09,750
Budgeted profit	2,48,500	1,52,750	4,01,250

Comments : The implementation of the proposal will increase profits for the company as a whole by Rs. 8,500 (ie Rs. 4,09,750 – Rs. 4,01,250) though Danima will be reporting a loss.

(b) (i) **Contribution per litre for Danima** Rs. 3.25
Total Fixed costs of Danima Rs. 91,000

Break even production for Danima
Fixed costs Rs. 91,000
----- = -----
Contribution per litre Rs. 3.25
= 28,000 litres

The Production that could be transferred from Danima to Danida, retaining break-even production in Danima is 47,000 litres (i.e. 75,000 litres - 28,000 litres)

(i) Statement showing the contribution and the profit for Danida, Danima and the company as a whole when break-even production is retained and the balance is transferred to Danida.

	Danida	Danima	Total
Production (litres)	1,47,000	28,000	1,75,000
	Rs.	Rs.	Rs.
Contribution per litre	4.02	3.25	--
Total Contribution	5,90,940	91,000	6,81,940
Less: Group incentive payable	18,800	--	18,800
	5,72,140	91,000	6,63,140
Less: Fixed costs	1,53,500	91,000	2,44,500
	4,18,640	----	4,18,640
Less: Transport cost	10,000	----	10,000
Profit	4,08,640	----	4,08,640
Budgeted profit	2,48,500	1,52,750	4,01,250

The overall profit will increase by Rs. 7,390 (i.e. Rs. 4,08,640 – Rs. 4,01,250) transferring 47,000 litres of production to Danida.

Working note:

	Danida	Danima
	Rs.	Rs.
	Rs. 7,00,000	Rs. 5,25,00
Sales price computation per litre:	----- 7.00	----- 7.00
	1,00,000 litres	75,000 litres

	Rs. 2,98,000		Rs. 2,81,250
Less: variable costs	----- 2.98	-----	3.75
	1,00,000 litres -----	75,000 litres -----	
Contribution per litre	<u>4.02</u>		<u>3.25</u>

Question8:- (Differential Methods of Pricing). An Organisation manufactures a product, particulars of which are detailed below:

Annual Production	20,000 units
Material cost	Rs. 60,000
Other variable costs	1,20,000
Fixed cost	40,000
Total Cost	2,20,000
Apportioned Investment	2,00,000

Determine the unit selling price under each of the following strategies. Assume that the Organisation's tax rate is 52%.

- (i) 20% return on investment;
- (ii) 30% mark – up based on total cost;
- (ii) 20% profit on net sales price;
- (iii) 15% profit on list sales when trade discount is 35%;
- (iv) 40% of Markup on incremental cost.
- (v)** 50% mark – up based on value added by manufacturer.

Solution:-

(1) Let the sales value be Rs. x.

or, (Sales – Total cost) (1 – tax rate) = PAT

or (x – 220,000) (1 – 0.52) = 200,000 x 20%

or (x – 220,000) (0.48) = 40,000

or, x = 40,000/0.48 + 220,000

x = Rs. 3,03,333.3

Sales value = 3,03,333.3

Selling Price = 3,03,333.33/20,000 = Rs. 15.16

(II) Statement of selling price

Total cost = 220,000

Add: markup 30% (220,000 x 30%) 66000

Sale (a) 2,86000

Qty (b) 20,000

Selling Price (a ÷ b) = 14.30

(III) Statement of Selling price

or (Sales – Total cost) (1 – tax rate) = PAT

or (Sales – 220,000) (1 – 0.52) = 20% of 'Sales'

or (Sales – 220,000) (1 – 0.52) = 20% of 'Sales'

or Sales – 220,000 = 0.41666 'Sales'

or Sales – 0.41666 Sales = 220,000

∴ Sales = 220,000/(1 – 0.41666)

= 220,000/0.58334

= Rs. 3,77,138.5469

(IV) Statement of Selling price

Let sale = x

Gross selling price = 100

Trade discount = 35

List sale = 65

$[(\text{Sale} - 0.35 \text{ Sale}) - 220,000] [1 - 0.52] = 15\% \text{ of } 60.65 \text{ 'Sale'}$

or, $[(S^x - 0.35^x) - 220000] 0.48 = 15\% \text{ of } 0.6x$

or, $0.48x - 0.168x - 105600 = 0.0975x$

or $0.2145x = 105600$

$x = 105600/0.2145 = \text{Rs. } 492307.6923$

Rs.

Total cost 2,20,000

Markup 40% of (180,000) 72000

Sales 2,92,000

(VI) Statement of price

Rs.

Material	60,000
Other variable cost	120,000
+ Fixed cost	40,000
Total cost	220,000
+ Markup 50% of 160,000	80,000
Sale value	3,00,000
Quantity	20,000 units
Selling price P.V Rs. 15 per unit.	

Question9:- A company manufactures Product M in addition to other products by using the same machines in Departments A and B. The cost data are as under:

Direct Material P 4 kg @ Rs. 6/- per kg used in Dept. A
Q 8 kg @ Rs. 2/50 per kg added in Dept. B.
Director Labour 2 Hours @ Rs. 4/- per hour in Dept. A.
3 Hours @ Rs. 3/- per hour in Dept. B.

Overheads:

Basis of overheads recovery	Dept. A/ per rupee of Direct material P. Rs.	Dept. B/per labour hour. Rs.
-----------------------------	--	--

Recovery rates

Variable	0.80	2.00
Fixed	2.20	3.00
Depreciation component of Fixed		
Overhead rate	0.80	0.10

Other relevant data:

Net plant and equipment value	70,00,000	1,20,000
Total depreciation per month	80,000	1,000

The working capital requirement of Product M based on a target volume of output of 1,000 units per month is estimated at R. 1,24,000 per annum.

Required:

- (A) Indicate the bottom line selling price of Product M assuming that:
- (i) Price is adequate to ensure contribution equivalent to 30% on investment made.
 - (ii) The product is a new product about to be introduced in the market.

(B) Calculate the selling price in a situation where Product is well established in the market so as to yield return of 18% on investment.

Solution:-

Calculation of Relevant Investment

Department A

	M & others	M	Other
	Rs.	Rs.	Rs.
Total value of plant & Machinery	70,00,000	16,80,000	53,20,000
Depreciation	9,60,000	2,30,400 (0.80 X 24 X 12000)	7,20,600

Department B

	M & others	M	Other
	Rs.	Rs.	Rs.
Plant & Machinery	1,20,000	36,000	84,000
Depreciation	12,000	3,600 (0.1 X 3 X 12000)	8,400

Total attributable value of plant & Machinery production Department A & Department B.

168000 + 36000

F.A = 17,16,000

+ Working capital = 1,24,000

Total Investment = 18,40,000

∴ Total relevant capital employed = 18,40,000

Statement of Cost

Material	Rs. per unit
Department	
A 4kg X Rs. 6	24
B 8 Kg X 2.5	20
Labour	
A 2 hr. X 4	8
B 3 hr. X 3	9
Variable Overhead	
A 0.80 X 24	19.2
B 2 X 3	6
Variable Cost	86.20
+ Fixed Cost	
A 2.2 X 24	52.80
B 3.00 X 3	9
Total Cost	148.00

Statement of price

	Rs.
Variable cost	86.20
+ Contribution (182400 x 30%/12000)	46.00
Minimum price	132.20

Statement of price

Rs.

Variable cost 86.20

This is to be applied only when we have new products

B. Statement of price.

Rs.

Variable cost	86.20
+ Fixed cost	61.80
Total cost	148.00
+ Return $1840000 \times 18\% / 12000$	27.6
Minimum price	<u>175.60</u>

Question10:- Look Ahead Ltd. want to fix proper selling price for their products 'A' and 'B' which they are newly introducing in the market. Both these products will be manufactured in Department D, which is considered as a Profit Centre.

The estimated data are as under:

	A	B
Annual Production(Units)	1,00,000	2,00,000
	Rs.	Rs.
Direct Materials per unit	15.00	14.00
Direct Labour per unit		
(Direct Labour Hour Rate Rs. 3)	9.00	6.00

The proportion of Overheads other than interest, chargeable to the two products areas under: Factory Overheads (50%Fixed) 100% of Direct Wages. Administration Over-heads(100% Fixed) 10% of Factory Cost. Selling and Distribution Overheads (50% variable) Rs. 3 and Rs.4 respectively per unit of products A and B.The fixed capital investment in the Department is Rs.50 lakhs. The working capital requirement is equivalent to 6 months stocks of cost of sales of both the products. For this project a term loan amounting to Rs. 40 lakhs has been obtained from Financial Institutions at an interest rate of 14% per annum.

Bank Borrowing carrying interest at 18% per annum meets 50% of the working capital needs. The Department is expected to give a return of 20% on its capital employed. You are required to: (a) Fix the selling prices of products A and B such that the contribution per direct labour hours is the same for both the products;

(b) Prepare a statement showing in detail the over-all profit that would be made by the Department.

Question11:- Prompt Printers Ltd. uses a scheme of pricing based on cost plus. All the overheads are charged based on direct labour and based on the total cost arrival at the selling price is fixed: The following figures are from the annual budget for 1984 prepared by the company:

Sales	Rs.10,00,000
Direct Material	1,80,000
Direct Labour	3,20,000
Factory Superintendent's Salary	30,000
Commission Paid On Sales	50,000
Foremen's Salaries	60,000
Insurance	10,000
Advertisement	20,000
Depreciation On Assets	30,000
Administration Expenses	90,000
Variable Factory Costs:	
Repairs and Maintenance	60,000
Tools Consumed	40,000
Miscellaneous Supplies	10,000

The company has submitted a tender quotation Rs.10,000 on a large order with cost of Rs.1,800 direct material and Rs. 3,200 direct labour. The customer strikes the business at Rs. 8,900 on a 'take it or leave

it' basis. If the company accepts the order, the total sales for 1984 would be Rs.10,08,900. The company is reluctant to accept the order, as it would be against its policy of accepting an order below cost:

As a Cost Accountant of the company, you are required to give your recommendation with supporting figures to explain that the price offered would not be below cost and a sizable profit also could be made.

[Answer:- Profit = 1,00,000 Rs., Price to be quoted =10,000 Rs., Surplus = 2,355 Rs.

Question12:- SM Ltd. is engaged in the manufacture of a range of consumer products. The sales are made through its own 47ackson47ti agents who are paid a commission of 20 per cent on the selling price of the product. The company has prepared the following budget for 1990.

	Rs. Lakhs
Sales	225.00
Production Costs:	
Prime cost and variable overheads	78.75
Fixed overheads	36.25
Selling Cost:	
Agents Commission(20%)	45.00
Sales office expenses (Fixed)	2.00
Administration costs (Fixed)	30.00
Total Costs	<u>192.00</u>
Profit	33.00

The company after the finalisation of the above budget is faced with a demand .From its agents for an increase in their commission to 22 per cent of selling price. The company is therefore contemplating to dispense with the services of agents and instead employ its own sales force in that event the company expects to incur the following costs:-

	Rs. Lakhs
Sales Manager's Salary and Expenses	7.50
Salesman expenses, including traveling expenses	2.00
Sales office costs (in addition to the present costs)	5.00
Interest & dep. On sales dept. Vehicles	3.50
Total	18.00

In addition to the above it will be necessary to hire 40 salesman at a salary of Rs. 40,000 per annum each plus a commission of 5 per cent on sales plus car allowance of Rs. 1 per kilometer to cover vehicle costs except interest and depreciation which has already been considered above.

Assuming that the company decides in favour of employing its own sales force, you are required to answer the following questions.

- (1) For the same volume of sales as envisaged in the budget what is the maximum average kilometer per annum that the salesman could travel if the company is to achieve the same budgeted profit as it who have obtained by retaining the agents and granting them the increased commission which they had demanded.
- (2) At what level of sales would the original budgeted profit be achieved if each salesman were to travel an average of 14,000 Km per annum. Assume all assumption inherent in the budget are maintained.

What is maximum level of commission on sales that the company could afford to pay if it wished to achieve a 16 per cent increase in its original budgeted profit and expected a 16 per cent increase in sales at the budgeted selling prices and an average of 16000 km per annum of travel by each salesman.

Question13:- Texomat Private Limited has been manufacturing track suits for athletes. Currently its output is around 70 per cent of its rated capacity of 19,000 units per annum. One exporter has approved the sample and has offered to buy 5,000 units at a special price of Rs.150 per suit. At present, the Company has been selling the tracksuit @ Rs. 210 the standard cost per unit is as under:

I:- Cloth and other material	Rs. 82
ii:- Labour	25
iii:- Fixed cost	42
iv:- Administration, variable cost	11
Total cost	160

Should the Company accept the offer?

What would be your advice if the exporter offers to buy 10,000 units instead of 5,000 units?

What is the minimum quotation for accepting the order?

If order is offer by Local Market Consumer at Rs. 118 for 5,700 units could the order be accepted.

Solution:-

Statement of lost benefit. (5000)

	Rs.
Incremental Revenue (5000 x 150)	75,0000
- Cost 5000 x 118	<u>5,90,000</u>
Net benefit	<u>160,000</u>
Statement of cost benefit (10,000)	
	Rs.
Incremental Revenue (10,000 x 150)	15,00,000
- Incremental cost:	
Cost to be incurred 5700 x 118	6,72,600
Cost to be incurred 4700 x 118	5,07,400
- Benefit loss 4300 x 92 (W.N 1)	<u>3,95,600</u>
Net benefit	(75,600)
It is better to accept the offer.	

Statement of minimum price.

Minimum price = Relevant cost/Quantity

$$= \text{Rs. } 1575600/75600$$

$$= \text{Rs. } 20.84$$

It is not possible for the company to charge two different prices of the same commodities from the same market consumer.

Question14:- Perfect piston Ltd., produces 60,000 pistons per annum for its parent company. Perfect Motors Ltd. The pistons are sold to perfect Motors at Rs. 200 per unit. The variable cost per piston is Rs. 180. The annual fixed cost of perfect pistons Ltd. Is Rs. 15 lakhs and it is currently operating at 60% capacity.

The company desires to respond to an export enquiry for 30,000 pistons of the type of it are currently manufacturing. The Company's aim is to improve capacity organisation and avoid loss. You have to take note of the following benefits that will accrue to the export transactions, while determining the F.O.B. price to be quoted.

Export incentive by way of cash assistance at 10% of F.O.B. value of exports.

Reimbursement of excise duty on manufacturing inputs by way of 5% drawback of duty on F.O.B. value of exports.

Entitlement of import license to the extent of 10% on F.O.B. value of exports. The import License can either be sold at a premium of 100% or it can be utilized to import certain critical auto components that will yield a 30% profit on cost.

Recommend the bare minimum price that the company should quote in order to break-even, assuming:

- 1:- It sells the import license in the market.
- 2:- It imports components against the license and sells them for profit.

Solution:-Total capacity = $60000/60\% = 1,00,000$ unit

Spare capacity:- 40,000

Statement of profit**[Rs. in loss] 6000 unit**

Revenue 60,000 x 200	120
- Variable cost (60,000 x 180)	<u>108</u>
Contribution	12
- Fixed cost	<u>15</u>
loss	3

If sells import license in the market.**Statement of min price****30,000 unit****Rs. per unit**

Cost to be incurred	180
+ Loss ($3,00,000 \div 30,000$)	<u>10</u>
Total amount to be received	190
Less: Benefit to be achieved	
(i) Cash assistance 10% of FoB.	
(ii) Duty draw back 5% of FoB.	
(iii) Profit on sale 10% of FoB.	
ie $(10 + 5 + 10) = 25\%$ of FoB	<u>38</u>
FoB	<u>152</u>

Total amount = FoB benefit + FOB

 $190 = 0.25x + x$ [Let FoB = x]

$$\therefore x = 152$$

If imports component against the license

Statement of profit

	Rs.
Amount to be received	190
- FOB benefit (govt.)	
(i) 10% Cash assistance	
(ii) 5% Duty drew bank.	
(iii) 3% of FoB.	
ie 18% of FoB	<u>28.98</u>
Amount to be received from Customer FoB	<u>161.02</u>

Let FoB = x

Amount received = 18% of x + x

$$190 = 0.18x + x$$

$$x = 161.02$$

Working notes

Import utilization

$$100 \times 10\% = \text{Rs. } 10$$

$$\text{Cost} = 10$$

$$+ \text{Duty} = -$$

$$\text{T.C} = 10$$

$$\text{Profit } 30\% = \underline{3}$$

$$\text{S.P} = 13 - \text{Benefit} = 3$$

$$\therefore \text{Benefit as \% of FoB} = 3/100 \times 100 = 3\%$$

Question15:- Profitability arising out of discontinuance of product, export total production and replacing existing machinery). Shiplon Products Ltd. Manufactures 3 different products. The relevant data of these products are as under:

Name of the Product	Cream	Pomade	Jelly
Production capacity (units)	5,000	7,000	8,100
Machine hours per unit	1	3	4
Variable cost per unit Rs.	3.00	2.50	3.50
Selling price –Rs. / Unit	4.00	5.50	6.00

The total fixed overheads at current capacity level are Rs. 40,000 per annum.

The company has various alternatives for improving profitability as given below:

To stop the production of Jelly and use the released capacity for producing Pomade. The machine for both the products are common. However cream is produced on a special purpose machine.

To export the total production of Jelly at current price. On export the following additional revenue is expected: 8% Duty Drawback on export price.

12% Cash Compensatory Support against an export scheme of government.

5% Replenishment License which can be sold in market at a premium of 80%.

To replace the conventional machine used for Jelly by a special purpose machine, which will reduce the production time from 4 hours to 3 hours per unit. Due to this change Rs. 0.50 per unit will reduce the variable cost of Jelly. The released machine will be used for producing Pomade. This proposal will entail an additional burden of fixed cost to the tune of Rs. 32,000 per annum.

Please advise the management about the right choice of an Alternative so as to maximize profits.

Solution:-

SHIPLON PRODUCTS LTD.

Profitability under the existing production schedule

Details	Cream	Pomade	Jelly	Total
No. of Units	5,000	7,000	8,100	
Selling Price (Rs./units)	4.00	5.50	6.00	
Variable Cost (Rs./units)	3.00	2.50	3.50	
Contribution per unit	1.00	3.00	2.50	
P/V Ratio	25%	54.55%	41.67%	
Total Contribution	5,000	21,000	20,250	46,250
Less: Fixed Cost				40,000
Net Profit				6,250
No. of machine hours per unit	1	3	4	
Contribution per machine (Rs.)	1.00	1.00	0.625	
Total machine hours required	5,000	21,000	32,400	

Note: Cream is produced on a special purpose machine. However Pomade and Jelly are produced on a common machine. Under the present scheme Jelly is yielding lower P/V Ratio than Pomade. The contribution per machine of Jelly is even lower than that of Cream. Therefore production of Jelly should be completely stopped and that of 32,400 machine hours are diverted to manufacture of pomade. The revised production of pomade will be as under:

Existing Production 7,000 units

Additional production of Pomade by utilizing additional 32,400 machine hours (3 hours are needed to produce one unit of pomade) 10,800 units

17,800 units

**Profitability under the revised production schedule
(Production of Jelly to be discontinued)**

Details	Cream	Pomade	Total
Production (units)	5,000	17,800	
Contribution per unit (Rs.)	1.00	3.00	
Total Contribution	5,000	53,400	Rs. 58,400
Less: Fixed Cost			40,000
Net profit			18,400

Profitability when total production of Jelly is exported

				Jelly
Export				Rs. 6.00
Add: (i) Duty drawback on exports (8% of Rs. 6.00)			Rs. 0.48	
(ii) Cash Compensatory (12% of Rs. 6.00)			0.72	
(iii) Replenishment benefit (80% X 5% of Rs. 6.00)			0.24	1.44
Revised revenue on exports				7.44
Less: Variable Cost				3.50
Contribution				3.94
Details	Cream	Pomade	Jelly (exports)	Total
Production in units	5,000	7,000	8,100	
Contribution per unit	Rs. 1.00	Rs. 3.00	Rs. 3.94	
Total Contribution	5,000	21,000	31,914	57,914
Fixed Costs				40,000
Net Profit				Rs. 17,914

A special purpose machine will now be used for production of Jelly. The production time will be thus be reduced from 4 hours to 3 hours per units. Thus, there will be a savings of 1 hour per unit and total hours saved will be $8,100 \times 1 = 8,100$ hours.

Additional units of Jelly = $8,100 / 3$ hours **2,700 units**
Existing production **8,100**
Revised production of jelly **10,800**

It should be noted the released machine will be used for producing Pomade. So the production of Pomade in the multi purpose machine will be 17,800 units.

Profitability when a special purpose machine is used for production of Jelly.

Details	Cream	Pomade	Jelly	Total
Production of units	5,000	17,800	10,800	
Contribution per unit	Rs. 1.00	Rs. 3.00	Rs. 3.00	
Total Contribution	5,000	53,400	32,400	90,800
Less: Fixed cost (40,000 + 32,000)				72,000
Net profit				18,800

The net profit under various alternatives
1:- Under existing production schedule.

Rs. 6,200

- 2:- Production of Jelly to be stopped and available time is spent on production of Pomade 18,400
 3:- Total Production of Jelly is exported 17,914
 4:- Jelly to be produced in a special purpose machine 18,800
 Fourth proposal i.e. when Jelly is produced on a special purpose machine is most profitable proposition. But second proposal is a lot quite attractive. Therefore before taking a final decision, other non-cost factors should be considered.

Question 16:- (Selling as it is Vs Further processing). A company is able to obtain 2,00,000 Kgs. of A and 4,00,000 kgs. of B from the input of 6,00,000 Kgs. of raw material F, The Selling prices of these outputs are A = Rs. 6 per kg. B – Rs. 4.50 per kg. The processing costs are:

	Rs.
Raw materials (6,00,000 X 2)	12,00,000
Variable processing costs	6,00,000
Fixed processing costs	2,00,000
Total	20,00,000

The company has three strategies for consideration:

- (a) Product A can be further processed by mixing it with other purchased materials. The entire quantity of the resultant product P can be sold at Rs. 13 per Kg. Each Kg. of “P” requires one Kg. of A and the processing costs amount to Rs. 16,00,000.
 (b) There is an offer to purchase an additional quantity of 40,000 Kgs. of product “B” at a price of Rs. 3.50 per kg. The existing market for “B” will not be affected by this proposal. All production of product A can be sold at a uniform price.
 © A new raw material has just become available. The processing costs will remain the same but the process will now yield 2 Kgs. of A for every 3 Kgs. of product B. The total quantity of the new raw material available is limited to 6,00,000 Kgs.

Required:

- (i) Find the original profit on sale of A and B
 (ii) Evaluate the proposal for further processing of “A” into “P”
 (iii) In the case of proposals (b) the increased quantum of “A” will reduce its selling price. Find the minimum average price of “A” that will sustain the Profit due to increased quantum of sales of A & B;
 (iv) Evaluate proposal (c) and find the maximum price the company can afford to pay for the new raw material by retaining the existing profit.

Answer:- (i) Profit 10,00,000/- (ii) Loss on Further Processing = Rs. 14,00,000 – Rs. 16,00,000 = (Rs. 2,00,000), (iii) Selling Price of product A = Rs. 5.6363, (iv) 2.10

Solution:- (i) Statement of profit

	A	B	Total
		Rs.	Rs.
Sale	12,00,000 (6 x 200,000)	18,00,000 (4,00,000 x 4.5)	30,00,000
Less: joint cost 12:18	7,20,000	10,80,000	18,00,000
Contribution			12,00,000
- Less Fixed Cost			2,00,000
Profit			10,00,000

(ii) Statement of cost benefit.

	Rs.
Incremental Revenue [2,00,000 x (13-6)]	14,00,000
- Incremental cost 16,00,000	
Net benefit	2,00,000

It is not better to produce (further processing) ‘P’ Let x be selling price of product ‘A’

(iii) Statement of selling price

	A	B	Total
Sales	12,40,000	19,40,000 [4,00,000 x 4.5 + 40,000 x 3.5]	3180,000
Less: processing cost			19,80,000
Contribution			12,00,000
- Fixed Cost			2,00,000
Profit			10,00,000

∴ Average price of A = 1040,000/220000

= 5.63

* If B is produced extra 40,000 Kg then A is also produced by being of by product in the ratio of 2:4 i.e 2/4 x 40000 = 20,000 Kg

So A = 2 lacs + 20,000 = 2.2 lacs Kg.

* Variable cost of 6,00,000 Kg input = 18,00,000

Then variable cost for 6,60,000 input = 18/6 x 6.6

(600000 + 20,000 A + 40,000 B) = 1980,000

(iv) Statement of Incremental benefit

Level	6,00,000 Kg	6,660,000 Kg
	Rs.	Rs.
Revenue	30,00,000	30,60,000
Less: processing cost	18,00,000	18,00,000
Contribution	12,00,000	12,60,000

Extra Contribution = 60,000

∴ Maximum price to be paid = Normal + extra price + Contribution

= 2 + 60,000/6,00,000

= 2 + 0.1

= Rs. 2.1/Kg

Question17:- A company producing a single product in its plant, sells it Rs.25 per unit. The plant is currently operating at full capacity of 8 lakh units in single shift and the standard cost per unit produced is as under:

	Rs.
Raw materials 4 Kgs @ Rs. 2	8
Direct labour 2 hrs @ Rs. 2.50	5
Variable overheads	2
Fixed Overheads	5

The Sales Manager has estimated that the company will lose sale of 4 lakh units next year if something is not done about the capacity constraint. Plant capacity could be doubled by running a second shift. This would require additional fixed costs as under:

	Rs. In Lakhs
Salaries per annum	7.50
Expenses towards Security Staff	2.50
Depreciation	10.35
Repairs and Maintenance	6.15
General Administration	7.00
Total	33.5

Also a night shift allowance of 10% on Direct Labour would become payable. Further, if annual production volume is 12 lakhs units or more, but not less, the company can enjoy a bulk discount of 5% on purchases of all the raw materials.

Discuss the profitability of working a second shift in order to obtain the additional Sales volume of 4 lakhs units per year.

What should be the minimum annual increase in production volume over the present 8 lakh units necessary to justify a second shift working ?

SOLUTION:-

Statement of cost benefit

	Rs. in lakhs
Incremental Revenue (4,00,000 x 25)	100.00
Incremental benefit (8,00,000 x 0.40)	<u>3.20</u>
	<u>103.20</u>
Less: Incremental cost	
Material 4,00,000 x 7.6	
Labour cost 4,00,000 x 5.50	
Variable over head 4,00,000 x 2	
Fixed cost 3350,000	<u>93.90</u>
Net benefit	<u>9.3</u>

It is better to introduce second shift working without subjecting the benefit of discounting policy.

Let x be the addition units over & above 8,00,000 where introduction of second shift is justified (we can say the required level of out put should be less than 4,00,000).

Hence we can say the benefit of discount would not be available on addition units. i.e over & above.

Incremental Revenue = Incremental cost

$X \times 25 = 8X + 5.50X + 2X + 3350,000$

$25X - 15.50X + 3350,000.$

$X = 3350,000/9.5$

$= 352\ 632\ \text{unit}$

This is minimum quantity to satisfy the demand.

Question18:- Makeshift Manufactures produce a single product. The company's annual normal production is 5 lakhs units of input on a single shift eight hour a day basis in terms of a standard input of 1 lakh direct labour hours. Last year's income statement is given below:

	Rs.
Sales (7 Lakh of units @ Rs. 2.50)	17,50,000
Variable Expenses	
Direct Material	2,80,000
Direct Labour	4,90,000
(1,40,000 hrs. @ Rs. 3.50)	
Factory Overhead:	
Overtime Premium	1,40,000
Miscellaneous	<u>2,10,000</u>
	11,20,000
Contribution Margin	6,30,000
Fixed Expenses	<u>5,30,000</u>
Net income	<u>1,00,000</u>

Management is concerned about the Overtime working done last year (Overtime is paid at double the normal rate) and wants to investigate the possibility of working a second shift. The Cost Accountant of the Company estimates that a second shift would increase costs as follows: an additional factory supervisor at Rs. 30,000 per annum, a night shift allowance of 60 paise per direct labour hour and an increase in security and administrative costs of Rs. 40,500 a year. Management required you as their consultant to answer these questions with supporting figures:

- (a) If instead of working overtime, a second shift had been introduced at the beginning of last year itself, would profits have been better? If so by how much?

At what capacity levels it would be advantageous to the company to change from overtime working to a second shift ?

This year it is estimated that there will be, on last year's figures 20% increase in units sold, 10% increase in selling price, 5% increase in direct material cost per unit and a direct labour rate increase of Re. 0.30 per hour. Assuming that the overtime working would be continued prepare an income statement for the year based on the current estimates;

If a second shift working were to be introduced, with an increase in night shift allowance of 6 paise per direct labour hour, what would have been the saving in cost?

Question19:- A company operates its plant on single shift basis. It can produce upto 8,000 units of output per month without overtime. The fixed costs on single shift basis of operation amount to Rs. 30,000 per month. The average variable cost per unit is Rs.10.

The output can be increased upto 15,000 units per month by working overtime. This entails no increase in fixed costs, but the variable costs per unit during overtime will be Rs. 12 in excess of 8,000 units upto the capacity of 15,000 units. If a second shift is worked, the maximum capacity of the second shift is 8,000 units per month. The variable cost on second shift operation is Rs. 10.50 per unit and the incremental fixed cost involved in the second shift is Rs. 6,000 per month. Required:

- 1: If the company's demand for the product is 10,000 units, should the company work overtime or second shift?
- 2: At what level of output will the company consider working second shift instead of working overtime? State the range of output for overtime working and second shift operation.
- 3: During a particular month, the company predicted its demand to be 14,000 units and worked second shift. At the end of the month it was discovered that the company's demand was only 11,000 units and the company accordingly Produced only 11,000 units. Calculate the cost of prediction error.

Solution:- Statement of Comparative cost

Second step		Overtime working	
Night shift allowance 0.5 X 2000	1000	Overtime premium 2 X 2000	4,000
Extra Fixed Cost	6,000		
Total Cost	7,000	Total Cost	4,000

Decision: It is better to introduce overtime working instead of second shift working further we can say that basis variable cost Rs. 10 on additional 2000 unit to be termed as irrelevant cost and existing fixed cost Rs. 30,000 to be termed as Sunk cost

(2) At what level of

Let x be Addition units

Total cost = Total cost

Second shift Over time

or, $0.5x + 6000 = 2x + \text{nil}$

$6000 - \text{nil}/2 - 0.5 = x$

$x = 4000$ units

Statement of Range.

Additional level

0 – 3999

4000

4001 to 8000

Preference

Overtime

Overtime/Second shift

second shift

Second shift = 3000 units produced.

Statement of Comparative cost 3000 unit.

Second Shift	Rs.	Overtime	Rs.
Variable Cost 0.5 X 3000	1500	Variable Cost 2 X 3000	6000
Fixed Cost	6000		
	7,500		6,000

The extra demand of 3000 units produced in second shift with cost Rs. 7500. due to existence of additional demand 6000 units But due to Actual additional 3000 units would have been produced in over time working of additional cost of Rs. 6000.

Hence, we can say extra burden of Rs. 1500 is cost of prediction error.

Budgetary control & performance measurement & Decision making

Question 2

Solution:-

(i) Statement of production budget (annually)

Particulars	Quantity (Kg)
Sale (30,00 + 3700 + 41250 + 4500)	153750
+ Closing Stock (to be maintained)	16250
- Opening stock	10,000
Quantity produced	160,000

(ii) Statement of production budget (quarter)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
80 % of current quarter sale	24000	30,000	33000	36000
20% of next quarter sale	7500	8250 (41250 x 20%)	9000 (45000 x 20%)	12250 (B.f.)
production	31500	38250	42000	48250

(iii) Statement of Raw material Consumption

	Production	Raw material required P.U.	Consumption
Quarter 1	31500	2	63000
Quarter 2	38250	2	76500
Quarter 3	42000	2	84000
Quarter 4	48250	2	96500
		Annual consumption [160000 x 2)	320,000
		- Opening Stock	10,000
		+ Closing Stock	5000
		Purchase	3,15,000

(v) Statement of purchase budget (quantity & value)

	Quantity	Rate	Value
	(kg)	Rs.	Rs.
Q1	94500 (315000 x 30%)	2	1,89,000
Q2	157500 (315000 x 50%)	2	472500
Q3	63000 (315000 x 20%)	2	252000

Q4	—	—	—
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Store ledger (F I F O)

	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
	Qty	Rate	Amount Rs.	Qty	Rate	Amount Rs.	Qty	Rate	Amount Rs.	Qty	Rate	Amount Rs.
Opening lock	10,000	2	20,000	41500	2	83000	122500	3	367500	38500	3	115500
+ Purchase	94500	2	189000	15700	3	472500	63000	4	252000	63000	4	252000
- Issue to production	(a) 10,000	2	20,000	(a) 41500	2	83000	84000	3	252000	(a) 38500	3	115500
	(b) 53000 63000	2	106000 126000	(b) 35000 76500	3	105000 188000	- 84000	- 252000	(b) 58000 96500	4	232000 347500	
Closing stock	(a) -			(a) -			(a) 38500	3	115500	(a) -		
	(b) 41500	2	83000	(b)	122500	3	367500	(b) 63000 x 4	252000	(b) 4	20,000	

Question 3

Solution:-

Statement of Contribution per unit

	ACB	MCB	OP
	Rs.	Rs.	Rs.
Selling price	520	500	350
cost;			
Material			
B. Board	60 (1 x 60)	60 (1 x 60)	60 (1 x 60)
ICO 8	160 (8 x 20)	40 (2 x 20)	40 (2 x 20)
IC 12	48 (4 x 12)	120 (10 x 120)	48 (4 x 12)
IC 26	16 (2 x 8)	48 (6 x 8)	64 (8 x 8)
Labour:			
A	40 (8 x 5)	30 (6 x 5)	20 (4 x 5)
B	64 (16 x 4)	48 (12 x 4)	32 (8 x 4)
Variable overhead	36	24	24
Contribution P.U.	96	130	62

Let the total quantity be x unit.

$$ABC = \frac{3}{9} x$$

$$MCB = \frac{4}{9} x$$

$$OP = \frac{2}{9} x$$

$$\text{Total contribution} = 96 \left(\frac{3}{9} x \right) + 130 \left(\frac{4}{9} x \right) + 62 \left(\frac{2}{9} x \right)$$

$$\text{Desire Contribution} = 19,57,200 (757200 + 12,00,000)$$

$$= 96 \times \frac{3}{9}x + 130 \times \frac{4}{9}x + 62 \times \frac{2}{9}x = 1957,200$$

$$\text{or } x \left(96 \times \frac{3}{9} + 130 \times \frac{4}{9} + 62 \times \frac{2}{9} \right) = 1957200$$

or $x = 18,900$ Unit

(i) Statement of sale budget

Product	Quantity	Selling price	Sale Value
	Unit	Rs.	Rs.
ACB	6300 $(18900 \times \frac{3}{9})$	520	3,27,6000
MCB	8400 $(18900 \times \frac{4}{9})$	500	42,00,000
DP	4200 $(18900 \times \frac{2}{9})$	350	14,70,000

iii) Statement of raw material consumption & purchase budget.

Components	Consumption
B. Board	$1 \times 6220 + 1 \times 8280 + 1 \times 3920 = 18420$
ICO 8	$8 \times 6220 + 2 \times 8280 + 2 \times 3920 = 74160$
IC 12	$4 \times 6220 + 10 \times 8280 + 4 \times 3920 = 123360$
IC 26	$2 \times 6220 + 6 \times 8280 + 8 \times 3920 = 93480$

(i) Statement of purchase

Components Consumed - Opening stock + Stock = Purchase

B. Board	18420	1600	1440	18260
ICO 8	74160	1200	1080	74040
IC 12	123360	6000	5400	122780
IC 26	93480	4000	3600	93080

(v) Statement of labour Hours required

	Grade A	Grade B
ACB	49760 (6220×8)	99520 (6220×16)
MCB	49680 (8280×6)	99360 (8280×12)
DP	15680 (3920×4)	31360 (3920×8)
Labour Hrs	1,15,120	2,30,240

$$\begin{aligned} \text{No. of worker required for Grade A} &= \frac{\text{Total labour hrs}}{\text{Labour hr per labour month}} \\ &= \frac{115120}{200} = 576 \text{ (Apps.)} \end{aligned}$$

$$\begin{aligned} \text{No. of worker for Grade B} &= \frac{230240}{200} \\ &= 1152 \text{ (Approx.)} \end{aligned}$$

Statement showing wage payable

	Labour hrs	Rate	wage payable
Grade-A	115120	5	575600
Grade-B	230240	4	920960

Question 4

Solution:-

Statement of flexible budget

Level	5500	6000	6500
	Rs.	Rs.	Rs.
Material list:			
A	66000 (5500 x 12)	72000 (6000 x 12)	78000 (6500 x 12)
B	60500 (5500 x 11)	66000 (6000 x 11)	71500 (6500 x 11)
Wages:-			
Variable	111375 (20.25 x 5500)	121500 (20.25 x 6000)	131625 (20.25 x 6500)
Fixed	57915	57915	57915
Premium	-	5062.5 (10.125 x 500)	10125 (10.125 x 1000)
Factory overhead:			
Variable	16500 (3 x 5500)	1800 (3 x 6000)	19500 (3 x 6500)
Fixed	83400 (69500 x 1.2)	83400 (69500 x 1.2)	69500 x 1.2)
Selling & Distribution			
Variable	110000 (20 x 5500)	120,000 (20 x 6000)	130,000 (20 x 6500)
Fixed	96250	96250	96250
Total cost	601940	940127.5	668190
Sales	522500	570000	617500
Profit	(79440)	(70127.5)	(50690)

II. Statement of lowest price 12000 Additional

	Rs.
Cost to be incurred	
Material	
A 12 x 2000	24000
B 11 x 2000	22000
Wages	
2000 x 30.375	60750
factory over head.	
Variable 2000 x 3	6000
Selling's Distribution	
Variable 2000 x 20	40,000
Return	29095
Price	18145

$$\text{Selling price} - \frac{230240}{200} = \text{Rs. } 90.9 \text{ P.V.}$$

Working Notes:-

Capital employed

Return = 20% C.E.

= 20% (F A + Working Capital)

= 20% (nil + 80% of sale)

= 20% (181845 x 80%)

= 29095

(2) Computation of wage rate

$$\text{Qtr 1} = \frac{156750}{5500} = 28.5$$

$$\text{Qtr 2} = \frac{138000}{4500} = 30.67$$

$$\begin{aligned}\therefore \text{Variable P.U.} &= \frac{\text{Change in lab. cost}}{\text{Change in unit}} \\ &= \frac{156750 - 138000}{5500 - 4500} \\ &= 18.75\end{aligned}$$

Qty	4500	5500
Variable cost @ 18.75	84375	103125
Fixed cost	53625 (B.f.)	53625 (B.f.)
Total	138000	156750

(3) Raw material price

$$A = \frac{66000}{55000} = 12$$

$$B = \frac{45000}{4500} = 10$$

New rate for Q3

$$A = 12$$

$$B = 10 + 10 - 1 = 11$$

Question 5

Solution:-

Statement of flexible budget

Level	75 %	90 %
Quantity	15000	18000
Cost:		
Direct material @ 10.5 (W.N 1)	15700	189000
Labour @ 17.18 (W.N 2)	257500	309000
Production overhead		
Variable @ 27.6042 (W.N 3)	414063	496875.6
Fixed	395000	427000
Selling expense		
Variable @ 11	165,000	198000
Fixed	216000	216000
Total cost	1733063	1973875.6
+ Profit	433265.75	
Sale	2166328.75	
Cost per unit	11.5.54	1096

II. Statement of cost benefit

	Rs	
Incremental Revenue 92 x 3000	276000	
– Cost		
Qty	15000	18000
Cost	1733063	1973875.6
Net Benefit	35187.4	

Decision: It is better to accept the offer being Revenue amount is sufficient to cover the cost

Working notes:-

(1) **Raw material cost** = $\frac{1,00,000}{10,000} = 10$

Increment = 5%

∴ new price = 10.5

(2) **Labour** = $\frac{1.92 \text{ lacs}}{12000} = 16$

Increment = 3%

New Labour rate = $16 + 3\% = 16.48$

Efficiency = 4 % decrease = $\frac{16.48 \times 100}{96} = 17.16$

(3) Over head

Variable over head = $\frac{650000 - 600000}{12000 - 10,000} = 25 \text{ P. Hr}$

Inflation = 6%

New rat = $25 + 6\% = 26.5$

Efficiency effect = $\frac{25.5}{96} \times 100 = 27.6042$

Out of total production over head = 600,000

VC 25 x 10,000 F.C

= 250,000 350000

+ 10% inflation upto 80%

385000

Question No:- 6

(Working Notes)

1. Direct Material Cost

A. Rs. 60,000 ÷ 10,000 = Rs. 6 per units

B. Rs. 50,000 ÷ 10,000 = Rs. 5 per units

2. Fixed and variable cost of production labour cost: (in both the Quarter Production in less than 19,000 units and overtime is not relevant)

	Quarter I	Quarter II	Quarter III
Production (Units)	10,000	15,000	5,000
Production labour (Rs.)	1,80,000	2,30,000	50,000

Variable cost (per units) = Charge in production labour cost/change in production units
= Rs. 50,000/5,000 = 10 per units

Fixed labour cost for quarter = Rs. 1,80,000 – (10,000 units x Rs. 10) = Rs. 80,000

For quarter III. (production 20,000 units and hence overtime is relevant).

Variable cost 20,000 unit @ Rs. 10	Rs. 2,00,000
Fixed cost	80,000
Overtime premium 1,000 x Rs. 5*	5,000
Total production labour cost	2,85,000

*Labour cost become 50% higher for activity in excess of 19,000 unit for quarter IV (18,000 unit)

Material production labour cost of 18,000 unit:	Rs. 1,62,200
18,000 unit x {Rs. 10 x 0.80 x 1.125}*	90,000
Fixed production labour cost	

* Due to 80% learning curve, labour rate rises by 12 1/2%. This factor of rise in rate applies both to variable and fixed labour.

3. Fixed and variable cost components of manufacture overhead.

	Quarter I	Quarter II	Change
Production (unit)	10,000	20,000	10,000
Manufacture Overhead excluding depreciation	90,000	1,20,000	30,000

Variable cost component of manufacturing overhead

$$= \text{Change in Manufacturing Cost} \div \text{Change in Production}$$

Unit = Rs. 30,000 ÷ 10,000 units = Rs. 3 per unit.

Hence fixed cost component of manufacturing overhead

$$= \text{Rs. } 90,000 - (10,000 \text{ unit} \times \text{Rs. } 3) = \text{Rs. } 60,000$$

For quarter IV

Fixed costs components	Rs. 60,000
Add – 20% increase of Rs.	12,000
Total fixed cost	72,000

4. Fixed and variable costs component of selling and distribution expenses

	Quarter I	Quarter II	Change
Sales (unit)	9,000		8,000
Selling and Distribution Expenses	Rs. 38,000	17,000	
		Rs. 54,000	

Variable cost component of selling and Distribution Expenses = Change in selling and Distribution Expenses/Change in sales units

$$= \text{Rs. } 16,000 \div 8,000 \text{ units} = \text{Rs. } 2 \text{ per unit}$$

Hence, fixed cost components of selling and distribution expenses

$$= \text{Rs. } 54,000 - (17,000 \text{ units} \times \text{Rs. } 2) = \text{Rs. } 20,000$$

Fixed cost component for IVth quarter = Rs. 20,000 x 1.20 = Rs. 24,000

Statement showing variable cost per unit and fixed cost under each cost classification effective for quarter IV

Particulars	Reference of working Note	For Quarter IV	
		Total fixed cost for the quarter	Variable cost per unit
Direct materials:			
A	1	–	Rs. 6.00
B	1	–	5.00
Production labour	2	90,000	9.00
Manufacturing overhead	3	72,000	3.00
Depreciation of production machinery	–	20,000	–
	–	25,000	–
Administrative expenses	4	24,000	2.00
Selling and distribution expenses			

Flexible Budget of Production Cost For the Quarter IV

	Production and Sales		
	15,000 Units	18,000 units	21,000 units
Direct material:			
A	15,000 x 6 Rs.	18,000 x 6 = Rs.	21,000 x 6 Rs.
B	90,000	1,08,000	1,26,000
Production labour:	15,000 x =	18,000 x 5 =	21,000 x 5 =
– Variable	75,000	90,000	1,05,000
– Fixed Cost	–	–	9,000
Depreciation			
Total production cost	15,000 x 3 = 45,000	18,000 x 3 = 54,000	21,000 x 3 = 63,000
	72,000	72,000	72,000
		20,000	20,000
	5,27,000	5,96,000	6,74,000

Question 7

Solution:-

Statement of profit for 1986 (20,000 unit)

	Rs.
Revenue 125 x 20,000	25,00,000
Less: Variable cost 68 x 20,000	1360,000
Contribution	1140000
– Fixed cost	675000
Profit	465000

Let Selling price be x

Sale – variable cost – F C = Profit

or 20,000 x – Variable cost – Fixed cost = profit

Revised Variable cost P.U. = 66.35 (W.N 1)

or, 2000 x – (66.35 x 20,000) – 800,000 = 4,65000

$$x = \frac{465000 + 8,00,000 + 13,27,000}{20,000}$$

X = 129.6

Percentage increase in selling price = $\frac{129.6 - 125}{125} = 3.68\%$

(iii) Statement of Comparative cost benefit.

Level	2000	4000	6000	8000
Selling price @ 125	250000	5,00,000	7,50,000	10,00,000
– Variable cost	1,32,700	265400	398100	530800
@ 66.35	—	—	—	—
Contribution	117300	234600	351900	469200
-Extra fixed cost	80,000	194000	320,000	460,000
Net benefit	37300	40600	31900	9200

Decision:

It is better to select 4000 quantity.

Working notes

(1) Statement of Revised Variable cost

Material = 16 + 10% = 17.6

Wages = (40 + 5%) x 100/112 = 37.5

$$\text{Variable overhead} = (12 + 5\%) \times 100/112 = \underline{11.25}$$

$$\text{Total } 66.35$$

Question 8

Solution:-

Capacity = 20,000 unit

Utilized = 15000 unit

Sport = 5000 unit

	Old Rate	New Rate
Direct material	Rs. 30	Rs. 33
Direct labour	Rs. 20	Rs. 25
Variable overhead	Rs. 20	Rs. 20
Fixed cost	Rs 15 (B. f)	
Profit	Rs. 15	
Selling price	100	

$$\therefore \text{F C} = 15 \times 15000 = 2,25,000$$

Statement of Comparative Result

	Extra 5000 unit (By utilising spare)	Extra 10,000 unit (By new machine)
Revenue	5,00,000 (5000 x 100)	9,00,000 (90 x 10,000)
– Variable cost	390,000 (78 x 5000)	7,80,000 (78 x 10000)
Fixed selling Exp.	50,000	—
Fixed cost Sunk	—	—
Depreciation	—	1,00,000
Fixed administration	—	80,000
Profit	60,000	(30,000)

Decision:-

It is better to accept extra 5000 units & reject the alternative due to loss of Rs 30,000.

Question 9

Solution:-

First Option

Incremental revenue:

Gift shop [(Rs. 48,000/80) x 10]	Rs. 6,000
Restaurant [Rs. 64,000/80 x 10]	8,000
Lodge [(1,80,000/90) x 10]	<u>20,000</u>
Total (A)	<u>34,000</u>

Differential costs:

Items of cost	Gift shop	Restaurant	Lodge	Total
Cost of sales	(26,400/80) x 10 x	(35,200/80) x 10 =	—	7,700
Supplies	Rs. 3,300	Rs. 4,400	(14,400/90) x 10 = 1,600	2,700
Electricity	(2,400/80) x 10 =	(6,400/80) x 10 =	(13,500-9,900)(10/90)	<u>600</u>
	300 (960-640)	800 (3,200-	= 400	<u>11,000</u>
	(10/80) = 40 Total	1,20)(10/80) = 40		
	(B)			

Excess of incremental revenue over differential cost (A-B) 23,000

Less: additional advertisement cost 12,000

Additional net income (Option 1) 11,000

Second option

Incremental revenue: (during off—season)

(No incremental revenue)

Gift shop: $[(48000 \div 80) \times 30] \times (8 \text{ month} \div 4 \text{ months}) \times 0.95$	Rs. 34,000
Restaurant: $[64,000 \div 80) \times 30] \times (8 \text{ month} \div 4 \text{ months}) \times 0.95$	45,000
Lodge: $[(1,80,000 \div 90) \times 30] \times (8 \text{ months} \div 4 \text{ months}) \times 0.50$	80,000
Total (A)	1,59,800
Differential Costs (during off—season only)	

Items of costs	Gift of shop	Restaurant	Lodge	Total
Cost of sales	$(26,400/80) \times 30 \times 2 = \text{Rs. } 19,800$	$(35,200/80) \times 30 \times 2 = \text{Rs. } 26,400$	—	Rs. 46,200
Supplies	$(2,400/80) \times 30 \times 2 = \text{Rs. } 1,800$	$(6,400/80) \times 30 \times 2 = \text{Rs. } 4,800$	$(14,400/90) \times 40 \times 2 = \text{Rs. } 12,800$	19,400
Salaries	$4,800 \times 2 = \text{Rs. } 9,600$	$4,800 \times 2 = \text{Rs. } 9,600$	$(25,200 - 4,800) \times 2 = \text{Rs. } 40,800$	60,000
Electricity (Fixed)	$\text{Rs. } 640 \times 2 = \text{Rs. } 1,280$	$\text{Rs. } 1,920 \times 2 = \text{Rs. } 3,840$	$6,900 \times 2 = \text{Rs. } 13,800$	18,920
Electricity (variable)	$(960-640) (30/80) \times 2 = \text{Rs. } 240$	$(3,200-1920) (30/80) \times 2 = \text{Rs. } 960$	$13,500-9,900 (40/90) \times 2 = \text{Rs. } 3,200$	4,400
Total (B)				1,48,920
Excess of incremental revenue over differential cost (A-B)				10,880

Suggestion

1. A company of the first and second option makes it clear, that it is in the interest of Mr. Philips to follow first option, because it will yield him an additional revenue of Rs. 120 i.e., Rs. 11,000 – Rs. 10,880.

2. Best course will be that Mr. Philips should go for advertisement insertion. He should also continue his operations during off – seasons period also. This will boost his earning as follow:

Due to advertisement	Rs. 11,000
Off – seasons	10,800
	21,880

Activity Based Costing

Question 1

Solution:

Statement of Cost pool (ABC)

Overhead	Amount (Rs.)	Basis	No of activity	Cost per Activity
Set-up cost	4250	no of set-up	17 [1+6+6+2+8]	250/-
Ordering cost	1920	no of order	10 [1+4+1+4+]	192/-
Handling cost	7560	no of times	27 [2+10+3+12]	57.77/-
Administration for spar ports	8400	no of spare ports	12[2+5+1+4]	700/-
Factory overhead	37749	machine hours	12475 [125+1250+60+10500]	3.0259/-

Statement of cost sheet

	A	B	C	D
	Rs.	Rs.	Rs.	Rs.
Direct material	2500	25000	9600	1,19,000
Direct Labour	1500	15000	7200	15300
Overhead cost:				
Set up @ 250	250	1500	500	2,000
Material ordering cost @ 192	192	768	192	768
Material handle cost @ 57.77	115	578	173	694
Spare parts @ 700	1400	3500	700	2800
Factory over head @ 3.0259	378	3782	1816	31773
Total over head cost	2335	9228	3381	38035
(a) Overhead/Unit (ABC)	4.67	1.8456	5.635	5.43357
(b) Overhead/Unit (Traditional)	1.2	1.2	4.8	7.2
(a-b) difference	3.47	0.6456	0.835	(1.76)

Question 2

Solution:-

Statement of cost pool (Absorption)

Department	cost (Rs.)	Basis	No. of Activity	Cost per Activity
I	1,100,000	Labour hours	1,83,333	6
II	15,00,000	machine hours	5,00,000	3

Statement of cost (Absorption)

	A	B	C	Total
Material	Rs. 5,00,000	Rs. 8,00,000	Rs. 9,00,000	Rs. 22,00,000
Labour	Rs. 3,00,000	Rs. 8,00,000	Rs. 15,00,000	Rs. 26,00,000
Overhead:				
Department – I	Rs. 180,000 (30,000 x 6)	Rs. 480,000 (6 x 80,000)	Rs. 9,00,000 (6 x 150,000)	Rs. 1560,000
Department – II	Rs. 120,000 (40,000 x 3)	Rs. 240,000 (3 x 80,000)	Rs. 630,000 (210000 x 3)	Rs. 990,000
Total Cost	11,00,000	2320,000	3930,000	7,350,00

Statement of comparative Cost

	Actual	Budgeted	effect
Department-I	11,00,000	15,60,000	460,000 (over)
Department-II	15,00,000	990,000	510,000 (under)

Statement of cost pool [ABC]

Overhead	Amount Rs.	Basis	No. of Activity	Cost per Activity
Receiving & Inspection	14,00,000	Requisition	5000 [1200+1800+2000]	280/-
Setup	12,00,000	Set up	800 [240+260+300]	1500/-

Statement of cost sheet as per ABC

	A	B	C	Total
	Rs.	Rs.	Rs.	Rs.
Material	5,00,000	8,00,000	9,00,000	22,00,000
Labour	3,00,000	8,00,000	15,00,000	26,00,00
Overhead:				
Receiving	336,000 (1200 x 280)	504,000 (1800 x 280)	560,000 (2000 x 280)	14,00,000
Set up cost	360,000 (240 x 1500)	390,000 (260 x 1500)	450,000 (260 x 1500)	12,00,000
Total cost	14,96,000	24,94,000	3410,000	74,00,000

Statement of Comparative

	A	B	C
Cost under	14,96,000	24,94,000	34,10,000
Cost under traditional	11,00,000	2320,000	3930,000
Difference	39,6,000	1,74,000	(5,20,000)

Question 3

Solution:-

1 (a) Statement of cost pool [Absorption]

Over head cost = Rs. 184,8000

Direct Labour hours = 88000 hrs (40000+40,000+8000]

Overhead cost per labour hours = 21 per hours

Statement of cost (Absorption)

Product	X	Y	Z	Total
	Rs.	Rs.	Rs.	Rs.
Material	750,000	4,00,000	8,8000	12,38000
Labour	240,000	240,000	48000	528,000
Over head	840,000 (21 x 40,000)	840,000 (21 x 40,000)	168000 (21 x 800)	18,48,000
Total	18,30,000	148,0000	30,4000	361,4000

1 (b.) Statement of cost pool (Absorption]

Overhead	Amount	Basis	Quantity	Cost/Qty.
Receipts	435,000	no of Receipt	270 (15+35+220]	16.11.11
Others	1413000	machine hours	76000 (140,000 + 20,000 + 16000)	18.59

Statement of cost (Absorption)

	X	Y	Z	Total
	Rs.	Rs.	Rs.	Rs.
Material	750,000	4,00,000	88000	1238,000
Labour	240,000	240,000	48000	52,8000
Overhead				
Receipts	24167	56389	354444	435000
Others	743600	731800	297440	1413000
Cost	1757767	1068189	787884	3613840

Statement of cost pool (ABC)

Overhead	Amount (Rs.)	Basis	No. of Activity	Cost per Activity
Setup	30,000	no. of set up	30 (3+7+20)	1000/-
Machine	760,000	machine hour	76000 (40,000+20,000+1600)	10/-
Receiving	435000	no. of Receipt	270 (15+35+220)	1611.11
Packing	435000	no. of Receipt	32 (9+3+20)	7812.5
Engineering	373000	no. of order	50 (15+10+25)	7460

Statement of cost (ABC)

	X	Y	Z	Total
	Rs.	Rs.	Rs.	Rs.
Material	750,000	4,00,000	88000	12,38,000
Labour	240,000	240,000	48000	528000
Overhead:				
Set-up @ 1000	3000	7000	20,000	30,000
Machine @ 10	4,00,000	2,00,000	16,00,000	760,000
Receiving @ 1111.11	24167	56389	354444	435000
Engineering @ 7460	111900	74600	186500	37000
	1599380	1001426	1013194	3614000

Question 4

Solution:-

Statement of cost pool

Overhead	Amount	Basis	no. of activity	cost per Activity
Machine	20860	Machine hours	5200 (1920+1200+640+1440)	4.01/-
Set-up cost	10500	no. of set-up	42 (12+10+8+12)	250/-
Store	7200	no. of requisition	80 (20+20+20+20)	90/-
Inspection	4200	no. of purchase order	42 (12+10+8+12)	100/-
Output handling & Dispatch	9240	no. of order	84 (24+20+16+24)	110/

Statement of cost (ABC)

Cost	A	B	C	D	Total
	Rs.	Rs.	Rs.	Rs.	Rs.
Material	19200 (80 x 240)	20,000 (200 x 100)	9600 (160 x 60)	28800 (240 x 120)	77600
Labour	13440 (240 x 56)	8400 (200 x 42)	4480 (160 x 28)	10080 (240 x 42)	36,400
Overhead					
Set up	3000 (12 x 250)	2500 (10 x 250)	2000 (8 x 250)	3000 (12 x 250)	10,500
Store	1800	1800	1800	1800	7200
Inspection	1200	1000	800	1200	4200
Out put hard lings & Dispatch	2640	2200	1760	2640	9240
Machine	7699 (1920 x 4.01)	4812 (1200 x 4.01)	2566 (640 x 4.01)	5783 (1440 x 4.01)	20860
Total Cost	48979	40712	23006	53303	166000

Statement of cost pool (Absorption)

Overhead = Rs 52000

Machine hours = 5200 (1920 + 1200 + 640 + 1440)

Cost per machine hour = 10/-

Statement of cost

	A	B	C	D	Total
	Rs.	Rs.	Rs.	Rs.	Rs.
Material	19200	20,000	9600	28800	77600
Labour	13440	8400	4480	10080	36400
Overhead @ 10	19200 (1920 x 10)	12000 (1200 x 10)	6400 (640 x 10)	14400 (1440 x 10)	5200
Cost	51840	40400	20480	53200	166000

Statement of Re conciliation

	A	B	C	D	Total
ABC (Rs.)	48979	40712	23006	53303	166000
Absorption (Rs.)	51840	40400	20480	53280	166000
Difference	(2861)	312	2526	23	nil

The difference of distribution of the overhead occurred due to the following reasons.

(i) The ratio of difference activity bet the product are different from the ratio of single recovery rate basis.

(ii) The product which consumes high volume of activity as compare to machine working hours. That product or products co ill absorb high volume of overhead. (The total value of overhead remain same).

Question 5

Solution:- 1

Statement of cost pool (Absorption)

Cost	Amount (Rs.)	Basis	No. of Activity	Cost per Labour hour
Professional labour cost				
Partner	3,00,000	professional Hr	9000	
Associates	2,40,000	professional Hr	(25+40+-----)	60/-
Overhead:				
Design	7,00,000	professional	9000 [250+ 40 + --]	120/-
Staff	380,000	Labour hours		

Statement of cost (Absorption)

	Host Restaurant	Pizza Hut
Hours	25 (5 + 20)	40 (30 + 10)
Cost:	Professional 1500 (60 x 25)	2400 (60 x 40)
Overhead	3000 (120 x 25)	4800 (120 x 40)
Cost	4500	7200

2. Statement of cost pool (ABC)

Cost	Amount (Rs.)	Basis	no. of Activities	Cost per Activity
Professional labour cost	3,00,000	professional Labor hrs	3000	100/-
Associates	240,000	Associate hours	6000	40/-
Overhead:				
Design	7,00,000	profession cost	540000 (1300 + 3400 + --)	1.296/ per professional cost
Staff	3,80,000	professional Labour hours	9000 (25 + 40 + --)	42.22

Statement of cost (ABC)

	Host Restaurant	Pizza Hut	Total
		Rs.	Rs.
Profession Labour cost	500 (5 x 100)	3000 (30 x 100)	3500
Associates labour cost	800 (20 x 40)	400 (10 x 40)	1200
	1300	3400	4700
Overhead:			
Design	1685.18 (1.296 x 1300)	4407.4 (1.296 x 3400)	6092.58
Staff	1055.55 (44.22 x 25)	1688.88 (40 x 42.22)	2744.43
Total cost	4040.73	9496.28	13537.01

3. Statement of difference in cost under ABC & traditional costing.

	Host Restaurant	Pizza Hut
		Rs.
Absorption	4500	7200
ABC	4040.73	9496.28
Difference	459.27	(2296.28)

Question 7

Solution:-

Statement of cost pool (Basis budget)

Cost	Amount (Rs.)	Basis	No. of Activity	Cost per Activity
Packing material	1950,000	Composite Ratio	1950 (30:90:75 W.N)	10,000
Other	940,000	Quantity	1,00,000 (30,000 + 45000 + 25000)	9.4

Statement of cost

	Iohn Ltd.	George Ltd.	Raul Ltd.
Quantity	30,000	45000	25000
Packing material (30:90:75)	Rs. 3,00,000	Rs. 9,00,000	Rs. 750000
Other cost	Rs. 282000 (9.4 x 30000)	Rs. 423000 9.4 x 45000)	Rs. 235000 (9.4 x 25000)
Cost	Rs. 5,82,000	Rs. 1323000	Rs. 98,5000

2. Departmention of over head

	Inspection	Storage	packing
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Labour	52500	35000	363500
Over time	15000	4500	10500
Occupancy	1,00,000	3,00,000	1,00,000
Administration & management	24000	6000	30,000
Total	1,91,500	345500	40,3000

Statement of cost pool (ABC)

Activities	Amt. (Rs.)	Base
Inspection	191500	9.3 lacks
		(150000 + 405000 + 375000)
		(5 x 30000) 4500 x 9 2500 x 15
Storage	345500	27500 (9000 + 13500 + 5000)]
Packing	403000	4605000 (108000 + 2025000 + 150,0000)

Statement of cost (Additional production)

	Iohn	George	Paul
		Rs.	Rs.
Packing	3,00,000	9,00,000	750,000
Receiving & Inspection	30887	83395	77218
Storage	113073	169609	62818
Packing	94515	177215	131270
Total	538475	1330219	1021306
Cost Unit	17.95	29.56	40.85
	$\left(\frac{538475}{30,000} \right)$	$\left(\frac{1330219}{29.56} \right)$	$\left(\frac{1021306}{25000} \right)$

Working notes:

	Iohn	George	Paul
1	1 cm	1 cm	1 cm
	1	2	3
Qty	30,000	45,000	25,000
Relative composite	30,000	90,000	75,000
Ratio:	30: 90: 75		

Question 8

Solution:-

Statement of cost pool

Overhead	Amount Rs.	Basis	No. of Activities	Cost per Activity
Stores	278250 + 262500	no. of receipt	1960 (48 + 52 + --)	275.89
Setup	255000 + 11,13,000	Inspection	1280 (30+10+--)	149.41

Statement of cost for the product P & Q

	P	Q
	Rs.	Rs.
Cost:		
Material	6000	4000
Labour	5760 (960 x 6)	600 (100 x 6)
Overhead:		

Production	24138 (670.5 x 36)	16092 (670.5 x 24)
Stores	13242.72 (275.89 x 48)	14346.28 (275.89 x 52)
Inspection	4482.3 (149.41 x 300)	1494.10 (149.41 x 10)
Total cost	53623.02	36532.38

Statement of cost pool (Absorption)

Overhead = Rs. 21,00,000

Labour hours = 40,000 (960 + 100 + --)

Overhead/hour = 52.50

(iii) Statement of cost & selling price per Quarter (ABC)

	Qty: 3000
	Rs.
Material	12000
Labour 300 x 6	1800
$\frac{\text{Avoidable overhead}}{\text{Design} \left(\frac{60,000}{24} \times 3000 \right)} = 7500$	
Overhead:	
Store 275.89 x 20	
Prod. 670.5 x 6	
Quality inspection 149.41 x 24	13128
Total cost 34428	
profit (25%) 8607	
Sale value 43035	
Selling Price	14.345

Working notes

1	30% mm	40% set-up	30% Q-9
Salary of technical stuff (637500)	1914250	255000	191250

Machine maintenance. & operation 191250

+ 1012500

187500

Total 139125

It can be distributed in to store & production in the ration of 20%: 80%

i.e. store = 278250

production = 11,13,000

Question 10

Solution:-

Statement of profit (Absorption)

	A	B	C	D	Total
	Rs.	Rs.	Rs.	Rs.	Rs.
Material	10,000	6400	9000	7500	32900
Direct Labour	3000	1600	3000	1000	8600
Factory overhead (34410)	12000+3	6400 +2	12000 +3	4000 +2	34400 +10

Selling expenses	2200	1920	2400	1400	7920
Total cost	27203	16322	26403	13902	83830
Selling price	27500	24000	30,000	17500	99000
Profit	297	7678	3597	3598	15170

Note: Under recovery and over recovery exist only when actual base are different from budgeted base.

2. Statement of profit (Machine hour Base)

	A	B	C	D
	Rs.	Rs.	Rs.	Rs.
Material	10,000	6400	9000	7500
Labour	3000	1600	3000	1000
Overhead	10095 (500 x 20.19)	8076 (400 x 20.19)	10820 (500 x 21.648)	5410 (250 x 21.648)
Set-up	2200 1920	2400 1400		
Total cost	25295	17996	25220	15310
Selling price	27500	24000	30000	17500
Profit	2205	6004	4780	2190

Statement of machine Hours.

	X	Y	Total
Set-up	470	900	1370
Supervision	1200	1200	2400
Machines	10800	9000	19800
Ware house	1691	1409	3100
Purchasing	2213	2227	4440
Power plant	1800	1500	3300
Total	18174	16236	34410
Machine hr	900	780	1650
Rate	20.19	21.64	20.85

3. Statement of cost pool

Overhead	Amount	Basis	no. of Activity	Cost per Act
Set up	13750	Set-up	137 (15+32+10+80)	10/-
Supervision	2400	Supervision Hr	240 (75+40+75+50)	10/-
Machine	19800	Machine hour	1650 (500+400+500+250)	10/-
Ordering price	440	order	110 (10+20+20+60)	4/-
Material handling	4000	Raw mat. Input	10,000 (200+4000+2000+2000)	0.4/-
Finished Goods	1600	Av. Holding	400 (0+100+100+200)	4/-
Dispatch	1500	delivery	400 (10+40+50+200)	3.75
Poser	3300	machine hrs	1650 (500+400+500+250)	2/-
Selling exp.	7920	Sale Staff	790 (30+160+200+400)	10.0253/-

3. Statement of profit (ABC)

	A	B	C	D
	Rs.	Rs.	Rs.	Rs.
Material	10,000	6400	9000	7500
Labour	3000	1600	3000	1000
Overhead:				
Setup	150 (15 x 10)	320 (32 x 10)	100 (10 x 10)	800 (80 x 10)
Suppression	750 (750 x 10)	400 (40 x 10)	750 (75 x 10)	500 (50 x 10)

Machine	6000 (500 x 12)	4800 (400 x 12)	6000 (500 + 12)	3000 (250 x 12)
Ordering price	40 (4 x 10)	80 (4 x 20)	80 (4 x 20)	240 (4 x 60)
Material handling	800 (2000 x .4)	1600 (4000 x .4)	800 (2000 x 0.4)	800 (2000 x 0.4)
Finished	– (0 x 4)	400 (4 x 100)	400 (4 x 100)	800 (4 x 200)
Dispatch	37.5 (3.75 x 10)	150 (3.75 x 40)	187.5 (3.75 x 50)	750 (3.75 x 200)
Power	1000	800	1000	500
Selling	300.76 (30 x 10.0253)	1604 (10.0253 x 160)	2005 (10.0253 x 200)	4010.24(10.0253 x 400)
Total cost	22078.26	18154	23322.5	19900.24
Sale value profit	$\frac{27500}{5421.74}$	$\frac{245000}{5846}$	$\frac{30,000}{6677.5}$	$\left(\frac{17500}{6677.5}\right)$
	5421.74	5846	6677.5	(2400.24)

Question 11

Statement of cost pool

Conversion	\$	Basis	no. of Basic	Cost per Activity
Making Variable	350000	Time minute	42000 (5.25 + 5000 +5.25 x 3000)	8.33
Avoid: fixed cost	84000	Time	42000	2/-
Unavoidable overhead	126000	Time	42000	3/-
Packing:				
Variable	28000	Time	42000	6.66
Fixed unavoidable	84000	Time	42000	2
Fixed avoidable	56000	Time	42000	1.33

Statement of cost & Revenue

	V4	V2	Total
	Rs.	Rs.	Rs.
Material cost	150,000	90,000	24,0000
Conversion cost:			
(i) Making;			
Variable cost	218750 (8.3 x 5000 x 5.25)	131250 (8.3 x 15750)	3,50,000
Avoidable fixed cost	52500 (2 x 26250)	80,000 (6.60 x 12000)	280000
Fixed cost	40,000 (30,000 x 1.3)	16000 (12000 x 1.3)	56000
Relevant cost	661250	348750	1010,000
Sale	750,000	540000	12,90,000
Benefit	88750	191250	280000
Unavoidable fixed cost:-			
Packing	78750 (26250x 3)	47250 (3 x 15750)	126000
Making	(2 x 30,000) 6,00,00	(2 x 12000) 24000	84000
Profit	50,000	120,000	70,000

Decision: It's not better to discontinue the product V4 because unavoidable fixed cost 78750 + 60,000 i.e. 138750 remain constant.

Hence we can say such fixed cost to be termed as fixed cost