

MARGINAL COSTING

Problem

Your company has a production capacity of 2,00,000 units per year. Normal capacity utilization is reckoned as 90%. Standard variable production costs are Rs.11 per unit. The Fixed costs are budgeted at Rs 3,60,000/- per year. Variable selling costs are Rs.3 per unit and fixed selling costs are Rs.2,70,000 per year. The unit selling price is Rs.20. In the year just ended on 30th June, 2002, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30.6.2002 was 20,000 units. The actual variable production costs for the year were Rs.35,000 higher than the standard. The actual fixed production over heads incurred were Rs.3,80,000/- for the year.

- i) Calculate the profit for the year
 - a) by absorption costing method, and
 - b) by marginal costing method.
- ii) Explain the difference in the profits

Solution

1. a Net Profit based on Absorbtion costing

Trading Profit & Loss A/c					
Particulars	Quantity	Amount	Particulars	Quantity	Amount
To opening stock	10,000	1,30,000	By sales	1,50,000	30,00,000
To variable overheads	1,60,000	17,95,000			
To Fixed OH absorption (160000*2) under absorption (380000- 320000)		3,20,000 60,000			
To gross profit		9,66,875	By closing stock	20,000	2,71,875
To variable sell.Exp.		4,50,000	By gross profit		9,66,875
To fixed sell. Exp		2,70,000			
To Net Profit		3,46,875			
Total		9,66,875	Total		9,66,875

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b. Net Profit as per Marginal Costing

Trading Profit & Loss A/c					
Particulars	Quantity	Amount	Particulars	Quantity	Amount
To opening stock	10,000	1,10,000	By sales	1,50,000	30,00,000
To variable overheads	1,60,000	17,95,000			
To gross profit		1,31,9375	By closing stock	20,000	2,74,375
		32,24,375			32,24,375
To factory OH		3,80,000	By Gross Profit		1,31,9375
To S & D OH					
Fixed		2,70,000			
Variable (*3)	1,50,000	4,50,000			
To Net Profit		2,19,3750			

2) PROFIT RECONCILIATION STATEMENT

Particulars	Amount
Net Profit as per Absorbtion Costing	2,46,875
Add : Opening Stock Difference	20,000
Less : Closing Stock Difference	(47,500)
Net Profit as per Marginal Costing	2,19,375

Notes: 1) Opening Stock valuation

a) In the absence of information, it is presumed that the actual variable production cost incurred in the last period is same as standard variable production cost this year. Accordingly, the opening stock valuation under both the systems include variable cost of Rs.11.

b) Under Absorbtion is supposed to include fixed production overheads of the last period about which we have no information.

Accordingly it is presumed that either there was no over or under absorption in the last period and if there was the company adjusted cost of sales and further the absorption rate last year was as same as that in this year or there was some under or over absorption that the company followed supplementary rate system and further that the actual rate last year was same as the absorption rate this year.

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2) Under / Over.

In the absence of instruction, we have decided to follow supplementary rate system for adjusting the under absorption. Accordingly the under absorption has been shown in the trading account so that apart thereof is automatically included in the closing stock valuation.

3) Closing Stock Valuation.

It is presumed that the company follows. FIFO Systems for valuation of stock which means the closing stock is part of current year's production.

a) Absorption

Particulars	Amount
Variable overheads: $17,95,000 \times 20,000 / 1,60,0000$	2,24,375
Fixed overheads	
Absorption : $20,000 \times 2$	40,000
Under Absorption ($60,000 \times 20,000 / 1,60,000$)	7,500
Total	2,71,875

b) Marginal

Particulars	Amount
Variable (P) cost : $17,95,000 \times 20,000 / 1,60,0000$	2,24,375
Total	2,24,375

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Problem

The budgeted sales of the products of a company are as follows :

		Products	
	X	Y	Z
Budgeted sales in unit	10,000	15,000	20,000
Budgeted selling price per unit	4	4	4
Budgeted variable cost per unit	2.5	3	3.5
Budgeted fixed expenses	12,000	9,000	7,500

From the above information, you are required to compute the following for each product:

- The Budgeted Profit
- The Budgeted break even sales
- The Budgeted margin of safety in terms of sales value

Solution

Statement showing the total budgeted net profit, break-even point and Margin of safety for each product.

Particulars	X	Y	Z
1) Budgeted Sales	40,000	60,000	80,000
(-) Budgeted Variable cost	(25,000)	45,000	70,000
Budgeted contribution	15,000	15,000	10,000
(-) Budgeted Fixed cost	(12,000)	9,000	7,500
Budgeted Net Profit	3,000	6,000	2,500
2) BEP (sales) $(12,000 \times 40 / 15)$	32,000	36,000	60,000
3) Margin of Safety	8,000	24,000	20,000

Problem

X Ltd. Is a recently formed company manufacturing vehicles. Its cost structure is such that on sale of every Rs.2,000, it spends Rs.1400/-. In 2002, when the total sales revenue was Rs.10,00,000/-, it sustained loss of Rs. 2,00,000/-

You are required to compute the break even point. If the minimum net profit to be earned is Rs.2,00,000/- in order to justify the survival, what must be sales revenue ?

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Solution

$$\frac{(2,000)}{5} \times \frac{1,400}{VC} = (600) \text{ Contribution} = FC \text{ \& NP}$$

1) Breakeven Point	
i) PV Ratio = $600/2,000 = 30\%$ Sales – VC = Contribution (2,000 -1,400)	600
ii) Fixed Cost = Contribution – Net profit = $[(10,00,000) * 30\%] - (-2,00,000)$	5,00,000
iii) BEP = FC/PV Ratio = $5,00,000/0.30$	16,66,667
2) Sales required = $(100/30) * (5,00,000 + 2,00,000)$ = $(7,00,000/ 0.30)$	23,33,334
OR	
Sales required = BEP + Margin of Safety($100/30*2$ lakh) (16,66,667 + 6,66,667)	23,33,334

Problem

From the following particulars, you are required to calculate :

- (i) P/V Ratio
- (ii) BEP for sales;
- (iii) Margin of Safety;
- (iv) Profit when sales are Rs.2,00,000/-
- (v) Sales required to earn a profit of Rs.40,000/-

Year	Sales	Profit
I	Rs. 2,40,000	18,000
II	Rs. 2,80,000	26,000

You may make plausible assumptions. Also evaluate the effect on II year's profit of

(a) 20% decrease in sales quantity.

(b) 20% decrease in sales quantity accompanied by 10% increase in sales price and reduction of Rs. 3,500/- in fixed costs

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Solution

(1) <u>P/V Ratio</u>	
In year 2, additional NP which means additional contribution	8,000
Additional sales	40,000
P/V Ratio	20%

(2) <u>BEP</u>		
Fixed cost = Contribution – NP		
= (2,40,000 * 20%) – 18,000	48,000 – 18000	30,000
BEP = FC/PV Ratio	30,000/0.20	1,50,000

(3) <u>Margin of Safety</u>		
Year 1	2,40,000 – 1,50,000	90,000
Year 2	2,80,000 – 1,50,000	1,30,000

(4) Net Profit	
(Contribution*PV Ratio) – Fixed Cost	(2,00,000 * 20%) – 30,000
	10,000

OR

Cap Sales	2,00,000
(-) BEP	1,50,000
Margin of Safety	50,000
(-) PV Ratio	20%
NP	10,000

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5) Sales Required	$100/20 (30,000(FC) + 40,000(NP))$	3,50,000
	<u>OR</u>	
BEP		1,50,000
Margin of Safety Req ($100/20 \times 40,000$)		2,00,000
Sales Required		3,50,000

(6)		
a) 20% decrease in sale Qty		
Reduction in Contribution & in net profit	$20\% \times (2,80,000 \times 20\%)$	20% (56,000)
Reduction in Contribution & in net profit		Rs.11,200
(b) Revenue Sales	$(2,80,000 \times 80\%) \times 110\%$	2,46,400
(-) Revenue Cost	$(2,80,000 \times 80\%) \times 80\%$	1,79,200
Revenue contribution		67,200
(-) Revenue Fixed Cost		(26,500)
Revenue NP		40,700
(-) Given NP		(26,000)
Increase in NP		14,700

OR

(b) Revenue Sales	$(2,80,000 \times 80\%) \times 110\%$	2,46,400
P/V Ratio (now)	$\frac{100-80}{100} = 20$	
(new)	$\frac{110-80}{100} = 30$	3/11

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(Reconciliation of NP change)

Change	Effect on NP
1) Reduction in Sales Qty (as per (a))	(11,200)
2) Increase in Sales Price (2,80,000*80%*10%)	22,400
3) Reduction in Fixed Cost	3500
Increase in NP	14,700

Problem

A Japanese soft drink company is planning to establish a subsidiary company in India to produce mineral water.

Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Indian subsidiary.

	Total Annual Cost	Percentage of Total Annual Cost which is variable
	Rupees	
Material	2,10,000	100%
Labour	1,50,000	80%
Factory overheads	92,000	60%
Administration expenses	40,000	35%

The Indian Production will be sold by the manufacturers representatives who will receive a commission of 8% of the sales price. No portion of the Japanese office expenses is to be allocated to the Indian subsidiary.

Required :

1. Compute the sales price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in India
2. Calculate the Break-even point in Rupee sales as also in number of bottles for the Indian subsidiary on the assumption that the sales price is Rs.14/- per bottle.

Solution

(a) Calculation of Sales price :

1) Commission	80% of sales
2) NP	10% of sales
3) Other total cost	82% of sales
Total Sales	100/82 * 4,92,000

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Sales	60,000
Sales QTY	40,000
Selling Price	15

(b) BEP

(i) Variable cost per unit	
Commission 8% of 14	1.12
Other cost = 3,99,200/40,000	9.98
Total	11.10

(ii) Contribution per unit	
BEP = SP	14
(-) Variable Cost	11.10
Contribution	2.90
BEP in value = FC / PV Ratio = 92800 / 2.9 * 14	4,48,000
BEP in Qty = 92,800/2.9	32,000

Problem

An Umbrella manufacturer makes an average net profit of Rs.2.50 per piece on a selling price of Rs.14.30 by producing and selling 60,000 pieces or 60% of the potential capacity.

His cost of sales is

Direct material	3.5
Direct wages	1.25
Work overheads	6.25 (50% fixed)
Sales overheads	0.80 (25% variable)

During the current year, he intends to produce the same number of units but anticipates That his fixed charges will go up by 10% while the direct labour and direct materials will go up by 8% and 6% respectively. But he has no option of increasing the selling price. Under this situation. He obtains an offer for further 20% of his capacity.

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What minimum price will you recommend for acceptance of offer to ensure the Manufacturer an overall profit of Rs.1,67,300/- ?

Solution

Statement showing the sales price per unit for 20,000 units		
Total net profit required		1.67,300
Add: Fixed cost to be incurred		
Present Fixed cost $(3.125 + 0.6) \times 60,000$	2,23,500	
Add: 10% increase	22,350	2,45,850
Total Contribution Required (A)		4,13,150
<u>Add: Variable Cost of 80,000 units</u>		
Material cost $(3.50 + 0.021)$	3.71	
Direct Labour $(1.25 + 0.10)$	1.35	
V (P) overheads	3.125	
V (A) overheads	0.20	
	8.385	
	80,000	6,70,800
Total sales required (A+B)		10,83,950
Less: sales value of 60,000 units $(60,000 \times 14.3)$		(8,58,000)
		2,25,950

Selling price per unit $2,25,950 / 20,000 = 11.2975$ or 11.30

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Problem

Nuksan Ltd. which makes only one product, sells 10,000 units of its product making a loss of Rs.10,000/-. The variable cost per unit of the product is Rs.8/- and the fixed cost is Rs.30,000/-

Sales units	Probability
10,000	0.10
12,000	0.15
14,000	0.20
16,000	0.30
18,000	0.25

- (i) What is the probability that the company will continue to make losses ?
- (ii) What is the probability that the company will make a profit of Rs.6,000 ?
- (iii) What is the probability that the profit will be at the most Rs.2,000 ?

Solution

I) Fixed Cost	30,000
NP	(10,000)
Total Contribution	20,000
Sales Qty	10,000
Contribution per unit	2
BEP (30,000/2)	15,000

- (i) There is a (0.45) probability that the sales would be below 15,000 units and therefore there is 0.45 probability that the company would continue to make losses

(ii)

Fixed Cost	30,000
NP	6,000
Total Contribution	36,000
Contribution per unit	2
Qty to be sold (units)	18,000

There is a 0.25 probability that the sales could be 18,000 units. Therefore, there is a 0.25 probability that profit could be Rs.6,000.

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(iii)

Fixed Cost	30,000
NP req	20,000
Total Contribution Req.	32,000
Contribution per unit	2
Qty to be sold (units)	16,000

There is a 0.75 probability that the sales could be 16,000 or less therefore there is 0.75 Probability that the profit could be at the most 2,000

Problem

Ever Forward Ltd is manufacturing and selling two products, Splash and Flash at selling prices of Rs.3 and Rs.4 respectively. The following sales strategy has been outlined for the year 2003 :

- (i) Sales planned for the year will be Rs.7.20 lakhs in the case of Splash and Rs.3.50 Lakhs in the case of Flash
- (ii) To meet the competition, the selling price of Splash will be reduced by 20% and that of Flash by 12.5%
- (iii) Break-even is planned at 60% of the total sales of each product
- (iv) Profit for the year to be achieved is planned as Rs.69,120 in the case of Splash and Rs.17,500 in the case of Flash. This would be possible by launching a cost reduction programme and reducing the present annual fixed expenses of Rs.1,35,000 allocated at Rs.1,08,000 to Splash and Rs.27,000 to Flash.

You are required to present the proposal in financial terms giving clearly the following information:

- (a) Number of units to be sold of Splash and Flash to break even as well as the total number of units of Splash and Flash to be sold during the year.
- (b) Reduction in fixed expenses, product wise, that is envisaged by the Cost Reduction Programme.

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Solution

(a) Statement Showing total Qty to be sold and the Break even Point		
	Splash	Flash
Budgeted sales	7,20,000	3,50,000
Selling price per unit	2.4	3.5
Total Qty to be sold	300,000	1,00,000
BEP Qty (60%)	1,80,000	60,000
(b) The Budgeted Reduction in Fixed Cost		
	Splash	Flash
Total Budgeted Sales	7,20,000	3,50,000
Net Profit	6,920	17,500
Margin of Safety 40% of sales	2,88,000	1,40,000
P/V ratio = (NP/MOS)	24%	12.5%
Budgeted Contribution (Sales * P/v Ratio)	1,72,800	43,750
Budgeted Fixed Cost (Contribution – NP)	1,03,680	26,250
Given Fixed Cost	1,08,000	27,000
Reduction in Fixed Cost	4,320	750

OR

	Splash	Flash
(BEP/MOS)	1.5	1.5
Budgeted Net Profit	69,120	17,500
Budgeted Fixed Cost	1,03,680	26,250
Given Fixed Cost	1,08,000	27,000
Budgeted Reduction	4,320	750

Problem

PQ Ltd has been offered a choice to buy a machine between A and B

You are required to compute :

- (a) Break even point for each of the machines
- (b) The level of sales at which both machines earn equal profits

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(c) The range of sales at which one is more profitable than the other

The other relevant data is as given below:

	Machine A	Machine B
Annual output in units	10,000	10,000
Fixed cost	30,000	16,000
Profit at above level of production	30,000	24,000

The market price of the product is expected to be Rs.10 per unit

Solution

	Machine A	Machine B
BEP = ?		
Fixed Cost	30,000	16,000
NP	30,000	24,000
Total Contribution	60,000	40,000
Sales Qty	10,00	10,000
Contribution per unit	6	4
Selling price	10	10
Variable cost	4	6
BEP 30/6	5,000	40,000

b) (i) If the demand for the product is independent of the machine used.

COST BEP

The sales being constant, the level at which the total cost would be the same under 2 alternatives would be the level at which profit would be the same. The level of activity at which total cost is same under the 2 alternatives is known as cost BEP.

If instead of machine B, we buy machine A:

Additional Fixed Cost 14,000

Savings in variable cost per unit / 2

Cost BEP 7,000 units

C) (ii) If the demand depends on the machine used.

At respective BEP's the profit would be nil under both the alternatives. Above the respective BEP's if the demand ratio of the products manufacture on machine A & B respectively is (2:3) or

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below the respective BEP's the demand deficit ratio is (2:3) then the profit or as the case may be, losses would be the same. Eg. 5002 units manufactured on A would give us the same net profit as 4003 manufactured on B would give (Rs.12) and likewise 4998 units manufactured on machine A & 3997 units manufactured on machine B would give same amount of losses (Rs.12).

(c)

(i) If the demand is independent of the machine as

Above 7,000 units machine A would be more profitable whereas below 7000 units machine B would be more profitable.

(ii) If the demand is independent on the machine

If the demand ratio of 2:3 above the respective BEP's changes or below the respective BEP's, the demand deficit ratio of 2:3 changes, then the machine in favour of which the ratio changes becomes more profitable.

Problem

Kalyan University conducts a special course of Computer Applications for a month During summer. For this purpose, it invites applications from graduates. An entrance Test is given to the candidates and based on the same, a final selection of a hundred Candidates is made. An entrance test consists of four objectives types of examinations and is spread over four days, one examination per day. Each candidates is charged a fee of Rs.50/- for taking up the entrance test. The following data was gathered for the past two years.

KALYAN UNIVERSITY

Statement of Net revenue from the Entrance Test for the course on Computer Application

	2001	2002
Gross Revenue (Fees collected) Rs.	1,00,000	1,50,000
<u>Costs</u>		
Valuation	40,000	60,000
Question booklets	20,000	30,000
Hall rent at Rs.2,000 per day	8,000	8,000
Honorarium to chief administrator	6,000	6,000
Supervision charges (One supervisor for every 100		
Candidates at the rate of Rs.50 per day)	4,000	6,000
General administration Expenses	6,000	6,000
TOTAL COST	84,000	1,16,000
Net Revenue	16,000	34,000

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You are required to compute:

- (a) The budgeted net revenue if 4,000 candidates take up the entrance test in 2003.
(b) The break-even number of candidates.
(c) The number of candidates to be enrolled if the net income desired is Rs.20,000/-

Solution

a) Statement showing the budgeted net income for 2003	
Fees collected (4,000 *50)	2,00,000
<u>Less: Budgeted cost</u>	
Evaluation 4000*20	80,000
G.B 4000* 10	40,000
Hall rev.	8,000
Hon. To Chief Adm.	6,000
Super changer (50*4 * 4000/100)	8,000
Total	1,48,000
Budgeted N.I	52,000

b) (i) Calculation of supervision cost

Fees per student		50
<u>Less: Variable cost + semi variable cost</u>		
Evaluation	20	
QB	10	
	30	
Semi-variable	2	
(supervision)		32
Gross contribution		18
Gross Fixed Cost		20,000
Gross BEP	20,000/18	1111.11
Therefore, no. of Supervisory required.		12
Therefore, Supervision Cost	12*200	2,400
Net fixed cost	20,000+2,400	22,400

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(ii) <u>BEP</u>	
Fixed Cost	22,400
Net CTR per student	
Fees 50	
(-) Variable Cost <u>(30)</u>	20
BEP	1,120

(C) (i)

Calculation of total contribution required	
Gross contribution per student	18
Gross Fixed Cost	20,000
Net Profit Required	20,000
Gross Total Contribution Required	40,000
Gross no. of students (40,000/18)	2,222.22
No. of Supervision required	23
Supervision cost (23*200)	4,600
Net Fixed Cost (20,000+4,600)	24,600
Net Contribution Required (20,000+24,600)	44,600
Net Total Contribution required	44,600
Net Contribution per Student	
Fees 50	
(-) Variable Cost (30)	20
No. of Students required	2230

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Problem

A multi-product company has the following costs and output data for the last year

	Product		
	X	Y	Z
Sales mix (in value)	40%	35%	25%
Selling price	Rs. 20	Rs. 25	Rs. 30
Variable cost per unit	Rs. 10	Rs. 15	Rs. 18
Total fixed costs	Rs.1,50,000		
Total sales	Rs.5,00,000		

The company proposes to replace product Z with product S.
Estimated cost and output data are:

	Product		
	X	Y	Z
Sales mix (in value)	50 %	30%	20%
Selling price	Rs. 20	Rs. 25	Rs. 28
Variable cost per unit	Rs. 10	Rs. 15	Rs. 14
Total fixed costs	Rs.1,60,000		
Total sales	Rs.4,50,000		

Analyze the proposed change and suggest what decision the company should take.
Also state the break even point for the company as a whole in the two situations.

Solution

(1) Evaluation of proposal to replace product Z with product S.

a: net profit if we continue with product Z.

X	$(5,00,000 \times 40\% / 20) \times (20 - 10)$	1,00,000
Y	$(5,00,000 \times 35\% / 25) \times (25 - 25)$	70,000
Z	$(5,00,000 \times 25\% / 30) \times (30 - 18)$	50,000
Total contribution		2,20,000
(-) Fixed Cost		1,50,000
Net Profit		70,000

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b) Net profit if we replace with S

X	$(4,50,000 \times 50\% / 20) \times 10$	1,12,500
Y	$(4,50,000 \times 30\%) / 25 \times 10$	54,000
Z	$(4,50,000 \times 20\%) / 28 \times 14$	45,000
Total contribution		2,11,500
(-) Fixed Cost		1,60,000
Net Profit		51,500

The company should continue with product Z because the replacement of 'Z' with 'S' would result in reduction net profit.

2) Statement showing the overall breakeven point of the 2 alternatives.

	XYZ	XYZ
Contribution	2,20,000	2,11,500
Sales	5,00,000	4,50,000
Fixed cost	1,50,000	1,60,000
BEP $50/22 \times 1,50,000$	3,40,909	3,40,426

The above calculation are based on the presumption, in addition to the usual presumptions that the sales of products X, Y & Z would always be in the ratio of Rs.40:35:25 and that of X, Y & Z would be in the ratio of 50:30:20

Problem

Mega Corporation manufactures and sells three products to the automobile industry. All the products must pass through a matching process, the capacity of which is limited to 20,000 hours per annum, both by equipment design and government regulation.

The following additional information is available:

	Product - X	Product - Y	Product - Z
Selling price Rs/unit	1,900	2,400	4,000
Variable cost Rs/unit	700	1,200	2,800
Machining requirement hrs/units	3	2	1
Maximum possible sales – units	10,000	2,000	1,000

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Required : statement showing the best possible production mix which would provide the maximum profit for Mega Corporation together with supporting workings

Solution

1) Requirement v/s Availability

Availability		20,000hrs
<u>Requirements</u>		
X	$10,000 * 3 = 30,000$	
Y	$2,000 * 2 = 4,000$	
Z	$1,000 * 1 = \underline{1,000}$	35,000

$35,000 > 20,000$ = Machine Hours is limiting factor

2) Statement showing the contribution per machine hour and the priority order for allocation of machine hours.

	X	Y	Z
SP	1,900	2,400	4,000
V.C	700	1,200	2,800
Contribution per unit	1,200	1,200	1,200
No. of hours	3	2	1
Contribution per machine hour	400	600	1,200
Priority order	3	2	1

3) Statement showing allocation of machine hours and determination of most profitable product mix.

Product	Machine hrs per unit	Allocation of machine hrs	Most profitable product mix
X	1	1,000	1,000
Y	2	4,000	2,000
Z	3	15,000	5,000
		20,000	

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Problem

A firm can produce three different products from the same raw material using the same production facilities. The requisite labour is available in plenty at Rs.8 per hour for all products. The supply of raw materials, which is imported at Rs.8 per kg. is limited to 10,400 kgs. for the budget period. The variable overheads are Rs.5.60 per hour. The fixed overheads are Rs.50,000. The selling commission is 10 per cent on sales.

a. From the following information, you are required to suggest the most suitable sales mix, which will maximize the firms profits. Also determine the profit that will be earned at that level:

Product	Market demand (units)	Selling price per Unit	Labour hours required per Unit	Raw Material required per Unit (Kgs)
X	8,000	30	1	0.7
Y	6,000	40	2	0.4
Z	5,000	50	1.5	1.5

b. Assume, in above situation, if additional 4,500 kgs of raw materials is made for production, should the firm go in for further production, if it will result in additional fixed overheads of Rs.20,000 and 25% increase in the rates per hour for labour and variable overheads ?

Solution

a) (i) Statement showing the contribution per kg of raw material and priority order for allocation of raw material

	X	Y	Z
Selling price	30	40	50
<u>Variable Cost</u>			
Direct material	(5.6)	(3.2)	(12)
Direct labour	(8.0)	(16.2)	(12)
Variable overheads	(5.6)	(11.2)	(8.4)
Commission	(3)	(4)	(5)
Contribution per unit	7.8	5.6	12.6
Raw material Qty per unit	0.7	0.4	1.5
Contribution per unit	11.14	14	8.4
Priority order	2	1	3

Statement showing allocation of raw material determination of most profitable product mix and its profitability.

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Product	Raw material per unit	Allocation of Raw material	Most profitable product mix	Contribution per unit	Total contribution
X	0.4	2,400	6,000	5.6	
Y	0.7	5,600	8,000	7.8	
Z	1.5	2,400	1,600	12.6	
		10,400		Total Contribution	1,16,160
				(-) Fixed Cost	(50,000)
				Total Profit	66,160

b)

Given Contribution P.U of Z	12.6
Less: Increase in variable Cost 25% (12+8.4)	(5.1)
Rev. contribution per unit	7.5
Additional Quantity (4,500/1.5)	3,000
Total additional contribution	22,500
(-) Additional Fixed Cost	(20,000)
Additional net Profit	2,500

The proposal is accepted

Problem

A toy manufacturing company is at present operating at the 80% capacity level, the production being 15,000 units per annum. The following relevant figures are obtained from the Company's budgets at different capacity utilization levels:

	Capacity utilization level	
	80%	100%
	(Rupees)	(Rupees)
Sales	20,00,000	25,00,000
Variable overheads	2,25,000	2,50,000
Semi-variable overheads	1,05,000	1,11,000
Fixed overheads	4,00,000	4,70,000
Output (In units)	15,000	18,750

The management earns a profit margin of 10% on sales.

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You are required to work out the differential cost of producing the additional 3,750 units by increasing the capacity utilization level to 100%

Solution

Statement showing the differential cost of production (3750 units)

1) Prime cost		2,67,500
2) <u>Overheads</u>		
Variable	25,000	
Fixed	70,000	
Semi- Variable	6,000	1,01,000
Total Differential cost		3,68,500
Note 1: Calculation of Prime Cost of 3750 units.		
At 80% sales		20,00,000
Net profit		(2,00,000)
Total cost		18,00,000
Less: Overheads		7,30,000
Prime cost at 15,000 units		10,70,000
Prime cost of 3750 units	$10,70,000 \times 3,750 / 15,000$	2,67,500
Therefore Prime Cost = 2,67,500		

Problem

The Management of M/s. Rama Ltd has prepared the following estimates of working results for the year ending 31st December,2001, for the purpose of preparing the budget for the year ending 31st December 2002:

		Rupees
Direct materials	Per unit	8.00
Direct wages	Per unit	20.00
Variable overheads	Per unit	6.00
Selling price	Per unit	62.50
Fixed overheads	Per annum	Rs.3,37,500
Sales	Per annum	Rs.12,50,000

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It is expected that during the year 2002, the material prices and variable overheads will go up by 10% and 5% respectively. As a result of reorganization of production methods, the overall direct labour efficiency will increase by 12% but the wage rate will go up by 5%. The fixed overheads are expected to increase by Rs.62,500/-

The Marketing manager states that market will not absorb any increase in the selling price. However, he is of the view that if advertisement expenditure is increased, the sales quantity will increase as under :

Advertisement Expenses	40,000	97,000	1,60,000	2,30,000
Additional Units of sales	2,000	4,000	6,000	8,000

You are required to :

Present an income statement for the year 2001.

Evaluate the four alternative proposals put forth by the marketing manager, determine the best output and sales level to be budgeted and prepare an overall income statement for 2002 at that level of output and sales.

Solution

a) Net profit

Sales (20,000*62.5)	12,50,000
(-) Variable Cost (20,000*34)	(6,80,000)
Contribution	5,70,000
Less: Fixed Cost	(3,37,500)
Net Profit	2,32,500

b) (i) Budgeted contribution per unit (200L)

Selling price	625
Variable Cost :	
Direct Material $8 + 0.8$ = 8.8	
Variable Overheads $6 + 0.3$ = 6.3	
Direct labour $920 \times 1.05 \times 1/1.12$ = <u>18.75</u>	(33.85)
Contribution revised	28.65

In the above labour cost calculation it is presumed that the labour efficiency improvement implies that the same time as taken before would give us 125 more output.

Alternatively, we could have presumed that the efficiency improvement implies that the same units as produced before would take 10% less time. In that case the revised labour cost per unit would be = (18.48) $[20 \times 1.05 \times 0.88]$

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ii) Evaluation of Marketing Managerial proposals .

	Increase in sales Qty			
	2,000	4,000	6,000	8,000
Additional Contribution at 28.65 P.U	57,300	1,14,600	1,71,900	2,29,200
(-)Additional Fixed cost	(40,000)	(97,000)	(1,66,000)	(2,30,000)
Additional net gain	17,300	17,600	11,900	(800)

iii) The Company is advised to increase the sales by 4,000 units.

Budgeted profit statements at 24,000BLA.		
Sales (24,000*62.5)		15,00,000
(-) variable cost (24,000*33.85)		8,12,400
Contribution		6,87,600
(-) Fixed Cost		
1. Original	3,37,500	
2. Increase	62,500	
3. Advt. Expense	97,000	4,97,000
Net profit		1,90,600

Problem

Following is the data taken from records of a concern manufacturing a special part ZED

	Rupees
Selling price per unit	20
Direct Material cost per unit	5
Direct labour cost per unit	3
Variable overhead cost per unit	2
Budgeted level of output and sales	80,000 (Units)
Budgeted recovery rate of fixed overheads cost per unit	5

You are required to :

- Draw a break even chart showing the break even point
- In the same chart show the impact of break even point
 - if selling price per unit is increased by 30% and
 - if selling price per unit is decreased by 10%

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Note : Assume a scale of 1" = 20,000 units of "X" axis and 1" Rs.4,00,000 for "Y" axis.
Working should form part of the answer.

Solution

1. Statement showing the BEP's under various alternatives.

	(a)	(b)	(c)
SP	20	26	18
(-) VC	10	10	10
Contribution P.U	10	16	8
Fixed Cost (80,000*5)	4,00,000	4,00,000	4,0,000
BEP	40,000	25,000	50,000

Problem

Soft Drink Ltd., bottles and distributes 'Amrit' brand cold drinks. It operates its distribution division as a cost center budgeted cost for the year ending 31st March, 2001 is as follows:

	Rs.
Cash operating costs	21,00,000
Depreciation on fleet of vehicles (8*52,500)	4,20,000
Apportioned Corporate Costs	3,00,000
Total	28,20,000

Distribution division has started operation on 1st April, 1999. Each vehicle of the fleet was acquired at a cost of Rs.2, 40, 000 and had on estimated economic life of four years. Salvage value each vehicle at the end of four years (March 31, 2003) was estimated at Rs.30,000.

Countrywide Distributors Ltd. Which has countrywide network for the distribution of food and beverages has offered Soft Drinks Ltd. A three year distribution contract for Rs.19,50,000 each year. The contract will start on 1st April, 2000.

If Soft Drink Ltd. accepts the offer, it will close down its own distribution division, and will sell the delivery vehicles. Current (April 1, 2000) disposal price of each vehicle is estimated at Rs.75, 000. Soft Drinks Ltd. will avoid cash operating cost of Rs.21,00,000.

Security analysts have recommended the purchase of share of Soft Drinks Ltd. Security analysts are forecasting a net profit of Rs.6,60,000 for 2000-2001 as against an estimated profit of

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Rs.6,30,000 for 1999-2000. The forecast assumes that the company will continue operation of its distribution division.

Required:

(a) Tabulate a comparison of all relevant cost for next three years (2000-2001 to 2002-2003) for the two alternatives, use of own distribution division or use of countrywide distributors. Recommend whether Soft Drink Ltd. Should Accept the offer of Countrywide Distributors.

(b) why might Soft Drinks Ltd. Be reluctant to accept the offer of countrywide distributors ? (Ignore Income tax and time value of money. Wherever appropriate, suitable assumptions to be made by you.)

Solution:

a) Relevant Cost under the two alternatives

Years	2000-01	2001-02	2002-03	Total
A) Continue the distribution division	21	21	21	63
Sales value of vehicle	--	---	(2.4)	(2.4)
	21	21	18.6	60.6
B) If we discontinue the operation	19.5	19.5	19.5	58.5
(-) Sales value of vehicles	(6.0)	--	---	(6.0)
Total	13.5	19.5	19.5	52.5
Net Gain over the option B (A-B)				

b) (i) The management may honestly believe that it can perform the distribution work efficiently.
(ii) Any organizational problem with the distributor would adversely affect the distribution of our product.
(iii) The management may feel that the distributors, who may be in charge of competitors product as were may not give the type of treatment that our product deserves.
(iv) The distributors may introduce their own product of similar type, may be through a wholly owned subsidiary and it may be offered to our customers by using our goodwill.
(v) As shown below, this decision though giving real additional profit of Rs.8,10,000 over next 3 years, will have very adverse affect on book profit, which will see very up and down and this will cause very heavy fluctuations in the prices of company's shares. This may not be acceptable to the management especially to a relatively new company. 1st years expected profit would be down by 50% whereas 2nd and 3rd years profit would increase by Rs.5,70,000 each.

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Statement showing the effect on net profit of closing down the distribution departments.

	2000-01	2001-02	2002-03	Total
Cash cost (21-19.5)	1,50,000	1,50,000	1,50,000	4,50,000
Depreciation	4,20,000	4,20,000	4,20,000	12,60,000
<u>Loss :</u>				
SV 7,50,000				
(-) WDV <u>1,87,500</u>				
Loss <u>1,12,500/8</u>				
	(9,00,000)			(9,00,000)
	(3,30,000)	5,70,000	5,70,000	8,10,000

Problem

Agrocaps Ltd., engaged in manufacturing agricultural machinery is preparing its annual budget for the coming year. The company has a metal pressing capacity of 20,000 hours, which will be insufficient for manufacture of all requirements of components A,B,C and D.

The company has the following choices:

- (i) Buy the components entirely from outside suppliers.
- (ii) Buy from outside suppliers and/or use a partial second sift.

The data for the current year are given below:

Standard production cost per unit

Component	A	B	C	D
	Rs.	Rs.	Rs.	Rs.
<u>Variable Cost:</u>				
Direct materials	37	27	25	74
Direct wages	10	8	22	10
Direct expenses	10	20	10	60
Fixed overhead	5	4	11	5
Total production cost	62	59	68	149
Requirements in units	2,000	3,500	1,500	2,800

Direct expenses relate to the use of the metal presses which cost Rs.10 per hour, to operate. Fixed overheads are absorbed as a percentage of direct wages. Supply of all or any part of the total requirement can be obtained at flowing prices, each delivered to the factory:

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Component	Rs.
A	60
B	59
C	52
D	168

Second shift operations would increase direct wages by 25 per cent over the normal shift and fixed overhead by Rs.500 for each 1,000 (or part thereof) second shift hours worked. You are required to present, with calculations:

- (a) Which component, and in what quantities should be manufactured in the 20,000 hours or press time available?
(b) Whether it would be profitable to make any of the balance of components required on a second shift basis instead of buying them outside suppliers.

Solution:

- a) (i) Calculation of Machine Hours required per unit.

	A	B	C	D
Direct expense	10	20	10	60
/ Rs.10 per hour	10	10	10	10
No. of Machine hrs p.u of Mfg.	1	2	1	6

- (ii) Statement showing the extra cost per machine hour for buying various components and the priority order for manufacturing the components.

	A	B	C	D
Purchase price	60	59	52	168
Variable Mfg. cost	57	55	57	144
Extra cost (savings P.U)	3	4	(5)	24
No. of Machine Hours P.U	1	2	--	6
Extra cost per machine hour if bought	3	2	--	4
Priority order for Mfg.	2	3		1

[In respect of component 'C', the buying results in cost savings and therefore component 'C' should be purchased.]

- iii) Quantities of various components to be manufactured.

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Requirement v/s Availability

Availability		(18,000)
Req.		
D 2,800 * 6	16,800	
A 2,000 * 1	2,000	
B 3,500 * 2	7,000	25,800
Deficit		5,800 hrs

‘C’ is not taken in to consideration as it is not in priority order.

iv) Quantities to be manufactured ‘2,800 units of D’ ‘2,000 units of A’ and ‘(600 units of B’) (1200/2) should be manufactured. The entire requirement of component ‘C’ and 2,900 units of ‘B’ should be purchased from the market.

Total extra if we:	
i) Buy B 2,900*4	11,600
ii) Mfg. in second shift	
Labour cost (8*25%)*2,900	5,800
Fixed cost for 5,000 machine Hours (5,000*500/1,000)	2,500
For ‘800’ hours	500
	<u>8,800</u>

Therefore, if we use 2nd shift we share (8,800 – 11,600) = 2,800 Rs. Hence, profitable to manufacture in 2nd shift.

Problem

A company has been making a machine to order for a customer, but the customer has since gone into liquidation and there is no prospect that money will be obtained from the winding up of the company.

Costs incurred to-date in manufacturing the machine are Rs.50,000 and progress payments of Rs.15,000 have received from the customer prior to the liquidation. The sales department has found another company willing to buy the machine for Rs.34,000 once it has been completed.

To complete the work, the following costs would be incurred:

(a) Materials: These have been bought at a cost of Rs.6,000. They have no other use and if the machine is not finished, they would be sold as scrap for Rs.2,000

(b) Further labour costs would be Rs.8,000. Labour is in short supply, and if the machine is not finished, the work force would be switched to another job which would earn Rs.30,000 in revenue and incur direct costs, not including direct labour, of Rs.12,000 and absorb fixed overheads of Rs.8,000.

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(c) Consultancy fees Rs.4,000. If the work id not completed, the consultants contract would be cancelled at a cost of Rs.1,500.

(d) General overheads of Rs.8,000 would be added to the cost of the additional work. Should the new customer's offer be accepted? Prepare a statement showing the economics of the proposition.

Solution:

Evaluation of the proposals

If the offer is accepted then;

Relevant revenue

1)

Sales value	34,000
<u>Less: Relevant Cost</u>	
1) Material Cost resale value	(2,000)
2) Labour Cost (1)	(18,000)
3) Consultancy Charges	(2,500)
4) General Overheads (2)	(Nil)
Net relevant gain	11,500

Recommendation: The Proposal is acceptable.

Notes: 1 Direct Labour Cost

Direct Labour Cost to be incurred		Nil
Contribution to be lost from job		
Sales	30,000	
<u>Less: Relevant Cost</u>		
Direct labour (nil)		
Other direct WS (12,000)	12,000	18,000
Total		18,000

Alternate presumption

Note: 2. It is presumed that the general overheads as against specific would be incurred anyway and hence it is taken as irrelevant cost.

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Problem

S.M.Ltd is engaged in the manufacture of plastic bottles of standard size. The factory has eight machines of identical size, each capable of producing 50 bottles per hour. The variable costs per bottle is Re.0.40 and the selling price is Re.1.00 each.

The Company has received an offer from another firm for manufacture of 50,000 units of a plastic moulded toy. The price per toy is Rs.6.00 and the variable cost is Rs.4.80 each. In case the company takes up the job, it has to meet the expenses of making a special mould required for the manufacture of the toy. The cost of the mould is Rs.20,000. The company's time study analysis shows that the machines can produce only 20 toys per hour. The company has a total capacity of 10,000 hours during the period in which the toy is required to be manufactured. The fixed costs excluding the cost of construction of the mould during the period will be Rs.2,00,000. The company has an order for the supply of 3,75,000 bottles during the period.

Required:

1. Do you advise the company to take up the order for manufacturing plastic moulded toys during the time it has an order in its books for the supply of 3,75,000 bottles?
2. If the order for the supply of bottles increases to 5,00,000 bottles will you advise the company to accept the order for the supply of the plastic moulded toys?
3. An associate company of S.M.Ltd has idle capacity and is willing to take up the whole or part of the manufacturing of the plastic moulded toys on subcontracting basis. The sub-contract price inclusive of the cost of construction of mould is Rs.5.60 per toy. Determine the minimum expected excess machine hour capacity needed to justify producing any portion of the toy order by the company itself rather subcontracting.
4. The company expected that it would be left with an excess capacity of 1600 machine hours during the period. Consequently, it accepted the toy order and subcontracted the balance requirements of the toys to meet the order. Later the demand for bottles increased to 4,50,000 units for the period. Since the company had accepted the toy order to fill 1600 machines hours, it could meet the demand for bottles only to the extent of 8400 machine hours. Work out the loss which the company suffered in not being able to predict the demand for the bottles accurately.

Solution:

1) Evaluation of proposal

Contribution 50,000 (6 – 4.8)		60,000
<u>Less: Relevant Cost</u>		
Money to be spent		
Fixed Cost	20,000	
Contribution to be Cost (1)	Nil	(20,000)
Net Gain		40,000

Proposal is acceptable.

Note: 1 As shown below, there is adequate idle machine capacity for taking up the production of 50,000 toys which means there would be no loss of contribution as a result of acceptance of this proposal.

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No. of Machine hours available	10,000
(-) No. of Machine hours required for bottles (3,75,000/50)	(75,000)
Idle Capacity	2,500 hrs
No. of Machine hours required for toys (50,000/20)	(2,500)hrs
Total	Nil

2) Evaluation of Proposal Relevant revenue

Contribution 50,000 (6 – 4.8)	60,000
<u>Less: Relevant Cost</u>	
Money to be spent	
Fixed Cost 20,000	
Contribution to be Cost (1) 75,000	(95,000)
Net Relevant Loss	(35,000)

The offer is not acceptable.

Note: (1) The additional demand for 1,25,000 bottles would require additional 2,500 machine hours which at present the idle capacity. If the toy offer is accepted , then the contribution we would have earned from the sale of 1,25,000 bottles.

(1,25,000 (1 – 0.4) = 75,000] would be lost

3) If, instead of buying the toys we manufacture them then additional

Fixed cost 2, 00,000 /

Reduction in variable P.U (5.6 – 4.8) 0.8

Minimum quantity to be produced i.e Cost BEP 25,000 toys

Minimum idle machine hours required = 25,000/20 = 1,250 hours.

4) Statement showing the profit lost as a result of demand estimation error

A) Relevant net profit that would have been earned had the error had not been made.

Bottles (1) (4,20,000 * 0.6)	2,70,000
Toys (1) (50,000 * 0.4)	<u>20,000</u>
Total	2,90,000

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B) Net Profit actually earned given that the error was made.

Bottles (1) (4,20,000 * 0.6)	2,70,000
Toys Mfg [32,000*(6-4.8)] – 20,000	18,400
Bottles bought (18,000*0.4)	7,200
	2,77,600

$$(A-B) = 2,90,000 - 2,77,600$$

Net profit = 12,400 Lost

OR

Bottles (1)	(4,20,000 * 0.6)	(18,000)
Toys	32,000	
Cost BEP	(25,000)	
	7,000	
Cost savings p.u (5.6 – 4.8)	0.8	5,600
Net profit lost		12,400

Note:1 If the demand had been rightly estimated at 4,50,000 bottles, then the company would have reserved 9,000 machine hours, bottles being more profitable than toys. As a result the company would have thought of having been left with 1,000 idle machine hours. This being less than 1,250 machine hours, which is minimum idle capacity required to produce toy in our factory, the company would not have produced all 50,000 toys from the associate company.

Problem

As a part of its rural upliftment programme, the government has put under cultivation a farm of 96 hectares to grow tomatoes of four varieties: Royal Red, Golden Yellow, Juicy Crimson, and Sunny Scarlet. Of the total, 68 hectares are suitable for all four varieties but the remaining 28 hectares are suitable for growing only Golden yellow and Juicy Crimson. Labour is available for all kinds of farm and is no constraint.

The market requirement is that all four varieties of tomatoes must be produced with a minimum of 1,000 boxes of any one variety.

The farmers engaged have decided that the area devoted to any crop should be in terms of complete hectares and not in fractions of a hectare. The other limitation is that not more than 20,000 boxes of any one variety should be produced. The following data are relevant.

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	Varieties			
	Royal Red	Golden Yellow	Juicy Crimson	Sunny Scarlet
Annual Yield:				
Boxes per hectare	350	100	70	180
Costs	Rs.	Rs.	Rs.	Rs.
Direct materials Per hectare	476	216	196	312
Labour:				
Growing per hectare	896	608	371	528
Harvesting and packing				
Per box	3.60	3.28	4.40	5.20
Transport per box	5.20	5.20	4.00	9.60
Market price per box	15.38	15.87	18.38	22.27

<u>Fixed overheads per annum:</u>	
Growing	11,200
Harvesting	7,400
Transport	7,200
General Administration	10,200

Required:

- i) Within the given constraints, the area to be cultivated with each variety of tomatoes if the largest total profit has to be earned.
- ii) The amount of such profit in rupees
- iii) A nationalized bank has come forward to help in the improvement program of the 28 hectares in which only Golden Yellow and Juicy Crimson will grow, with a loan of Rs.5,000 at a very normal interest of 6% per annum. When this improvement is carried out, there will be a saving of Rs.1.25 per box in the harvesting cost of Golden Yellow and the 28 hectares will become suitable for growing Royal Red in addition to the existing Golden Yellow and Juicy Crimson varieties. Assuming that other constraints continue, find the maximum total profit that would be achieved when the improvement programme is carried out.

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Solution:

I (a) Calculation of contribution per hectare and the priority order for allocation of land.

	Royal Red	Golden Yellow	Juicy Crimson	Sunny Scarlet
Sales per hectare	5,383	1,587	1,286.60	4,008.6
<u>Less: variable cost</u>				
Direct material	476	216	196	312
<u>Direct labour</u>				
Growing	896	608	371	528
Harvesting	1,260	328	308	936
Transport	1,820	520	280	1,728
Contribution	931	(85)	131.60	504.60
Priority	28 hectare	--	(1)	--
	68 hectare (1)	--	(3)	2

b) Allocation of 28 hectare

Gy offers negative contribution and hence the allocation would be minimum possible

a) 100 boxes per hectare to G.Y. Balance 18 hectares, if allocated to Juicy Crimson would give us the total output of 1,260 boxes (18*70). This is more than minimum but less than maximum which means that the allocation is feasible.

To conclude, 10 hectares should be allocated to GY and balance 18 to Juicy Crimson.

c) Allocation of 68 hectares – RR & SS enjoy priority over JC and the minimum requirements of these 2 items is first to be met. Between the 2, SS offers lower contribution, therefore, the allocation would be minimum. a) 180 boxes per hectare, we need to make allocation of 6 hectares loss fractional allocation being not allowed. Balance 62 hectares, if allocated to RR could give us the total output of 21,700 boxes. This is more than 20,000 and hence, not allowed for 20,000 boxes. The land area required is 57.142857 (20,000/350).

This means that the allocation can be 57 or 58. if 57 then the additional hectare will go to SS and the contribution from that is Rs.504.60. If 58 then the additional boxes of RR would be 50 boxes [20,000 –(57*350)] balance land area of 0.857143 remaining idle. This will give us the additional contribution of Rs. (931*50/350)

Since, the contribution from SS is more than that from RR in respect of this additional hectare, we propose to allocate only 1 hectare to RR and balance 5 to SS. With this the allocation to SS would be 11 hectares (6+5) and the total output would be 1980 boxes which is well within lower and upper limits. To conclude 57 hectares should be allocated to RR and 11 to SS.

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II) Calculation of NP

Item	Land	Allocated out of	Total	Ctr per hectare	Total contribution
RR	--	57	57	931	53,067
GY	10	---	10	1,857	(850)
JC	18	---	18	131.63	2,368.8
SS	--	11	11	504.60	555.006
		28	68	Total contribution	60,136.4
(-) Fixed Cost					(50,000)
Net profit					2,41,136.40

III) Calculation of Net Profit

Item	Land	Allocated out of	Total	Ctr per hectare	Total contribution
	28	68			
RR	3	54	57	931	53,067
GY	10	---	10	40	400
JC	15	---	15	131.60	1,974
SS	--	14	14	504.60	7,064.40
				Total contribution	62,505.40
				(-) Fixed Cost	(36,300)
				Net profit	26,205.40

Notes: (1) With reduction in the variable cost of GY of Rs.125 per hectare, the revised contribution would be Rs.40. it still remains the least profitable product and the land allocation would continue to remain minimum.

(2) It is presumed that the land improvement cost of Rs.5,000 is a one time cost which would increase the worth of land permanently by at least Rs.5,000. Accordingly, no part of that cost is proposed to be written off.

(3) With land improvement RR can also be grown on land of 28 hectares for this allocation to JC has to be reduced and allocation of SS increased to 14.

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(4) The Word 'anyone' occurring in the minimum quantity- constraint has been taken to mean 'each'. This is wrong because, it goes against a clearly stated factory and we have done it so as to have same solution as given in suggested.

Problem

A company manufactures two products 'AB' and 'CD' by utilizing 25% and 40% of its total capacity respectively. The cost data per unit for 2001-2002 are as under:

	'AB'	'CD'
Production & Sales (units)	5,000	10,000
	Rs.	Rs.
Selling price	80	100
Direct material	10	30
Direct labour (Rs.5 per hour)	25	20

Variable overheads are 100% on wages. Fixed overheads for 2001-2002 amounted to Rs.2,25,000.

During 2002-2003, the company expects that the direct material costs will rise by 5% the labour hour rate will rise by 25 paise and variable overheads will continue to maintain same relationship with wages as was in 2001-2002.

For the same volume of output as was in 2001-2002, the selling price is to be enhanced by 5% in case of 'AB' and 4% in case of 'CD'

The company has the following proposals for consideration of the management for 2002-2003 to improve profitability:

(a) Utilise the balance capacity to produce 'AB' and to sell this increased production at the existing selling price of Rs.80

(b) Utilise the balance capacity to produce 'CD'. While doing so the efficiency will however go down by 16% on account of newly recruited labour in respect of this increased production. Fixed selling and distribution expenses of Rs.50,000 will have to be spent to sell this additional output. The present allocation of 25% and 40% capacities for 'AB' and 'CD' cannot be changed and only the spare capacity is required to be used for production under the aforesaid proposals.

Required:

(i) Present a statement of profit for 2001-2002

(ii) Using incremental revenue and differential cost approach, find out which proposal is more profitable for 2002-2003

(iii) Present a statement of profit for 2002-2003 based on above recommendation

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Solution:

(i) Statement of NP 01-02

	AB	CD	Total
SP	80	100	
<u>Variable Cost</u>			
Direct material	(10)	(30)	
Direct labour	(25)	(20)	
Variable overheads	(25)	(20)	
Contribution	20	30	
Sales Quantity	5,000	10,000	
Total Cost	1,00,000	3,00,000	4,00,000
(-) Fixed Cost			(2,25,000)
Net profit			1,75,000

(ii) a) Calculation of idle Capacity

Present utilization (i.e- 65% units)	
AB (5,000 units *5hrs)	25,000
CD (10,000 units * 4 hrs)	40,000
Total	65,000
Idle capacity (i.e -35%) = 65,000*35/65	35,000 hrs

b) Time Required per unit of CD.

At present 1 unit = 4 hrs

Hence forth 0.84 unit = 4 hrs

Therefore, 1 unit = $4/0.84 = 4.7619047619$ hrs

It is presumed as a result of fall in efficiency the same time

as taken before would give us 16% less output. Alternatively, the same unit as produced before would take 16% more time (i.e. 4.64 hrs per unit)

(c) Calculation of output quantity of each product

AB : 35,000/5 hours per unit	7,000
CD : 35,000/4.761904	7,350
EF : 35,000/7	5,000

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d) Calculation Of contribution of each product.

	AB	CD	EF
SP	80	100	145
VC:DM	(10.50)	(31.50)	(40)
DL	(26.25)	(25)	(36.75)
Variable overheads	(26.25)	(25)	(36.75)
Contribution of each product	17	18.50	31.50

As per suggested sale price of CD for extra product is taken as Rs.104/- which is wrong (all. To JK) going by facts given in the question.

e)

Incremental revenue contribution	AB	CD	EF
Sales Quantity	7,000	7,350	5,000
Contribution per unit	17	18.50	31.50
Differential cost Fixed Cost	---	50,000	30,000
Net Additional Gain	1,19,000	85,975,	1,27,500

The company is advised to introduce new product 'EF' for utilizing the present idle capacity.

(iii) (a) Calculation of contribution per unit of AB & CD fro same output as in 2001-02.

	AB	CD
Selling Price	84	104
Direct Material	(10.5)	(31.50)
Direct Labour	(26.25)	(21)
Variable Overheads	(25)	(21)
Contribution per unit	21	30.50

b) Budgeted profitability statement for 2002-03.

	AB	CD	EF	Total
Sales Quantity	5,000	10,000	5,000	
Contribution per unit	21	30.50	31.50	
Total contribution	1,05,000	3,05,000	1,57,500	5,67,500

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Less: Fixed Cost	(2,25,000+30,000)	(2,55,000)
Net profit		3,12,500

Problem

The Management team of Exe Limited is considering the possibility of undertaking a single production process which jointly produces four products in standard proportion. The output from each 10kg. batch of raw material input into the process together with the net realizable value per kg. of output immediately after the split off point is:

Material	Output per 10 kg. input	Net realizable value per kg. of output (Rs)
A	4	8
B	3	4
C	2	10
D	1	2

The costs of processing each 10 kg. in out batch are Rs.12 and the cost of the raw material input is Rs.4 per kg.

For each of the four materials jointly produced, there is a possibility of further processing before sale. The further processing will entail both manual operation and mechanical processing as well as incurring some costs directly attributable to each product. Details of the resources used in and costs incurred by, the further processing as well as the final price per kg. are:

Material	Machine Hours	Labour Hours	Other direct Cost (Rupees)	Sale Price (Rupees)
A	2	1	4	17
B	6	1	2	13
C	4	5	3	36
D	2	2	2	9

“Other direct cost” are variable cost but exclude the cost of labour, also a variable cost, at Rs.3/- per labour hour. Apart from ‘Other direct costs’ and labour costs, all other costs of this further processing are fixed and are expected to amount to Rs.3,40,000 per annum.

Exe Limited has the opportunity to process 1,00,000 kgs. of the basic raw material per year and machine capacity is capable of fully processing this amount.

The managing director feels that all products which are subjected to further processing must be treated as joint products and all products sold immediately after the split off point without further processing are to be treated as by-products of the original process. The net costs of the joint process are allocated to the joint products in proportion to the contribution of each product line, after considering the marginal costs after the split off point and the sales revenues.

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However, the Managing Director is uncertain whether the Rs.3,40,000/- fixed production costs of the further processing should be allocated to products in accordance with machine or labour hours.

REQUIRED:

(a) specify which of the jointly produced materials should be subject to further processing if the joint process is carried out.

(b) Produce a product profitability report for the joint products utilizing the managing Director's approach to the determination of joint and by-products, for each of the methods of allocating fixed production overhead she has mentioned. You may assume all production will be sold.

Solution:

(a) Statement showing the depth of processing of various products.

	A	B	C	D	Total
Final SP per Kg	17	13	36	9	
Selling price at split off point	(8)	(4)	(10)	(2)	
Additional selling price	9	9	26	7	
(-) Additional cost per kg					
Direct labour @ 3	3	(3)	(15)	(6)	
Other direct cost	(4)	(2)	(3)	(2)	
Additional contribution per kg.	2	4	8	(1)	-----
Sales Quantity	40,000	30,000	20,000	----	-----
Total Additional Contribution	80,000	1,20,000	1,60,000	----	3,60,000
Less: Additional specific fixed cost					(3,40,000)
Additional net profit					20,000

Products A, B, C should be processed further, whereas D should be sold at separation point.

Note 1

As per suggested, the recommendations is based on these figures of additional contribution per kg. And the additional specific Fixed Cost has been completely ignored through incidentally, the recommendations happens to be right.

The Fixed Cost cannot be ignored because it is given to be specifically relating to the further proceeding and all those products which offer positive contribution per kg. would be processed further if and only if the total additional contribution exceeds the specific fixed cost.

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b) i) Calculation of net joint cost

Notes 1

Material cost : $(1,00,000 \times 4)$	4,00,000
Processing Cost $(1,00,000 \times 1.2)$	1,20,000
Gross IT cost	5,20,000
(-) SV of (D)' at operation point $(10,000 \times 2)$	(20,000)
Net joint cost	5,00,000

(ii) Apportionment of joint cost

Prod's	SP	V.Cost	CTR	Output	Total	Apportionment of joint cost
A	17	7	10	40,000	4,00,000	2,00,000
B	13	5	8	30,000	2,40,000	1,20,000
C	36	18	18	20,000	3,60,000	1,80,000
10,00,000						

(iii) Apportionment of fixed overheads based on machine hours.

Budgeted fixed overheads	3,40,000
Budgeted machine hours	
A $(40,000 \times 2) = 80,000$	
B $(30,000 \times 6) = 1,80,000$	
C $(20,000 \times 4) = 80,000$	3,40,000
Absolute Rate per Machine hour	Rs. 1.00
Apportionment	
A = $80,000 \times 1 = 80,000$	
B = $1,80,000 \times 1 = 1,80,000$	
C = $80,000 \times 1 = 80,000$	

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(iv) Apportionment of Fixed overheads on labour hours.

Budgeted fixed overheads	3,40,000
Budgeted machine hours	
A (40,000*1) = 40,000	
B (30,000*1) = 30,000	
C (20,000*5) = 1,00,000	1,70,000
Absolute Rate per Machine hour	Rs.2.00
<u>Apportionment</u>	
A = 40,000*2 = 80,000	
B = 30,000*2 = 60,000	
C = 1,00,000*2 = 2,00,000	3,40,000

2) Product profitability statements

(A) When fixed overheads are apportioned on machine hour basis.

	A	B	C	Total
Sales	6,80,000	3,90,000	7,20,000	
<u>Less : Cost</u>				
Joint cost (1)	(2,00,000)	(1,20,000)	(1,80,000)	
<u>Post Sepn.</u>				
Direct labour	(1,20,000)	(90,000)	(60,000)	
Direct Cost	(1,60,000)	(60,000)	(3,00,000)	
Fixed Cost	(80,000)	(1,80,000)	(80,000)	
Net profit (loss)	1,20,000	(60,000)	1,00,000	1,60,000

B) When Fixed overheads are based on labour fixed overheads method.

	A	B	C	Total
Sales	6,80,000	3,90,000	7,20,000	
<u>Less : Cost</u>				
Joint cost (1)	(2,00,000)	(1,20,000)	(1,80,000)	

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<u>Post Sepn.</u>				
Direct labour	(1,20,000)	(90,000)	(60,000)	
Direct Cost	(1,60,000)	(60,000)	(3,00,000)	
Fixed Cost	(80,000)	(60,000)	(2,00,000)	
Net profit (loss)	1,20,000	60,000	(20,000)	1,60,000

Problem

A company a raw material into five products. In Process 1, products AXE and BXE are produced in 1:1 ratio. Product AXE than passes on to Process 2 where it is processed into CXE and DXE. Product BXE is used in process 3 to produce the product EXE.

Product AXE yields products CXE and DXE in ratio of 7:3. CXE is processed further in Process 4 after which it is sold for Rs.18 per unit. DXE may be sold immediately at Rs.14.40 per unit or it may be processed further in process 5 after which it can be sold for Rs.20.80 per unit.

Exe is processed in process 6 where normal spoilage of 5% occurs. The spoiled units are disposed of at a price of Rs.2 per unit. EXE sells at Rs.15.20 per unit.

The costs incurred during a period are as under:

Process	Output Units	Costs Rs.
1	1,00,000	5,41,000
2	50,000	1,50,000
3	50,000	1,08,000
4	35,000	1,30,000
5	15,000	1,00,000
6	47,500	97,000

The output of Process 6 represents good units. The process costs are variable costs

(i) Prepare a statement showing the apportionment of joint costs to products AXE and BXE and products CXE and DXE

(ii) State with supporting calculations whether the product DXE should be processed in process 5 or not

(iii) Prepare a statement of profit for the period based on your decision at (ii) above

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Solution:

(A) Selection of method for apportionment of joint cost

The output method is highly irrational and hence we decide not to follow it. Sales value method, using the real sales price at separation point or the net relative sales value as the case may be is the most reasonable and logical method and we decide to follow sales method.

B) Apportioned of joint cost to A & B products	
<u>(i) NRV of A :</u>	
Final sales value of C (35,000*18)	6,30,000
Less: P4 cost	(1,30,000)
NRV of C	5,00,000
S.V of D (15,000*14.4)	2,16,000
Final S.V of A	7,16,000
Less: P2 cost	(1,50,000)
NRV of A	5,66,000

<u>(ii) NRV of B</u>	
Final SV of E (47,500*15.2)	
Scrap quantity value (2,500*2)	
Total	7,27,000
Less: P3 & P6 cost	(2,05,000)
NPV of B	5,22,000

<u>(iii) Apportioned of Joint cost</u>	
A = $[5,41,500 * 566 / (566 + 522)]$	2,81,700
B = $[5,41,500 * 522 / (566 + 522)]$	2,59,800

<u>(iii) Apportioned of Joint cost to C & D</u>	
(i) Calculation of Total Joint Cost	
P1 cost apportioned to A	2,81,700
P2 cost	1,50,000
Total	4,31,699

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(ii) Apportioned of Joint cost	
C = $[4,31,699 \times 500 / 500 + 216]$	3,01,466
D = $[4,31,699 \times 216 / 500 + 216]$	1,30,233

(II) Depth of Processing D.	
If processing 15,000 (20.8-1.44)	96,000
Less: Additional cost	<u>1,00,000</u>
Relevant cost	(4,000)

Product 'D' should not processed further

(III) NP		
Sales C	$35,000 \times 18$	
Sales D	$5,000 \times 14.4$	
Sales E	$17,500 \times 15.2$	
Scrap	$2,500 \times 2$	
Total		15,73,000
<u>Less: Cost incurred</u>		
P1	5,41,500	
P2	1,50,000	
P3	1,08,000	
P4	1,30,000	
P6	97,000	10,26,500
		5,46,500

In Suggested both these aspects have been ignored.

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Problem

X Corporation is working at full production capacity, producing 10,000 units of a product, Rose 60. Standard cost per unit for Rose 60 are:

Direct Material	Rs.2
Direct Labour	Rs.3
Factory overhead	Rs.5
Total	Rs.10

The non-manufacturing costs, all variable are Rs.4/- per unit and the sales price is Rs.20 per unit. A customer, Rosewell Corporation, has asked X Corporation to produce 2,000 units of a modification of Rose 60 to be called Orange 60. Orange 60. would require the same manufacturing processes as Rose 60. Rosewell corporation has offered to share equally the non-manufacturing costs with X Corporation.

It is expected that Orange 60 will have a sales price of Rs.15/- per unit. Fixed factory overheads are Rs.30,000/- per annum.

Required:

(1) What is the relevant cost to X Corporation of producing and selling 2,000 units of Orange 60? It is known that overtime working is not possible and that installation of new capacity, if it is desirable to do so, will cost Rs.28,000/- with economic life of two years.

(2) The brazen Corporation has offered to produce 2,000 units of Rose 60 for X Corporation. Should X Corporation accept the Brazen offer if unit price offered is Rs.14/-? What, if brazen offers Orange 60 at Rs.14/- per unit?

(3) Suppose X had been working at less than full capacity producing 3000 units of Rose 60 at the time, the offer was made and that balance capacity, being idle had been hired out to Pepsi Cola Limited at Rs.10,000 per annum.

What is the minimum price X should accept for Orange 60 under these conditions? (Ignore Rs.15/- price above)

Solution:

A) If we reduce the production of rose 60 by 2000 units and use this capacity for orange 60.

<u>Variable cost to be incurred.</u>		
Direct Material	2	
Direct labour	3	
Variable factory overheads		
[S-30,000/10,000]	2	
Variable non-transfer overheads (9*2,000)	(9*2,000)	18,000
2) Contribution to be lost	[20 – (2+3+2+4)]*2,000	18,000
		36,000

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B) If fresh capacity is installed to produce orange 60.	(2,000*9)	18,000
S. capacity cost		
Gross cost	28,000	
Less: contribution to be earned (1)	14,000	14,000
		32,000

,In the event of offer being found acceptable, the best option would be to produce 2000 units would be by installing fresh capacity and the relevant cost there of would be Rs.32,000.

Note: It is presumed that this customer would keep us busy for one year and further in the 2nd year this capacity would be so fruitfully used that the contribution to be earned would be equal to 2nd year's burden of proportionate capital cost. i.e Rs.14,000.

2) (a) <u>Rose 60 at 14 p.u</u>		
<u>Relevant Revenue</u>		
Sales of orange 60 (2,000*Rs15)		<u>30,000</u>
Less; Relevant cost		
Money to be spent (2,000*9)	18,000	
Contribution to be lost from R-60		
2,000(14-7)	14,000	(32,000)
Relevant Loss		2,000

Offer is not acceptable.

(b) <u>Orange 60 at 14 Rs.</u>		
<u>Relevant Revenue:</u>		
Sales of orange 60	(2,000*Rs15)	<u>30,000</u>
Less: Relevant cost		
Money to be spent	(2,000*14)	(28,000)
(2,000*2) Non- Mfg. cost		<u>(4,000)</u>
(2,000*2) Relevant loss		2,000

Offer is not acceptable.

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3) Calculation of minimum selling price

Variable cost to be incurred.	18,000
Rent to be lost	10,000
Minimum sales value required (Min. Sell.price =14)	28,000

Problem

Elec. Ltd is engaged in the manufacture of four products in its factory. The production and sales volume is much lower than the normal volume and so there is a substantial unfavorable variances in the recovery of overheads. The sales and cost data for a year are as under:

Products (Rs. In lacs)					
	A	B	C	D	Total
Sales	400	500	200	100	1,200
Direct Materials	64	70	32	07	173
Direct Wages	88	105	60	18	271
Factory overheads	128	172	120	24	444
Selling & Admn. overheads	80	100	40	20	240
Total Costs	360	447	252	69	1,128
Profit/ (loss)	40	53	(52)	31	72
Unabsorbed overheads					48
Net Profit					24

50 percent of the factory overheads is variable at normal operating volume and the variable selling and administration overheads account for 5% of sales.

Of the total sales of product "C", half of the volume is used in the market for applications in which product 'D' can be substituted. Thus if product "C" is not available, the sales of product "D" can be increased by Rs.100 lacs without any change in the fixed selling expenses.

Of the total sales of product "C", about 25% is sold in conjunction with product "A". The customers will not be able to substitute product "D" and so the sales of product 'A' will be reduced by 12.5% of the present level if product "C" is withdrawn.

In the event of total discontinuance of product "C", the fixed factory and selling and administration overheads will be reduced by Rs.20 lacs. Alternatively, if the production and sales of product "C" is maintained to the extent of 25% of the present level as service to product 'A', there will be a reduction in the fixed costs to the extent of Rs.10 lacs.

You are required to:

a) Prepare statements to show the financial implications of:

Continuance of product "C"

Total discontinuance of Product "C"

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Continuance of product “C” only as service to customers using product “A” whose business will otherwise be lost.

b) Make your recommendations on the course of action to be taken by the company with such comments as you may like to offer.

Solution:

1) Statement showing financial implications of continuing with product C

	A	B	C	D	Total
Sales	400	500	200	100	1200
<u>Variable cost</u>					
Direct Material	(64)	(70)	(32)	(7)	(173)
Direct Wages	(88)	(105)	(60)	(18)	(271)
Variable production	(64)	986	(60)	(12)	(222)
Variable selling & distribution overheads	(20)	(25)	(10)	(5)	(60)
Contribution	164	214	38	58	474

Less: Factory overheads

Production (222+48) = 270

Administration & S&D overheads (240-60)= 180 (450)

Net profit = 24

C 200 lakhs sales (effect on other's sales)

A --- 50 lakh (25% of total)

Remain 150 lakh ----- D—100 lakh 950% of total

Remain 150 lakh ----- remain (lost 50 lakh)

ii) Statement showing financial implications of discontinuing product.

A = $164 \times 350/400$	143.50
B = 214×1	214.00
C =	Nil
D = $58 \times 200/100$	116.00
Total contribution	473.50
Less: Fixed cost (450-20)	430.00
Net Profit	43.50

iii) Statement showing financial implications of Continuing with Product ‘C’ partially.

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A (Full)	164
B (No Change)	214
C = $(38 \times 50 / 200)$	9.5
D = $58 \times 200 / 100$	<u>116.</u>
Total contribution	503.50
Less: Fixed cost (450-10)	<u>440</u>
Net Profit	63.50

Problem

Tiptop Textiles manufactures a wide range of fashion fabrics. The company is considering whether to add a further product the 'Superb' to the range. A market research survey recently undertaken at a cost of Rs.50,000 suggests that demand for the 'Superb' will last for only one year during which 50,000 units could be sold at Rs.18 per unit. Production and sale of 'Superb' would take place evenly throughout the year.

The following information is available regarding the cost of manufacturing 'Superb'

Raw Materials:

Each 'Superb' would require 3 types of raw material Posh, Flash and Splash. Quantities required current stock levels and costs of each raw material are shown below Posh is used regularly by the company and stocks are replaced as they are used. The current stock of Flash is the result of overbuying for an earlier contract. This material is not used regularly by Tiptop textiles and any stock that is not used to manufacture 'Superb' should be sold. The company does carry a stock of Splash and the units required would be specially purchased.

Raw Material	Quantity required. Per unit of Superb (mtrs)	Current Stock level (mtrs)	Original Cost Rs.	Current replacement cost Rs.	Current resale value Rs.
Posh	1.00	1,00,000	2.10	2.50	1.80
Flash	2.00	60,000	3.30	2.80	1.10
Splash	0.50	--	--	5.50	5.00

Labour:

Production of each 'Superb' would require a quarter of an hour of skilled labour and two hours of unskilled labour. Current wage rates are Rs.3 per hour for skilled labour and Rs.2 per hour for unskilled labour. In addition, one foreman would be required to devote all his working time for one year in supervision of the production of Superb. He is currently paid an annual salary of

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Rs.15,000/- Tiptop textiles is currently finding it very difficult to get skilled labour. The Skilled workers needed to manufacture 'Superb' would be transferred from another job on which they are earning a contribution surplus of Rs.1.50 per labour hour comprising sales revenue of Rs.10.00 less skilled labour wages of Rs.3.00 and other variable costs of Rs.5.50 it would not be possible to employ additional skilled labour during the period. The company expects to have available 2,00,000 surplus unskilled labour hours during the coming year. Because the company intends to expand in the future, It has decided not to terminate services of any unskilled worker in the foreseeable future. The foreman is due to retire immediately on an annual pension payable by the company of Rs.6,000. He can be prevailed upon to stay on for a further year and to defer his pension for one year in return for his annual salary, if Superb is introduced.

Machinery:

Two machines would be required to manufacture 'Superb', MT 4 and MT 7. Details of each machine are as under:

	Start of the year Rs	End of the year Rs.
MT 4		
Replacement Cost	80,000	65,000
Resale Value	60,000	47,000
MT 7		
Replacement Cost	13,000	9,000
Resale Value	11,000	8,000

Straight line depreciation has been charged on each machine for each year of its life. Tiptop Textile owns a number of MT 4 machineries, which are used regularly on various products. Each MT 4 is replaced as soon as it reaches the end of its useful life. MT 7

Machines are no longer used and the one which would be used for 'Superb' is the only one the company now has. If it was not used to produce 'Superb' it would be sold immediately.

Overheads:

A predetermined rate of recovery for overhead is in operation and the fixed overheads are recovered fully from the regular production at Rs.3.50 per labour hour. Variable overhead costs for Superb are estimated at Rs.1.20 per unit produced.

For decision making, incremental costs based on relevant cost and opportunity costs are usually computed.

You are required to compute such a cost sheet for 'Superb' with all details of material, labour, overhead etc. substantiating the figures with necessary explanations.

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Solution:

Cost sheet based on relevant cost approach showing the evaluation of proposal.

If the new product is introduced then,

<u>Relevant cost</u>	
1) Raw Material	
Posh ---- 1) $2.5 \times 50,000$	1,25,000
Hash 2) $(60,000 \times 1.1) + (40,000 \times 2.8)$	1,78,000
Splash 3) $(25,000 \times 5.5)$	1,37,500
(A)	4,40,500
2) Labour cost	
Unskilled (3)	NIL
Skilled (4)	56,250
Foreman's salary	9,000
(B)	65,250
3) Variable overheads $50,000 \times 1.2$	(C) 60,000
4) Machinery Utilization cost	
MTY (6) 15,000	
MJT (5) 36,000	(1) 18,000
Relevant cost	5,83,750
Profit	3,16,250
Relevant Revenue cost ($5,00,000 \times 18$]	9,00,000

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Problem

A trader whose current are in the region of Rs.6 lakhs per annum and an average collection period of 30 days wants to persue a more liberal policy to improve sales. A study by a management consultant reveals the following information.

Credit Policy	Increase in collection period	Increase in sales	Percent default anticipated
A	10 days	Rs.30,000	1.5%
B	20 days	Rs.48,000	2%
C	30 days	Rs.75,000	3%
D	40 days	Rs.90,000	4%

The selling price per unit is Rs.3/-. The average cost per unit is Rs.2.25 and variable cost per unit is Rs.2/-. The current bad debt loss is 1% Required return on additional investment is 20%. Assume a 360 days a year

Solution:

Statement showing the evaluation of various credit policies.

Policy	Add'l CTR (addl sls.*1/3)	Additional inferent (1)	Additional Bad-Debts (2)	Net Add'n gain (loss)
A	10,000	2,667	3,450	3,883
B	16,000	7783	6,960	3,707
C	25,000	8,333	1,4250	2,417
D	30,000	12,500	21,600	(4,100)

Notes: 1 Calculation of additional interent cost

	A	B	C	D
Expenses outstanding Balance [6,30,000*40/360]	70,000	90,000	1,12,500	1,73,750
<u>Less: Present outstanding</u>				
Bal (6,00,000*30/360)	<u>(50,000)</u>	<u>(50,000)</u>	<u>(50,000)</u>	<u>(50,000)</u>
Additional Investment	20,000	48,000	62,500	93750
Variable cost of o/s balance (2/3)	13,334		41,667	62,500
Interest @ 20%	2,667	9,333	8,333	12,500

Note on Interest

In the above calculations, the measurement has been expressed in terms of variable cost of sales remaining outstanding. There are 2 other views in respect of calculation of investment held by

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ICAI as per which the investment was expressed in terms of sales value remaining outstanding or the average cost of sales remaining outstanding. The Calculation of interest cost as per these 2 views in respect of policy A. is shown below.

(a) Investment in terms of sales

Additional investment (70-50)	20,000
Interest @ 20%	4,000

b) Investment in terms of Average cost of sales

i) Expense Average cost per unit	$2 + 2,00,000 \text{ units} * \text{Rs.}0.25 / 2,10,000$	2.238
ii) Average Cost of Exp. O/s Balance	$70,000 * 2.238 / 3$	52,220
iii) Average Cost of Current o/s Balance.	$50,000 * 2.25 / 3$	37,500
iv) Additional investment	$[52,220 - 37,500]$	14,720
v) Additional interest	$(14,720 * 20\%)$	2,944

Note 2 Calculation of Additional Bad-Debt

	A	B	C	D
Expenses : Bad-Debt [1.5% of 6,30,000]	9,450	12,960	20,250	27,600
<u>Less: Present Bad-Debt</u>				
(1% of 6,00,000)	(6,000)	(6,000)	(6,000)	(6,000)
Add. Bad Debt	3,450	6,960	14,250	21,600
<u>Recommendation:</u> The company is advised to adopt policy A and give credit period of 40 days.				

Problem

In the process of reducing its foreign shareholdings as per the directives of the government, a closely held FERA company has acquired about 80,000 shareholders through a broad based Public Issue. It was thought that within a year's time, the number of share holders would fall to a manageable 40,000 but though the transfer transactions have been numerous, the number had fallen only to 75,000 share holders. The secretarial Departmental of the company is housed in a rented building and consists of three Divisions, the Secretarial Division dealing with the registration, statutory records and board matters, the share Division dealing with Share Transfers, Transmissions etc. and correspondence with shareholders and the mailing division which looks after the incoming and outgoing mail. For the past one year, the company has found difficulty in coping with the increasing work load of the share division and is now seriously considering to give the entire work of the Share Division and is now seriously considering to give the entire work of the share division to a firm of Share Transfer Agents. The following information is taken from last year's working.

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		Divisions	
	Secretarial	Shares	Mailing
	Rs	Rs	Rs
Salaries and Wages	3,00,000	1,50,000	30,000
Postage and Telegram	1,000	5,000	20,000
Materials and Supplies	50,000	2,50,000	10,000
Rent, Rates and Taxes	80,000	85,000	10,000
General Administration	45,000	34,000	4,000
Depreciation	5,000	40,000	5,000
TOTAL	4,81,000	5,64,000	79,000

Additional information:

If Share Division is discontinued, the Secretarial Division would require an additional staff at Rs 7,200 per year to liaise with the Share Transfer Agent Two senior staff from the Share Division at a total cost of Rs. 24,000 per annum could be retained as well as a Mailing Clerk at Rs 4800 per annum. The rest of the staff in the Share and Mailing Division would be sacked with a three months termination pay

The fixed element in the Postages and Telegrams cost is fully borne by the Secretarial Division with the discontinuance of the Share Division the Postage and Telegrams in the Mailing Division would be only Rs 1000 per annum 3 There would be a marginal reduction of Rs 1000 per annum in the Mailing Division on account of Materials and Supplies 4 With the discontinuance of the Share Division, the postage and Telegrams in the Mailing Division would be only Rs.1,000 per annum.

There would be a marginal reduction of Rs.1,000 per annum in the mailing Division on account of Materials and Supplies

With the discontinuance of the Share Division, the company would be in a position to sublet office space and service which would fetch 40% of the total rent, rates and taxes.

When Share Division goes away, the clerk in charge of statistics would not be required (Rs.6,000 per year) Other general and administrative personnel would be retained. Included in the General Administration is an amount of Rs.60,000 being the allocated administration overhead of the company.

The Cardex Cabinets and other office equipments in the Share Division can be sold at book value without gain or loss (Book value Rs.4 Lakhs)

The Share transfer agents are willing to enter into a five year contract with company their charges being Rs.2/- per transaction pertaining to share transfer and Rs.3/- per transaction pertaining to share transmission. No charges would be levied on the issue of duplicate certificates, share splitting etc. The charges per year would be on actual subject to a maximum of 2 lakhs transaction pertaining to share transfer and 50,000 transaction pertaining to share transmissions.

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Assuming that the expenses of the secretarial Division would not much fluctuate during the next five years, advise the company with proper figures whether it can accept the five year contract of the Share Transfer Agents.

Solution:

Evaluation of proposal

If share transfer division is discontinued then,

<u>Relevant Revenue (p.a for 5 years)</u>	
Salary (150+30-28.8)	1,51,200
P & T [5+19]	24,000
M & S [250+1]	2,51,000
Salary to clerk	<u>6,000</u>
	4,32,200

<u>Money to be received</u>	
Rent, Rates	70,000
Additional resale of Cardex Cabinets (Note*1) [4 lakhs – 2lakhs]*1/5	40,000
Interest [Note*2]	36,070
(A)	
Less: Fees to be paid to transfer agents (Note*3)	5,50,000
Relevant cost (per annum for 5 years)	
Salary (7,200)	7,200
Compensation to the staff in share transfer and maintaining division. [1,51,200**2/12*1/5]	7,560
Termination pay to be given to clerk in the Adm. Dept. (6,000/12*3/5)	300
(B)	
(A-B)	13,210

Recommendation: The company is advised to discontinue the share transfer division.

Note 1: Sale of Cardex Cabinet

$$= (4 \text{ lakhs} - 2 \text{ lakhs}) * 1/5 = 40,000$$

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It is presumed that the company follows SLM of depreciation and further that the market value of Cardex Cabinet after 5 years if the depreciation is continued for 5 years, would be equal to its book value at that time.

The Current BV is Rs.4,00,000 and total depreciation for next 5 years could be Rs.2 lakhs. $[4,00,000 \times 5]$. This means that the BV after 5 years would be Rs.2,00,000. $(4,00,000 - 2,00,000)$. If we discontinue the depreciation, then we get Rs.4,00,000 now and if we continue we get Rs.2,00,000 After 5 years ignoring the time value of money which is considered separately in note (2) the additional cash flow, as a result of the discontinuance of the department would be Rs.2,00,000 or Rs.40,000 annualized

Note 2: It is presumed that the non-operating surplus arising as a result of this decision would be put to alternate profitable use that would earn simple interest @ 10% p.a. the calculation is shown below:

Sales value of Cardex Cabinet

= $[4,00,000 - \text{termination pay to be staff } (7560 + 300) \times 5]$

$[4,00,000 - 39,300] = 3,60,700$

Non-operating surplus	3,60,700
(X) Interest @ 10%	36,070
	3,24,630

Note 3:

It is presumed that the no. of transfer & transmission apps p.a would not be less than 2,00,000 & 50,000 respectively.

Problem

The Legran Manufacturing Company Currently manufactures part 509 K in Department 10 for assembly into one its major products, Motor 897. Management has, for some time been considering closing down the parts making operation and purchasing the parts from outside source because of inefficiencies in the operations of the department.

After some careful cost scrutiny, Master Tools and Dye Company was selected as a prospective source. The company is able to supply all the parts required at a rate of 3,000 a year at present for Rs.60,000/- per year, the contract to run definitely for a term of five years and thereafter to be renewed from year to year.

The General Manager compared the Master's figure with the cost figures prepared by the chief accountant for the manufacture of 3,000 such parts, which are follows:

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Materials	Rs.28,000	Rs.48,000
Labour	Rs.20,000	
<u>Departmental overheads:</u>		
Manager's Salary	Rs.3,200	Rs.18,740
Rent	Rs.1,800	
Depreciation of Machinery	Rs.6,000	
Maintenance of Machinery	Rs.1,440	
Other Miscellaneous Expenses	Rs.6,300	
Share of general administrative overheads		Rs.9,000
Total cost of depreciation for one year		Rs.75,740

The general manager's immediate reaction was that the department should be immediately closed down and negotiations be completed with Masters. He wished, however to discuss this proposal with manager of the department before action was taken.

The manager was informed that his position was not in jeopardy, since another managerial position would be available at equal pay and opportunity, should his department be disbanded. After a few days, the manager dropped into GM's office and raised several questions. "What will be done with the machinery"? he asked.

'it cost Rs.48,000/- five years back but probably would only bring Rs.8,000/- from the market now, even though it is good for another five years at least. Also there's the stock of metal castings and rings (a special stock) we bought a year ago. It cost us Rs.40,000/- and at the rate we're using it', it'll last us another four years or so. We used about one-fifth of it last year. The accountant's figure of Rs.28,000/- for materials probably includes about Rs.8,000/- for this special stock. But it'll be tricky stuff to handle if we don't use it up. We purchased it at Rs.200 a ton though its current replacement cost is Rs.240/-. But you wouldn't have more than Rs.160/- a ton left if you sold it, after covering handling expenses.

The chief accountant, upon hearing the manager's conjectures replied, I think my figures are pretty conclusive. Besides if you are going to get so fussy, don't forget the problem of space we're paying Rs.3,400/- a year in rent for a warehouse a couple of miles away. If we closed the department we would not need the warehouse space.

Finally, the manager concluded the discussion by saying "Well I've told Masters that I'll let them know my decision within a week. I'll let you both know what I decide to do before I call them."

REQUIRED: Make cost analysis to arrive at a make or buy decision.

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Solution:

Evaluation of the proposal

If the department is discontinued, then,

Relevant Revenue over 5 years outflows to be avoided

Managers salary	[3,200*5]	16,000
NOTE 1		
Material cost		
Normal	[20,000*5]	1,00,000
Special stock (Note3)	{240*4} 9,600	1,09,600
Warehouse rent (Note4)	(3,400*5)	17,000
Labour cost	(2,00,000*5)	1,00,000
Machinery Maintenance	[1,440*5]	7,200
Miscellaneous expenses	[6,300*5]	31,500

Money to be received

Additional sales value of Machinery [8,000- Nil]	8,000
Resale value of special stock 9160*160]	25,600
(A)	3,49,000

Relevant cost over 5 years

Purchase Cost (60,000*5 years)	3,00,000
(B)	3,00,000
Relevant Gain (A-B)	19,000

Department should be discontinued

Notes: (see page 390 for notes)

Problem

Johnson traders as a chandler at the Savoy Marina. His profit in this business during the year to 30th June,2002 was Rs.12,000/- Johnson also undertakes occasional contracts to build the Blue Blood for Mr.B.W.Dunn, Delivery to be in one year's time. He has no other contract in hand or under consideration for at least the next few months.

Johnson expects that if he undertakes the contract, he would devote one quarter of his time to it. To facilitate this, he would employ G. Harison an unqualified practitioner, to undertake his book keeping and other paper work at a cost of Rs.2, 000/-

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He would also have to employ on the contract one supervisor at a cost of Rs.11,000/- and two craftsman at a cost of Rs.8,800/- each. These costs include Johnson's normal apportionment of the fixed overheads of his business at the rate of 10% of labour costs.

During spells of bad weather, one of the craftsmen could be employed for the equivalent of upto three months full time during the winter in maintenance and painting work in the chandler's business. He would use materials costing Rs.1,000/-. Johnson already has two inclusive quotations from jobbing builders for this maintenance and painting work, one for Rs.2,500/- and the other for Rs.3,500/- the work to start immediately.

The equipment which would be used for the Blue Blood contract was bought nine years back for Rs.21,000/-. Depreciation has been written off on a straight line basis, assuming a ten years life and a scrap value of Rs.1,000/-. The current replacement cost of similar new equipment is Rs.60,000/- and could be Rs.66 000/- after a year. The current resale price of this equipment is Rs.6,000 and Johnson considers that in a year's time he would

Have little difficulty in obtaining Rs.3,000/- for it. The plant is useful to Johnson only for contract work.

In order to build the Blue Blood, Johnson will need six types of materials. The Details are given below:

Materials	Number of units in stock	Needed for contract	Purchase price of items in stock	Current purchase price	Current Resale price
A	200	1,000	1.00	3.00	2.00
B	1,100	1,000	2.00	0.90	1.00
C	--	100	--	6.00	--
D	100	200	4.00	3.00	2.00
E	50,000	5,000	0.18	0.20	0.25
F	1,000	3,000	0.90	2.00	1.00

Material B and E are sold regularly in the chandler's business. Material A could be sold to a local sculptor if not used for the contract. Material 'A' and 'E' can be used for other purpose such as property maintenance. Johnson has no other use for material D and F, the Stocks of which are obsolete.

The blue blood would be built in a yard held on a lease with four years remaining at a fixed annual rental of Rs.5, 000. It would occupy half of this yard which is useful to Johnson only for contract work.

Johnson anticipates that the direct expenses of the contract, other than those noted above Would be Rs.6, 000/-

Johnson has recently been offered one year appointment at a fee of Rs.15, 000/- to manage a boat building firm on the Isle of Wight. If he accepts the offer, he would be unable to take on the contract to build Blue Blood or any other contract. He would have to employ a manager to run

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the chandler's business at an annual cost (including fidelity insurance) of Rs.10,000 and would incur additional personal living costs of Rs.2,000

REQUIRED:

Calculate the price at which Johnson would be willing to take on the contract in order to break even based exclusively on the information give above.

Set out any further considerations which you think Johnson should take in on account in setting the price at which he would tender for the contract.

Solution:

Statement showing the Calculation of Break-even price i.e relevant cost for accepting the proposal.

1) Fees to be paid to accountant	2,000
2) Salary supervisor [11,000*10/11]	10,000
Craftsmen [8,800*2*10/11]	16,000
3) Savings in respect of painting & maintenance work (Note1)	(1,500)
4) Reduction in sale value of plant [6,000-3,000]	3,000
5) Raw Material Cost (Note 2)	11,000
6) Other Direct cost	6,000
7) Income from other firm	3,000
	49,500

Note 1 : There are 3 alternatives in all to get the painting & maintenance work done. They are to accept the 1st quotation, to accept 2nd quotation or buy material, employ the labour and get it done.

If this proposal is not accepted then the relevant cost under the 3 alternatives would be Rs.2,500, Rs.3,500 and Rs.3,000. [1,000+(8,000*3/12)] respectively. This means the best option is the first one and the relevant cost would be Rs.2,500. If the offer is accepted, then the relevant cost under the 3 alternatives Rs.2,500, Rs.3,500 and Rs.1,000 {M(1,000) + L(nil)}. Best of the 3 option is the 3rd one and the relevant cost would be Rs.1,000. This means that as a result of the acceptance of the proposal ,the cost of painting & work would fall by Rs.1,500 (2,500-1,000).

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Note 2: Material cost

Type	Reasoning	Amount
(A)	The 8 th is 200 units as against requirement of 1,000 units which means 800 units will have to be bought at Rs.3.00. The Stock that can be used for property maintenance and if it is kept for that proposal additional 200 units will be purchased. Either way in all 1,000 units will have to be purchased at Rs.3. $1,000 \times 3$	3,000
B)	The resale price is more than the current purchase price and therefore the stock that we have should be sold. Additional 1,000 units will need to be purchased at Rs.0.90	900
C)	Purchase Cost	600
D)	Resale price is less than current purchase price and therefore stock that we have which otherwise would be sold should now be retained. As a result the resale value of Rs.200 would be lost (100×2) . balance 100 units. Will have to be purchased at Rs.3.00 $[(100 \times 2) + (100 \times 3)]$	500
E)	Same as Raw Material $(5,000 \times 0.2)$ (B)	1,000
F)	Same as D $(1,000 \times 1 + 1,000 \times 2)$	3,000
TOTAL		11,000

Part B

- 1) If there is nay possibility of cost escalation then the same should be considered.
- 2) Possibility of penalty if project competition is delayed.
- 3) Escalation in period cost if project is delayed.
- 4) Reasonable amount of profit should be added to the relevant cost.
- 5) The likely Quotation of the strong competition should be considered.

Problem.

Companies RR, RP, RS AND RT are members of a group. RP wishes to buy an electronic control system for its factory and in accordance with the group policy, must obtain quotations from companies inside and outside the group.

From outside of the group, the following quotations are received

Company A quoted Rs.33, 200/-

Company B quoted Rs.35, 000/- but would but a special unit from RS for Rs.13, 000/-. To make this unit, however, RS would need to but parts from RR at a price of Rs.11,000/-

Additional data are as follows:

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RR is extremely busy with work outside the group and has quoted current market for all its products

RS costs for the RP contract, including purchases from RR and RT, total Rs.42,000/-. For the company B contract, it expects a profit of 25% on the costs of its own work.

RT price provided for a 20% profit margin on total assets

The variable cost of the group companies in respect of the work consideration are:

RR: 20% of the selling price

RS: 70% of own cost (excluding purchases from other group companies)

RT: 65% of own asset(excluding purchases from other group companies)

You are required from a group point of view to:

Recommend with appropriate calculations, whether the contract should be placed with RS or company A or company B

State briefly two assumptions you have made in arriving at your recommendations.

Solution:

<u>Relevant cost to the group if order is placed with</u>		
1) Company A		33,200
2) Company B		
Gross Cost	35,000	
Less: <u>Inter comp. contribution</u>		
RR --- (A)	Nil	
RS --- Sales value	13,000	
(-) Purchase from RR	(7,500)	
Balance Sales Value	5,500	
Net Profit	1,100	
Total Cost	4,400	
Fixed Cost @ 30%	1,320	
Contribution (1,100+1,320)	(2,420)	32,580

3) Company RS		48,000
Gross Cost		
Less: Inter company contribution		
RR	Nil	
RS --- Sales value	48,000	

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(-) N.P (48-42)	(6,000)	
Total cost	42,000	
Purchase from RR/RT	38,000	
Own Total Cost	4,000	
Fixed Cost @ 30%	1,200	
Contribution (6,000+1,200)	(7,200)	
Less: Inter Company Contribution		Nil
RR		
RT---- Sales Value	30,000	
(-) NP (1/6)	(5,000)	
	25,000	
(-) Purchase from RR	(11,000)	
Own Total cost	14,000	
Fixed Cost @ 35%	9,900	(17,100)
Contribution (5,000+4,900)		30,900

Order should be placed with company Rs. Refer for Past 'B' Solution Page no.

Problem

A company producing and selling a range of consumer durable appliances has its after sales service work done by local approved sub-contractors

The company is now considering carrying out all or some of the work itself and it has chosen on area in which to experiment with new routine.

Some of the appliances are so large and bulky that repair/service work can only be done at the customer's homes. Others are small enough for sub-contractors to take them back to their local repair workshops, repair them and redeliver them to customer. If the company does its own after sales service, it proposes that customers would bring these smaller items for repair to a local company service center which would be located and organized to deal with visitors.

There is a list price to customers for the labour content of any work done and for material Used. However, the majority of the after sales service work is done under an annual maintenance contract taken out by customers on purchasing the product; covers the labour content of any service work to be done, but customers pay for materials used.

Any labour or material needed in the first six months are provided to the customers free of charge under the company's product guarantee and sub-contractors are allowed by the company a fixed sum of 35% of the selling price for each appliance to cover this work. These sums allowed have proved closely in line with the work needed over the past few years.

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The price structure is:

For materials: price to sub-contractor : Company cost plus 10%
Price to customer : Sub-contractor's price plus 25%
For Labour : Price to sub-contractor :

Work done under maintenance contract : 90% of list price

Adhoc wok (i.e work NOT done under maintenance contract) : 85% of list price

Records show that 60% by value of the work has to be carried out at customer's homes whilst the remainder can be done anywhere appropriate.

The annual income that the company currently receives from sub contractors for the area in which the experiment is to take place is:

Labour	under maintenance contract	Rs.30,000
	adhoc	Rs.12,000
Material	under maintenance contract	Rs.18,000
	adhoc	Rs. 6,000
		Rs.66,000

The company expects the volume of after sales work to remain the same as 1st year for the period of the experiment.

The company is considering the following options:

1. Set up a local service center at which it can service small appliances only. Work at customer's houses would continue to be done under sub-contract
2. Set up a local service center to act only as a base for its own employees who would only service appliances at customer's homes.
3. Set up a local combined service center plus base for all work. NO work would be sub-contracted

If the company were to do service work, annual fixed costs are budgeted to be:

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	Option 1 (Rs. 000)	Option 2 (Rs. 000)	Option 3 (Rs. 000)
Establishment costs			
(rent, rates, light, etc	40	15	45
Management costs	20	15	30
Storage/ staff costs	10	10	15
Transport cost (all vans /cars hired)	8	65	70
Repair/service staff	70	180	225

You are required to recommend which of the three options the company should adopt from a financial view point:

Solution:

Notes 1:

<u>1) Calculation of Sales Value and its analysis.</u>	
Labour Adhoc: Rs.12,000*100/15 =	80,000
M. contract: 30,000*100/10 =	3,00,000
Material (18,000+6,000)*137.5/10 =	3,30,000
	7,10,000

Analysis:

Relating to Big app. 60%	4,26,000
Small app.	2,84,000

2) Material: Cost to sales & NP to sales ratio.	
M. contract: 30,000*100/10 =	100
Material (18,000+6,000)*137.5/10 =	10
Cost to sub-contractor	110
Sub- Contractors net profit	27.5
	137.5

Cost to sales = 10/100

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NP to sales = 10/137.5

3) Material: Cost and its analysis Total Material Cost (18,000+6,000)*100/10	2,40,000
Analysis	
Big App. 60%	1,44,000
Small App. 40%	96,000

Solution:

1) If work of small application servicing is taken over then	
Income from sub contractor (60% of 66,000)	39,600
Income from own operation	
<u>Sales</u>	2,84,000
<u>Less: Relevant cost</u>	
Material 96,000	
Other cost <u>1,48,000</u> (2,44,000)	40,000
Net Relevant Gain	79,600

2) If surviving of big installation is taken over then		
Income from sub contractor (40% of 66,000)		26,400
Income from own operation		
Sales	4,26,000	
<u>Less: Relevant cost</u>		
Material 1,44,000		
Other cost <u>2,85,000</u>	(4,29,000)	(3,000)
Net Relevant Gain		23,400

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3) If entire service function is taken over.		
Income from sub contractor		Nil
<u>Income from own operation</u>		
Sales	7,10,000	
<u>Less: Relevant cost</u>		
Material 2,40,000		
Other cost <u>3,85,000</u>	(6,25,000)	85,000
Net Relevant Gain		85,000

The third option is the best amongst 3 options and it gives higher income than the income given by the existing option. Accordingly, the company is advised to take over the entire service function.