

PAPER – 5 : COST MANAGEMENT

QUESTIONS

- During the current period, ABC Ltd sold 60,000 units of product at Rs. 30 per unit. At the beginning for the period, there were 10,000 units in inventory and ABC Ltd manufactured 50,000 units during the period. The manufacturing costs and selling and administrative expenses were as follows:

	<i>Total cost</i> Rs.	<i>Number of units</i>	<i>Unit cost</i> Rs.
Beginning inventory:			
Direct materials	67,000	10,000	6.70
Direct labour	1,55,000	10,000	15.50
Variable factory overhead	18,000	10,000	1.80
Fixed factory overhead	<u>20,000</u>	10,000	<u>2.00</u>
Total	<u>2,60,000</u>		<u>26.00</u>
Current period costs:			
Direct materials	3,50,000	50,000	7.00
Direct labour	8,10,000	50,000	16.20
Variable factory overhead	90,000	50,000	1.80
Fixed factory overhead	<u>1,00,000</u>	50,000	<u>2.00</u>
Total	<u>13,50,000</u>		<u>27.00</u>
Selling and administrative expenses:			
Variable	65,000		
Fixed	<u>45,000</u>		
Total	<u>1,10,000</u>		

Instructions:

- Prepare an income statement based on the variable costing concept.
 - Prepare an income statement based on the absorption costing concept.
 - Give the reason for the difference in the amount of income from operations in 1 and 2.
- A budgeted profit statement of a company working at 75% capacity is provided to you below,

Sales	9,000 units at Rs. 32	Rs. 2,88,000
Less:	Direct materials	Rs. 54,000
	Direct wages	72,000
	Production overhead:	
	–fixed	42,000
	–variable	18,000
		1,86,000
	Gross profit	1,02,000
Less:	Administration, selling and distribution costs:	
	–fixed	36,000
	–varying with sales volume	27,000
		63,000
	Net profit	39,000

You are required to:

- (a) Calculate the breakeven point in units and in value.
- (b) It has been estimated that:
 - (i) if the selling price per unit were reduced to Rs. 28, the increased demand would utilise 90% of the company's capacity without any additional advertising expenditure, and
 - (ii) to attract sufficient demand to utilise full capacity would require a 15% reduction in the current selling price and a Rs. 5,000 special advertising campaign.

You are required to present a statement showing the effect of the two alternatives compared with the original budget and to advise management which of the three possible plans ought to be adopted, i.e., the original budget plan or (i) above or (ii) above.

- (c) An independent market research study shows that by spending Rs. 15,000 on a special advertising campaign, the company could operate at full capacity and maintain the selling price at Rs. 32 per unit.

You are required to:

- (i) Advise management whether this proposal should be adopted.
3. (a) ABC Ltd. expects to maintain the same inventories at the end of the year as at the beginning of the year. The estimated fixed costs for the year are Rs. 2,88,000, and the estimated variable costs per unit are Rs. 14. It is expected that 60,000 units will be sold at a price of Rs. 20 per unit. Maximum sales within the relevant range are 70,000 units.

Instructions:

1. What is (a) the contribution margin ratio and (b) the unit contribution margin?
2. Determine the break-even point in units.
3. What is the margin of safety?
- (b) Garland Company uses a standard cost system. The standard for each finished unit of product allows for 3 kgs of plastic at Rs. 0.72 per kg. During December, Garland bought 4,500 kgs of plastic at Rs. 0.75 per kg, and used 4,100 kgs in the production of 1,300 finished units of product. What is the material purchase price variance for the month of December ?
4. Selected information concerning sales and production for ABC Ltd. for July, 2006 are summarised as follows:
 - a. Estimated sales:

Product K: 40,000 units at Rs. 30.00 per unit

Product L: 20,000 units at Rs. 65.00 per unit
 - b. Estimated inventories, July 1, 2006:

		Rs.
Material A: 4,000 kgs.	Product K: 3,000 units at Rs. 17 per unit	51,000
Material B: 3,500 kgs.	Product L: 2,700 units at Rs. 35 per unit	<u>94,500</u>
	Total	<u>1,45,500</u>

There were no work in process inventories estimated for July 1, 2006.

- c. Desired inventories at July 31, 2006:

		Rs.
Material A: 3,000 kgs.	Product K: 2,500 units at Rs. 17 per unit	42,500
Material B: 2,500 kgs.	Product L: 2,000 units at Rs. 35 per unit	<u>70,000</u>
	Total	<u>1,12,500</u>

There were no work in process inventories desired for July 31, 2006.

d. Direct materials used in production:

	Product K	Product L
Material A:	0.7 kgs. per unit	3.5 kgs. per unit
Material B:	1.2 kgs. per unit	1.8 kgs. per unit

e. Unit costs for direct materials:

Material A:	Rs. 4.00 per kg.
Material B:	Rs. 2.00 per kg.

f. Direct labour requirements:

	Department 1	Department 2
Product K	0.4 hour per unit	0.15 hour per unit
Product L	0.6 hour per unit	0.25 hour per unit

g.

	Department 1	Department 2
Direct labour rate	Rs. 12.00 per hour	Rs. 16.00 per hour

h. Estimated factory overhead costs for July:

	Rs.
Indirect factory wages	2,00,000
Depreciation of plant and equipment	40,000
Power and light	25,000
Indirect materials	<u>34,000</u>
Total	<u>2,99,000</u>

Instructions:

1. Prepare a sales budget for July.
 2. Prepare a production budget for July.
 3. Prepare a direct materials purchases budget for July.
 4. Prepare a direct labour cost budget for July.
 5. Prepare a cost of goods sold budget for July.
5. ABC Ltd manufactures Product S for national distribution in India. The standard costs for the manufacture of Product S were as follows:

	Standard Costs	Actual Costs
Direct materials	1,500 kgs at Rs. 35	1,600 kgs at Rs. 32
Direct labour	4,800 hours at Rs. 11	4,500 hours at Rs. 11.80
Factory overhead	Rates per labour hour, based on 100% of normal capacity of 5,500 labour hours:	
	Variable cost, Rs. 2.40	Rs. 12,300 variable cost
	Fixed cost, Rs. 3.50	Rs. 19,250 fixed cost

Instructions:

1. Determine the quantity variance, price variance, and total direct materials cost variance for Product S.
 2. Determine the time variance, rate variance, and total direct labour cost variance for Product S.
 3. Determine the controllable variance, volume variance, and total factory overhead cost variance for Product S.
6. ABC Ltd. uses flexible budgets and standard costing for its single product PCM 30 produced at its factory at Solan. The following details relate to a particular months 'Actual' & also provide brief details of 'Standards' established,

Standard Quantity required for producing 1 unit of PCM 30	3 Kgs
Standard cost of the raw material	Rs 4.40 per kg
Cost of actual material purchased and used in the relevant month	Rs 3,36,000
Actual price paid for the raw material in the relevant month	Rs 4.20 per kg
Standard labour time required to produce 1 unit of PCM 30	30 minutes
Standard wage rate	Rs 5 per hour
Actual wage rate	Rs 5.40 per hour

Sufficient direct labour time, equivalent for producing 28,000 units of PCM 30 was utilised, although the actual production in the relevant month was only 25,000 units.

The company has a normal operating capacity of 15,000 hours per month and flexible overhead budgets are:

Hours of operation	12,500	14,000	15,000
Variable production overhead	Rs. 1,50,000	Rs. 1,68,000	Rs. 1,80,000
Fixed production overhead	2,70,000	2,70,000	2,70,000
Total	4,20,000	4,38,000	4,50,000

Actual fixed overheads incurred did not deviate from the budgeted amounts. However, the variable overheads incurred amounted to Rs 1,60,000 in the concerned month.

You are required to:

- (i) calculate the appropriate variances for material, labour and overhead;
 - (ii) show the variances in a statement suitable for presentation to management, reconciling the standard cost with the actual cost of production.
7. You are the manager of a paper mill (XYZ Ltd) and have recently come across a particular type of paper, which is being sold at a substantially lower rate (by another company –ABC Ltd) than the price charged by your own mill. The value chain for one use of one tonne of such paper for ABC Ltd is as follows,

ABC Ltd. —————> Merchant —————> Printer —————> Customer

ABC Ltd sells this particular paper to the merchant at the rate of Rs 1,466 per tonne. ABC Ltd pays for the freight which amounts to Rs 30 per tonne. Average returns and allowances amount to 4% of sales and approximately equals Rs 60 per tonne.

The value chain of your company, through which the paper reaches the ultimate customer is similar to the one of ABC Ltd. However, your mill does not sell directly to the merchant, the latter receiving the paper from a huge distribution center maintained by your company at Haryana. Shipment costs from the mill to the Distribution Center amount to Rs 11 per tonne while the operating costs in the Distribution Center have been estimated to be Rs 25 per tonne. The return

on investments required by the Distribution Center for the investments made amount to an estimated Rs 58 per tonne.

You are required to compute the "Mill manufacturing Target Cost" for this particular paper for your company. You may assume that the return on the investment expected by your company equals Rs 120 per tonne of such paper.

8. ABC Ltd recently began production of a new product, M, which required the investment of Rs. 16,00,000 in assets. The costs of producing and selling 80,000 units of Product M are estimated as follows:

	Rs.	
Variable costs:		
Direct materials	10.00	per unit
Direct labour	6.00	
Factory overhead	4.00	
Selling and administrative expenses	<u>5.00</u>	
Total	<u>25.00</u>	per unit
Fixed costs:		
Factory overhead	8,00,000	
Selling and administrative expenses	4,00,000	

ABC Ltd is currently considering establishing a selling price for Product M. The President of ABC Ltd has decided to use the cost-plus approach to product pricing and has indicated that Product M must earn a 10% rate of return on invested assets.

Instructions:

- Determine the amount of desired profit from the production and sale of Product M.
 - Assuming that the total cost concept is used, determine (a) the cost amount per unit, (b) the markup percentage, and (c) the selling price of Product M.
 - Assuming that the product cost concept is used, determine (a) the cost amount per unit, (b) the mark up percentage, and (c) the selling price of Product M.
 - Assuming that the variable cost concept is used, determine (a) the cost amount per unit, (b) the markup percentage, and (c) the selling price of Product M.
 - Assume that for the current year, the selling price of Product M was Rs. 42 per unit. To date, 60,000 units have been produced and sold, and analysis of the domestic market indicates that 15,000 additional units are expected to be sold during the remainder of the year. Recently, ABC Ltd received an offer from XYZ Ltd for 4,000 units of product M at Rs. 28 each. XYZ Ltd. will market the units in Korea under its own brand name, and no additional selling and administrative expenses associated with the sale will be incurred by ABC Ltd. The additional business is not expected to affect the domestic sales of Product M, and the additional units could be produced during the current year, using existing capacity. (a) Prepare a differential analysis report of the proposed sale to XYZ Ltd (b) Based upon the differential analysis report in (a), should the proposal be accepted?
9. ABC Ltd manufactures three prototype toy furniture products – chairs, benches and tables. The budgeted unit cost and resource requirements of each item is detailed below:

	<i>Chair</i>	<i>Bench</i>	<i>Table</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Timber cost	5.00	15.00	10.00
Direct labour cost	4.00	10.00	8.00

Variable overhead cost	3.00	7.50	6.00
Fixed overhead cost	<u>4.50</u>	<u>11.25</u>	<u>9.00</u>
	<u>16.50</u>	<u>43.75</u>	<u>33.00</u>
Budgeted volumes per annum	4,000	2,000	1,500

These volumes are believed to equal the market demand for these products.

The fixed overhead costs are attributed to the three products on the basis of direct labour hours.

The labour rate is Rs. 4.00 per hour.

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

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

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

The selling prices of the three products are:

	Rs.
Chair	20.00
Bench	50.00
Table	40.00

Requirements:

- (a) Determine the optimum production plan and state the net profit that this should yield per annum.
 - (b) Calculate and explain the maximum prices which should be paid per square metre in order to obtain extra supplies of the timber.
10. ABC Ltd is in the business of publishing, printing and distributing a range of catalogues and other manuals. The management have now decided to discontinue printing and distribution and concentrate solely on publishing. Instead of ABC Ltd, XYZ Ltd shall now print and distribute the range of catalogues and other manuals. This shall be done on behalf of ABC Ltd . commencing either at 30 June 2006 or 30 November, 2006. XYZ Ltd will receive Rs. 65,000 per month for a contract which will commence either at 30 June, 2006 or 30 November 2006.

The results of ABC Ltd for a typical month are as follows:

	<i>Publishing</i> Rs. '000	<i>Printing</i> Rs. '000	<i>Distribution</i> Rs. '000
Salaries and wages	28	18	4
Materials and supplies	5.5	31	1.1
Occupancy costs	7	8.5	1.2
Depreciation	0.8	4.2	0.7

Information related to the possible closure proposals is as follows:

- (i) Two specialist staff from printing will be retained at their present salary of Rs. 1,500 each per month in order to fulfill a link function with XYZ Ltd. One further staff member will be transferred to publishing to fill a staff vacancy through staff turnover, anticipated in July. This staff member will be paid at his present salary of Rs. 1,400 per month which is Rs. 100 more than that of the staff member who is expected to leave. On closure all other printing

and distribution staff will be made redundant and paid an average of two months redundancy pay.

- (ii) The printing department has a supply of materials (already paid for) which cost Rs. 18,000 and which will be sold to XYZ Ltd. for Rs. 10,000 if closure takes place on 30 June, 2006. Otherwise the material will be used as part of the July 2006 printing requirements. The distribution department has a contract to purchase pallets at a cost of Rs. 5000 per month for July and August, 2006. A cancellation clause allows for non-delivery of the pallets for July and August for a one-off payment of Rs. 300. Non-delivery for August only will require a payment of Rs. 100. If the pallets are taken from the supplier, XYZ Ltd has agreed to purchase them at a price of Rs. 380 for each month's supply which is available. Pallet costs are included in the distribution material and supplies cost stated for a typical month.
- (iii) Company expenditure on apportioned occupancy costs to printing and distribution will be reduced by 15% per month if printing and distribution departments are closed. At present, 30% of printing and 25% of distribution occupancy costs are directly attributable costs which are avoidable on closure, whilst the remainder are apportioned costs.
- (iv) Closure of the printing and distribution departments will make it possible to sub-let part of the building for a monthly fee of Rs. 2,500 when space is available.
- (v) Printing plant and machinery has an estimated net book value of Rs. 48,000 at 30 June, 2006. It is anticipated that it will be sold at a loss of Rs. 21,000 on 30 June, 2006. If sold on 30 November, 2006 the prospective buyer will pay Rs. 25,000.
- (vi) The net book value of distribution vehicles at 30 June, 2006 is estimated as Rs. 80,000. They could be sold to the original supplier at Rs. 48,000 on 30 June, 2006. The original supplier would purchase the vehicles on 30 November, 2006 for a price of Rs. 44,000.

Required:

Using the above information, prepare a summary to show whether ABC Ltd. should close the printing and distribution departments on financial grounds on 30 June, 2006 or on 30 November, 2006. Explanatory notes and calculations should be shown. Ignore taxation.

11. . (a) Describe the concept of Back flushing as used in a JIT system. What problems need to be addressed before implementing such a concept? Briefly discuss.
- (b) "Skimming pricing is a policy where the prices are kept high during the early period of a product's existence". Discuss briefly the reasons for following such a policy.
12. Discuss briefly your understanding of a Balanced Scorecard? What are its advantages ?
13. (a) "Costs may be classified in a variety of ways according to their nature and the information needs of the management." Explain.
- (b) Indicate the major areas of short-term decisions in which differential cost analysis is useful.
- (c) "Relevant cost analysis helps in drawing the attention of managers to those elements of cost which are relevant for the decision." Comment.
14. (a) Indicate the possible disadvantages of treating divisions as profit centres
- (b) Explain the role of bench marking in continuous improvement in an organisation.
15. ABC Ltd manufactures a product '1+7 ASCS' at its plant at Faridabad, the maximum capacity of which is 200 units per month. Details of raw material which go into the making of 1 unit of '1+7 ASCS' are provided to you below;

S. No.	Raw Material description	Standard quantity per finished unit (No)	Standard purchase price per unit (Rs 00)
1	A	1	6
2	B	2	5
3	C	3	4

4	D	4	3
5	E	5	2
6	F	6	1

Standard Fixed overheads are Rs 20,00,000 per month whereas the standard variable overhead rate has been estimated as equal to Rs 1,400 per unit of finished good. You are required to compute the

- standard cost of the product
- compute the production volume variance in case the company produces and sells only 100 units of finished goods in the concerned month.
- compute the usage and material price variances considering the following actual data(actual production and sale: 100 units)

Raw material description	Actual quantity consumed (Nos)	Actual price(Rs 00)
A	102	7
B	201	6
C	310	5
D	415	4
E	540	3
F	610	2

- How is marginal costing different from absorption costing? What are the various limitations attributed to marginal costing?
- HAL is an aircraft manufacturer that has introduced a new airplane model. It expects the plane to cost Rs. 150,000,000 to manufacture to (not including development cost) but their products have historically exhibited an 85% experience curve. Assuming the same experience rate will apply to this product.
 - Compute the cost of computing the each of the first five planes
 - Compute the average cost per plane to produce the first 25 planes.
- The following table gives the activities in a construction project and other relevant information.

Activity	Immediate Predecessor	Time (Days)		Direct Cost (Rs.)	
		Normal	Crash	Normal	Crash
A	-	4	3	60	90
B	-	6	4	150	250
C	-	2	1	38	60
D	A	5	3	150	250
E	C	2	2	100	100
F	A	7	5	115	175
G	D, B, E	4	2	100	240

Indirect cost vary as follows

Days	15	14	13	12	11	10	9	8	7	6
Cost (Rs)	600	500	400	250	175	100	75	50	35	25

- Draw an arrow diagram for the project
- Determine the optimum project duration.

19. ABC Ltd has been approached by a customer who would like a special job to be done for him, and who is willing to pay Rs. 22,000 for it. The job would require the following materials.

Material	Total units required	Units already in stock	Book value of units in stock Rs./unit	Realisable value Rs. /unit	Replacement cost Rs./unit
A	1,000	0	—	—	6
B	1,000	600	2	2.50	5
C	1,000	700	3	2.50	4
D	200	200	4	6.00	9

Material B is used regularly by ABC Ltd, and if units of B are required for this job, they would need to be replaced to meet other production demand.

Material C and D are in stock as the result of previous over-buying, and they have a restricted use. No other use could be found for material C, but the units of material D could be used in another job as substitute for 300 units of material E, which currently costs Rs. 5 per unit (of which the company has no units in stock at the moment).

Calculate the relevant costs of material for deciding whether or not to accept the order.

20. A manufacturer of the firm is investigating the inventory situation of his company. Distribution of daily demand is

Demand (units)	No. of Days
5	15
6	25
7	30
8	18
9	8
10	4

The lead time distribution in days is given below

Lead time	Probability
3	.2
4	.3
5	.35
6	.15

The ordering cost is Rs. 100 per order; the holding cost is Rs. 3 per unit per day and the shortage cost is Rs. 20 per unit, representing the loss in profits.

Using simulation determines the total inventory cost for specific reorder level and reorder quantity.

Assume the opening inventory is 25 units, the reorder level is 20 units and the reorder quantity is 40 units.

21. The occurrence of the rain in a day is dependent upon whether it rained on the previous day. If it rained on the previous day the rain distribution is given by

Event	Probability
No rain	.50
1 cm rain	.25
2 cm rain	.15

3 cm rain	.05
4 cm rain	.03
5 cm rain	.02

If it did not rained on the previous day the rain distribution is given by

Event	Probability
No rain	.75
1 cm rain	.15
2 cm rain	.06
3 cm rain	.04

Simulate the city's weather for 10 days and determine by simulation the total days without rain as well as the total rain fall during the period. Use the following random numbers

76 78 84 75 02 86 02 78 07 63

For simulation. Assume that for the first day of the simulation it had not rained before.

22. ABC Ltd plans to use activity-based costing to determine it product costs. It presently, uses a single plantwide factory overhead rate for allocating factory overhead to products, based on direct labour hours. The total factory overhead cost is as follows:

Department	Factory overhead Rs.
Production Support	12,25,000
Production (factory overhead only)	<u>1,75,000</u>
Total cost	<u>14,00,000</u>

The Company determined that it performed four major activities in the Production Support Department. These activities, along with their budgeted costs, are as follows:

Production Support Activities	Budgeted Cost Rs.
Set up	4,28,750
Production control	2,45,000
Quality control	1,83,750
Materials management	<u>3,67,500</u>
Total	<u>12,25,000</u>

ABC Ltd estimated the following activity-base usage quantities and units produced for each of its three products:

Products	Number of Units	Direct Labour hours	Setups	Production Orders	Inspections	Material requisitions
Product K	10,000	25,000	80	80	35	320
Product L	2,000	10,000	40	40	40	400
Product M	<u>50,000</u>	<u>1,40,000</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>30</u>
Total cost	<u>62,000</u>	<u>1,75,000</u>	<u>125</u>	<u>125</u>	<u>75</u>	<u>750</u>

Instructions:

1. Determine the factory overhead cost per unit for Products K, L and M under the single plantwide factory overhead rate method. Use direct labor hours as the activity base.
2. Determine the factory overhead cost per unit for Products K, L and M under activity-based costing.
3. Which method provides more accurate product costing? Why?

SUGGESTED ANSWERS/HINTS

1. Variable Costing Income Statement

	Rs.	Rs.
Sales (60,000 × Rs. 30)		18,00,000
Variable cost of goods sold:		
Beginning inventory (10,000 × Rs. 24)	2,40,000	
Variable cost of goods manufactured (50,000 × Rs. 25)	<u>12,50,000</u>	
Variable cost of goods sold		<u>14,90,000</u>
Manufacturing margin		3,10,000
Variable selling and administrative expenses		<u>65,000</u>
Contribution margin		2,45,000
Fixed Costs:		
Fixed manufacturing costs	1,00,000	
Fixed selling and administrative expenses	<u>45,000</u>	<u>1,45,000</u>
Income from operations		<u>1,00,000</u>

Absorption Costing Income Statement

	Rs.	Rs.
Sales (60,000 × Rs. 30)		18,00,000
Cost of goods sold:		
Beginning inventory (10,000 × Rs. 26)	2,60,000	
Cost of goods manufactured (50,000 × Rs. 27)	<u>13,50,000</u>	
Cost of goods sold		<u>16,10,000</u>
Gross profit		1,90,000
Selling and administrative expenses (Rs. 65,000 + Rs. 45,000)		<u>1,10,000</u>
Income from operations		<u>80,000</u>

2. (a) Contribution and Profitability Analysis

	Total	Per unit
Sales*	Rs 2,88,000	Rs 32
Less Variable costs		
Direct material	54,000	6
Direct wages	72,000	8
Production Overheads	18,000	2

	Admn , S & D OH	27,000		3
			1,71,000	19
	Contribution		1,17,000	13
Less	Fixed Overheads			
	Production	42,000		
	Admn , S & D	36,000		
			78,000	
			39,000	

*Capacity utilisation: 75%

$$P/V \text{ Ratio} = (S - V)/S \times 100 = 40.625\%$$

$$BE \text{ Sales} = \text{Fixed costs} \div P/V \text{ Ratio}$$

$$= 78,000 \div 40.625\%$$

$$= \text{Rs } 1,92,000$$

$$\text{or } 1,92,000 \div \text{Rs } 32 = 6,000 \text{ Units}$$

(b)	Production	90% Capacity(10,800 Units)	100% Capacity(12,000 Units)
	Selling price per unit	Rs 28	Rs 27.20
	Variable cost per unit	19	19.00
	Contribution per unit	9	8.20
	P/V Ratio	31.143%	30.147%
	Total contribution	97,200	98,400
	Less Fixed Overheads	78,000	83,000
		19,200	15,400

The P/V Ratio has gone down to 31.143% in the case of alternative b(i) and to 30.147% in alternative b(ii). Therefore the company should follow the original plan as at (a) above

(c) (i)	Selling price per unit	Rs 32
	Less Variable costs	19
	Contribution per unit	13
	Total contribution (12,000 × Rs 13)	1,56,000
	Less fixed costs	93,000
	Profit	63,000

This proposal may be expected as there is a considerable increase in the profits.

$$\begin{aligned}
 3. \quad (a) \quad 1. \quad (a) \quad \text{Contribution margin ratio} &= \frac{\text{Sales} - \text{Variable costs}}{\text{Sales}} \\
 \text{Contribution margin ratio} &= \frac{(60,000 \text{ units} \times \text{Rs. } 20) - (60,000 \text{ units} \times \text{Rs. } 14)}{(60,000 \text{ units} \times \text{Rs. } 20)} \\
 \text{Contribution margin ratio} &= \frac{\text{Rs. } 1,20,000 - \text{Rs. } 8,40,000}{\text{Rs. } 12,00,000} = \frac{\text{Rs. } 3,60,000}{\text{Rs. } 12,00,000} \\
 \text{Contribution margin ratio} &= 30\%
 \end{aligned}$$

(b) Unit contribution margin = Unit selling price – Unit variable costs

$$\text{Unit contribution margin} = \text{Rs. } 20 - \text{Rs. } 14 = \text{Rs. } 6$$

$$2. \quad \text{Break - even sales (units)} = \frac{\text{Fixed costs}}{\text{Unit contribution margin}}$$

$$\text{Break - even sales (units)} = \frac{\text{Rs. } 2,88,000}{\text{Rs. } 6} = 48,000 \text{ units}$$

3. Margin of safety:

	Rs.
Expected sales (60,000 units × Rs. 20)	12,00,000
Break-even point (48,000 units × Rs. 20)	<u>9,60,000</u>
Margin of safety	<u>2,40,000</u>

Or

$$\text{Margin of safety} = \frac{\text{Sales} - \text{Sales at break - even point}}{\text{Sales}}$$

$$\text{Margin of safety} = \frac{\text{Rs. } 2,40,000}{\text{Rs. } 12,00,000} = 20\%$$

(b) (Standard price – actual price) × number of kgs purchased
 (Rs 0.72 – 0.75) × 4,500 kgs = Rs 135 unfavourable

4. 1.

ABC Ltd

Sales Budget
 for the Month ending July 31, 2006

Product	Unit Sales Volume	Unit Selling Price	Total Sales
		Rs.	Rs.
Product K	40,000	30.00	12,00,000
Product L	20,000	65.00	<u>13,00,000</u>
Total revenue from sales			<u>25,00,000</u>

2.

ABC Ltd.

Production Budget
 for the Month ending July 31, 2006

	Units	
	Product K	Product L
Sales	40,000	20,000
Plus desired inventories at July 31, 2006	<u>2,500</u>	<u>2,000</u>
Total	42,500	22,000
Less: Estimated inventories, July 1, 2006	<u>3,000</u>	<u>2,700</u>
Total production	<u>39,500</u>	<u>19,300</u>

3.

ABC Ltd			
Direct Materials Purchases Budget for the Month ending July 31, 2006			
	<i>Direct Materials</i>		
	<i>Material A</i>	<i>Material B</i>	<i>Total</i>
Units required for production:			
Product K (39,500 × lbs. per unit)	27,650 kgs*	47,400 *	
Product L (19,300 × lbs. per unit)	67,550 kgs**	34,740 **	
Plus desired units of inventory			
July 31, 2006		<u>2,500</u>	
	<u>3,000</u>		
Total	98,200	84,640 kgs,	
	kgs.		
Less estimated units of inventory			
July 1, 2006	<u>4,000</u>	<u>3,500</u>	
Total units to be purchased	94,200	81,140 kgs.	
	kgs.		
Unit price	<u>..... ×</u> <u>.....Rs.4.00</u>	<u>.....×</u> <u>Rs.2.00</u>	
Total direct materials purchases	<u>Rs. 3,76,800</u>	<u>Rs. 1,62,280</u>	<u>Rs. 5,39,080</u>

$$*27,650 = 39,500 \times 0.7 \quad 47,400 = 39,500 \times 1.2$$

$$**67,550 = 19,300 \times 3.5 \quad 34,740 = 19,300 \times 1.8$$

4.

ABC Ltd			
Direct Labour Cost Budget for the Month ending July 31, 2006			
	<i>Department 1</i>	<i>Department 2</i>	<i>Total</i>
Hours required for production:			
Product K (39,500 × hours per unit)	15,800*	5,925*	
Product L (19,300 × hours per unit)	<u>11,580**</u>	<u>4,825**</u>	
Total	27,380	10,750	
Hourly rate	<u>× Rs.12.00</u>	<u>× Rs.16.00</u>	
Total	Rs.3,28,560	Rs.1,72,000	<u>Rs. 5,00,560</u>

$$*15,800 = 39,500 \times 0.4 \quad 5,925 = 39,500 \times 0.15$$

$$**11,580 = 19,300 \times 0.6 \quad 4,825 = 19,300 \times 0.25$$

5.

ABC Ltd			
Cost of Goods sold Budget for the Month ending July 31, 2006			
		<i>Rs.</i>	<i>Rs.</i>
Finished goods inventory, July 1, 2006			1,45,500
Direct materials:			
Direct materials inventory, July 1, 2006 (Note A)		23,000	

Direct materials purchases	<u>5,39,080</u>	
Cost of direct materials available for use	5,62,080	
Less: Direct materials inventory, July 31, 2006 (Note B)	<u>17,000</u>	
Cost of direct materials placed in production	5,45,080	
Direct labour	5,00,560	
Factory overhead	<u>2,99,000</u>	
Cost of goods manufactured		<u>13,44,640</u>
Cost of finished goods available for sale		14,90,140
Less: Finished goods inventory, July 31, 2006		<u>1,12,500</u>
Cost of goods sold		<u>13,77,640</u>

Note A:			Rs.
Material A	4,000 kgs.	at Rs. 4.00 per kg.	16,000
Material B	3,500 kgs.	at Rs. 2.00 per kg.	<u>7,000</u>
Direct materials inventory, July 1, 2006			<u>23,000</u>

Note B:			Rs.
Material A	3,000 kgs.	at Rs. 4.00 per kg.	12,000
Material B	2,500 kgs.	at Rs. 2.00 per kg.	<u>5,000</u>
Direct materials inventory, July 31, 2006			<u>17,000</u>

5. 1 Direct Materials Cost Variance

Quantity Variance:

Actual quantity	1,600 kgs	
Standard quantity	1500 kgs	
Variance – unfavourable	100 kgs × Std price, Rs 35	Rs. 3,500

Price Variance:

Actual price	Rs. 32.00 per kg	
Standard price	35	
Variance – favourable	Rs(300) per kg × Actual Qty, 1600	<u>(4,800)</u>
Total direct materials cost variance - favourable		Rs. <u>(1,300)</u>

2 Direct Labour Cost Variance

Time Variance:

Actual time	4,500 hours	
Standard time	4,800 hours	
Variance – favourable	(300 hours) × Std rate, Rs 11	Rs. (3,300)

Rate Variance:

Actual rate	Rs. 11.80	
Standard rate	11.00	
Variance – favourable	Rs 0.80 per hr × Actual time, 4500 hours	<u>3,600</u>
Total direct labour cost variance - unfavourable		Rs. <u>300</u>

3. Factory Overhead Cost Variance

Variable factory overhead – controllable variance:

Actual variable factory overhead cost incurred	Rs. 12,300	
Budgeted variable factory overhead for 4,800 hours	<u>11,520*</u>	
Variance – unfavourable		Rs. 780

Fixed factory overhead – volume variance:

Budgeted hours at 100% of normal capacity	5,500 hours	
Standard hours for actual production	<u>4,800</u>	
Productive capacity not used	700 hours	
Standard fixed factory overhead cost rate	<u>× Rs. 3.50</u> hours	
Variance – unfavourable		<u>2,450</u>

Total factory overhead cost variance – unfavourable Rs. 3,230

*4,800 hours × Rs. 2.40 = Rs. 11,520

6. (i) Standard Variable O.H. rate = Rs. 1,80,000 ÷ 15,000 = Rs. 12 per hr.

Standard Fixed OH rate = 2,70,000 ÷ 15,000 = Rs. 18 per hr.

Material Variances (Actual Production : 25,000 Units)

Std Qty of RM /FG	Std Price of RM/kg	Std Qty of RM on Actual Production	Actual Qty of RM on Actual Production	Actual Price paid for RM	Usage Variance(Rs)	Price Variance(Rs)
(a)	(b)	(c)	(d)	(e)	(c – d) × b	(b – e) × d
3 kg	Rs 4.40	75,000 kgs	80,000	Rs 4.20	(22,000)	16,000

Labour Variances

Std time / FG	Std rate per hour	Std time on Actual Production	Actual time on Actual Production	Actual rate per hour	Efficiency Variance(Rs)	Rate Variance(Rs)
(a)	(b)	(c)	(d)	(e)	(c – d) × b	(b – e) × d
30 min	Rs 5	12,500 hrs	14,000 hrs	Rs 5.4	(7,500)	(5,600)

Variable Overhead Variances

Actual variable overhead	= Rs. 1,60,000 (a)
(Rs. 4,30,000 – Rs. 2,70,000)	
Actual Hours worked at Standard V.O.H. rate	= Rs. 1,68,000 (b)
(28,000 × 0.5 hr × Rs. 12)	
Standard Variable O.H. for actual production	= Rs. 1,50,000 (c)
(25,000 units × 0.5 hr × Rs. 12)	
Variable O.H. Expenditure variance	= (a) – (b)
	= Rs. 1,60,000 – Rs. 1,68,000
	= Rs. 8,000 (F)
Variable O.H. Efficiency variance	= (b) – (c)
= Rs. 1,68,000 – Rs. 1,50,000	= Rs. 18,000 (A)

Fixed Overhead Variances

Actual fixed overhead incurred	= Rs. 2,70,000
Budgeted Fixed Overhead	= Rs. 2,70,000
Expenditure Variance	= Nil
Budgeted production	= 3 0,000 Units
Actual production	= 25,000 Units
Unutilised capacity	= 5,000 Units or 2,500 Hrs
Production volume variance	= 2,500 Hrs × Rs 18 per hr
	= (Rs 45,000)

(ii) Reconciliation

Standard Cost 25,000×Rs. 30.70			=7,67,500
Variances			
Materials	Favourable	<u>Adverse</u>	
Price usage	Rs. 16,000		
Usage		Rs. 22,000	
Labour			
Rate		5,600	
Efficiency		7,500	
Variable OH			
Expenditure	8,000		
Efficiency		18,000	
Fixed OH.			
Expenditure	-		
Volume		45,000	74,100 (A)
Actual cost			8,41,600

7. Computation of Target Cost

	<i>Per tonne (in Rs)</i>
ABC Ltd selling price to the merchant	1,466
Less freight paid by ABC Ltd	(30)
Less normal sales returns and allowances	(60)
XYZ Ltds Capital charge	(120)
Target cost for XYZ Ltd	1,256
Ship to Distribution Centre	(11)
Distribution Centre operating cost	(25)
Subtotal	1,220
Distribution centre capital charge	(58)
Mill target manufacturing cost	1,162

8. 1. Rs. 1,60,000 (Rs. 16,00,000 × 10%)
 2. a. Total costs:

	Rs.
Variable (Rs. 25 × 80,000 units)	20,00,000
Fixed (Rs. 8,00,000 + Rs. 4,00,000)	<u>12,00,000</u>
Total	<u>32,00,000</u>

Cost amount per unit: Rs. 32,00,000 ÷ 80,000 units = Rs. 40.00

b. Markup percentage = $\frac{\text{Desired profit}}{\text{Total costs}}$

Markup percentage = $\frac{\text{Rs. 1,60,000}}{\text{Rs. 32,00,000}} = 5\%$

	Rs.
Cost amount per unit	40.00
Markup (Rs. 40 × 5%)	<u>2.00</u>
Selling price	<u>42.00</u>

3. a. Total manufacturing costs:

	Rs.
Variable (Rs. 20 × 80,000 units)	16,00,000
Fixed factory overhead	<u>8,00,000</u>
Total	<u>24,00,000</u>

Cost amount per unit: Rs. 24,00,000 ÷ 80,000 units = Rs. 30.00

b. Markup percentage = $\frac{\text{Desired profit} + \text{Total selling and administrative expenses}}{\text{Total manufacturing costs}}$

Markup percentage = $\frac{\text{Rs. 1,60,000} + \text{Rs. 4,00,000} + (\text{Rs. 5} \times 80,000 \text{ units})}{\text{Rs. 24,00,000}}$

Markup percentage = $\frac{\text{Rs. 1,60,000} + \text{Rs. 4,00,000} + \text{Rs. 4,00,000}}{\text{Rs. 24,00,000}}$

Markup percentage = $\frac{\text{Rs. 9,60,000}}{\text{Rs. 24,00,000}} = 40\%$

	Rs.
Cost amount per unit	30.00
Markup (Rs. 30 × 40%)	<u>12.00</u>
Selling price	<u>42.00</u>

4. a. Variable cost amount per unit : Rs. 25
 Total variable costs: Rs. 25 × 80,000 units = Rs. 20,00,000

b. Markup percentage = $\frac{\text{Desired profit} + \text{Total fixed costs}}{\text{Total variable costs}}$

Markup percentage = $\frac{\text{Rs. 1,60,000} + \text{Rs. 8,00,000} + \text{Rs. 4,00,000}}{\text{Rs. 20,00,000}}$

Markup percentage = $\frac{\text{Rs. 13,60,000}}{\text{Rs. 20,00,000}} = 68\%$

c.

	Rs.
Cost amount per unit	25.00
Markup (Rs. 25 × 68%)	<u>17.00</u>
Selling price	<u>42.00</u>

5. a. Proposal to Sell to XYZ Ltd.

	Rs.
Differential revenue from accepting offer:	
Revenue from sale of 4,000 additional units at Rs. 28	1,12,000
Differential cost from accepting offer:	
Variable production costs of 4,000 additional units at Rs. 20	<u>80,000</u>
Differential income from accepting offer	<u>32,000</u>

b. The proposal should be accepted.

9. (a) Production plan and net profit

Timber required

	Square metres	Budgeted volume	Requirement (square metres)
	(a)	(b)	(a × b)
Chair	Rs. (5 ÷ 2) = 2.5	4,000	10,000
Bench	Rs. (15 ÷ 2) = 7.5	2,000	15,000
Table	Rs. (10 ÷ 2) = 5.0	1,500	<u>7,500</u>
			<u>32,500</u>

Therefore, there is a shortfall of 12,500 square metres.

	Chair	Bench	Table
Unit contribution	Rs. 8.00	Rs. 17.50	Rs. 16.00
Timber requirement (square metres)	2.5	7.5	5.0
Contribution per square metre	Rs. 3.20	Rs. 2.33	Rs. 3.20
Ranking	1st =	3rd =	1st =

Production plan

	Square metres	Contribution Rs
4,000 chairs (inclusive of 500 firm orders)	10,000.0	32,000.00
1,500 tables (inclusive of 150 firm orders)	7,500.0	24,000.00
333 benches (inclusive of 100 firm orders)	<u>2,497.5</u>	<u>5,827.50</u>
	<u>19,997.5</u>	61,827.50
Fixed overhead (Rs18,000 + Rs22,500 + Rs13,500)		<u>54,000.00</u>
Profit		<u>7,827.50</u>

- (b) Since the optimum production plan in part (a) indicates that demand for chairs and tables is satisfied by production, any additional timber would be utilized to manufacture benches.

Each square metre used on a bench contributes Rs2.33 (see part (a) after charging the present cost of timber (Rs. 2 per square metre).

Therefore the maximum price to be paid is Rs2.33 + Rs2 = Rs 4.33 per square metre.

Unsatisfied demand = (2,000 – 333) 1,667 benches.

∴ Timber required is 1,667 × 7.5 square metres = 12,502.5 square metres, less the 2.5 square metres still available from the original supplier = 12,500 square metres.

10. The costs/benefits of closing on 30 November, 2006 instead of closing on 30 June, 2006 are:

	Rs.	Rs.
Payments to XYZ Ltd avoided (5 months @ Rs. 65,000)		3,25,000
*Salaries and wages cost		
(5 months @ (Rs. 18,000 + Rs. 4,000 – Rs. 3,000 + Rs. 1,300))		(1,01,500)
**Printing materials		
(5 months @ Rs. 31,000) – Rs. 18,000 + Rs. 10,000)		(1,47,000)
***Distribution materials		(5,280)
Occupancy costs		
****Printing	17,212.50	
*****Distribution	<u>2,175.00</u>	
		(19,387.50)
Loss of sub-letting income (5 months @ Rs. 2,500)		(12,500)
*****Additional loss on sale of plant		<u>(2,000)</u>
Additional loss on sale of vehicles (Rs. 48,000 – Rs. 44,000)		<u>(4,000)</u>
Net benefit of closing on 30 November		<u>33,332.50</u>

The plant should remain open until 30 November.

- * The total salaries equal Rs. 22,000 (Rs. 18,000 + Rs. 4,000) but two staff will be retained so the net saving of closing on 30 June is reduced by their salaries (Rs. 3,000 per month). If closure does not occur until November, the vacancy in the publishing department will need to be filled (at Rs. 1,300 per month) until closure in November when the transfer occurs. The redundancy pay will arise whenever closure occurs and is therefore irrelevant.
- ** The future cash outflow on printing materials is Rs. 31,000 per month for five months less the Rs. 18,000 held in stock. However, the opportunity to sell the stock is lost, therefore,

there is an additional cost of Rs. 10,000.

*** If the department is closed then the options are (from note (ii) in the question):

- (i) Accept both deliveries, pay for them and sell the goods to XYZ Ltd:
 $(2 \times \text{Rs. } 500) - (2 \times \text{Rs. } 380) = \text{Rs. } 240 \text{ net cost.}$
- (ii) Accept the July delivery, pay for it, sell it to XYZ Ltd and pay the cancellation cost for August:
 $(\text{Rs. } 500 - \text{Rs. } 380) + \text{Rs. } 100 = \text{Rs. } 220 \text{ net cost.}$
- (iii) Cancel both deliveries at a net cost of Rs. 300.

The lowest cost option would be selected if closure occurred, therefore this is a benefit of continuing to November.

The distribution material costs to November are (5 months @ Rs. 1,100) – Rs. 220 = Rs. 5,280.

**** Attributable costs are $[(\text{Rs. } 8,500 \times 30\%) + (\text{Rs. } 8,500 \times 70\% \times 15\%)] \times 5 \text{ months}$
 = Rs. 17,212.50.

***** Attributable costs are $[(\text{Rs. } 1,200 \times 25\%) + (\text{Rs. } 1,200 \times 75\% \times 15\%)] \times 5 \text{ months}$
 = Rs. 2,175.

*****	Rs.
Net book value	48,000
June sale	<u>21,000</u> loss
Therefore June proceeds	27,000
November proceeds	<u>25,000</u>
Additional loss	<u>2,000</u>

11. (a) Back flushing in a JIT system

Traditional accounting systems record the flow of inventory through elaborate accounting procedures. Such systems are required in those manufacturing environment where inventory/WIP values are large. However, since JIT systems operate in modern manufacturing environment characterized by low inventory and WIP values, usually also associated with low cost variances, the requirements of such elaborate accounting procedures does not exist.

Back flushing requires no data entry of any kind until a finished product is completed. At that time the total amount finished is entered into the computer system which is multiplied by all components as per the Bill of materials (BOM) for each item produced. This yields a lengthy list of components that should have been used in the production process and this is subtracted from the opening stock to arrive at the closing stock to arrive at the closing stock/inventory.

The problems with back flushing that must be corrected before it works properly are:

- (i) The total production quantity entered into the system must be absolutely correct, if not, then wrong components and quantities will be subtracted from the stock.
- (ii) All abnormal scrap must be diligently tracked and recorded. Otherwise materials will fall outside the back flushing system and will not be charged to inventory.
- (iii) Lot tracing is impossible under the back flushing system. This is required when a manufacturer needs to keep records of which production lots were used to create a product in case all the items in a lot need be recalled.
- (iv) The inventory balance may be too high at all times because the back flushing transactions that relieves inventory usually does so only once a day, during which time

other inventory is sent to the production process. This makes it difficult to maintain an accurate set of inventory records in the warehouse.

(b) Reasons for following skimming pricing policy

It is a policy where the prices are kept high during the early period of a product's existence. This can be synchronised with high promotional expenditure and in the latter years the prices can be gradually reduced. The reasons for following such a policy are as follows:

- (i) The demand is likely to be inelastic in the earlier stages till the product is established in the market.
- (ii) The gradual reduction in price in the latter years will tend to increase the sales.
- (iii) This method is preferred in the beginning because in the initial periods when the demand for the product is not known the price covers the initial cost of production.
- (iv) High initial capital outlays needed for manufacture, results in high cost of production. In addition to this, the producer has to incur huge promotional activities resulting in increased costs. High initial prices will be able to finance the cost of production particularly when uncertainties block the usual sources of capital.

12. The 'Balanced Scorecard' aims to provide information to management to assist in strategic policy formulation and achievement. It emphasizes the need to provide the user with a set of information which addresses all relevant areas of performance in an objective and unbiased fashion. For further details, please refer to chapter 14 of the Institute's Cost Management book.

13. (a) Cost classification is the process of grouping costs according to their characteristics. Costs are classified or grouped according to their common characteristics. Costs may be classified according to elements, according to functions or operations, according to their behaviour, according to controllability or according to normality.

The break up of the aggregate costs into relevant types, is an essential pre-requisite of decision making as well as of controlling costs. Classification of costs on different bases is thus necessary for various purposes. For the purpose of decision-making and control, costs are distinguished on the basis of their relevance to different type of decisions and control functions. The importance of distinguishing costs as direct or indirect lies in the fact that direct costs of a product or an activity can be accurately allocated while indirect costs have to be apportioned on the basis of certain assumptions. This is so because direct costs are controllable at the operational level whereas indirect costs are not amenable to such control.

(b) Cost information is required both for short-term and long-run managerial problems. Differential costs are of particular use in short-term problems which are non-repetitive, one-time, ad-hoc problems. The following are the most common short-term problems and areas where differential cost analysis may be deployed.

1. Accept - or - reject special order decisions.
2. Make - or - buy decisions.
3. Sell- or - process decisions.
4. Reduce - or - maintain price decisions.
5. Add - or - drop product decisions.
6. Operate - or shut down decisions.

(c) Relevant costs are pertinent or valid costs for a decision. These bear upon or 'influence decision' and are directly related to the decisions to be made. These are critical to the decision, and have significance for it. These are the costs which generally respond to managerial decision making, and have significance in arriving at correct conclusions. These costs are capable of making a difference in user-decisions and enter into a choice between alternative courses of action. In specific terms, relevant costs for decisions are defined as "expected future costs that will differ under alternatives".

Relevant costs are futuristic in nature. These are the costs that are expected to occur during the time period covered by the decision. These costs are different between alternatives being considered. Only costs that differ among decision alternatives are relevant to a decision.

14. (a) The possible disadvantages of treating divisions as profit centres are as follows:
1. Divisions may compete with each other and may take decisions to increase profits at the expense of other divisions thereby overemphasizing short term results.
 2. It may adversely affect co-operation between the divisions and lead to lack of harmony in achieving organisational goals of the company. Thus it is hard to achieve the objective of goal congruence.
 3. It may lead to reduction in the company's overall total profits.
 4. The cost of activities which are common to all divisions may be greater for decentralised structure than for centralised structure. It may thus result in duplication of staff activities.
 5. Top management may lose control by delegating decision making to divisional managers. There are risks of mistakes committed by the divisional managers which the top management, may avoid.
 6. Series of control reports prepared for several departments may not be effective from the point of view of top management.
 7. It may under utilise corporate competence.
 8. It leads to complications associated with transfer pricing problems.
 9. It becomes difficult to identify and define precisely suitable profit centres.
 10. It confuses division's results with manager's performance.
- (b) Bench marking is a technique which is being adopted as a mechanism for achieving continuous improvement. It is a continuous process of measuring a company's products, services or activities against the other best performing organizations either internal or external to the company. The objective is to ascertain how the processes and activities can be improved. The latest developments, best practices and model examples can be incorporated within various operations of the business of the company. It represents an ideal way of achieving high competitive standards.

15. (a) **Standard Cost Sheet**

Max. capacity = 200 units.

Description	Cost per unit of Finished Good
Standard Raw Material Cost	Rs 5,600
Variable Overheads	Rs 1,400
Standard Fixed Overheads	Rs 10,000
Standard Cost per Unit of Finished Good	Rs 17,000

(b) **Production Volume Variance**

Unutilised capacity × Standard Fixed Cost per Finished Good

$$100 \times \text{Rs } 10,000 = \text{Rs } 10,00,000 \text{ Adverse}$$

Usage and Material Price Variance (Actual Production : 100 Units)

Raw Material	Std Qty/FG	Std. Qty on actual prod	Actual Qty on actual prod	Act Price per unit of RM (Rs.)	Std Price per unit of RM (Rs.)	Usage Variance (Rs.)	Price Variance (Rs.)
A	1	100	102	700	600	(1,200)	(10,200)
B	2	200	201	600	500	(500)	(20,100)
C	3	300	310	500	400	(4,000)	(31,000)
D	4	400	415	400	300	(4,500)	(41,500)
E	5	500	540	300	200	(8,000)	(54,000)
F	6	600	610	200	100	(1,000)	(61,000)
						(19,200)	(2,17,800)

16. Marginal Costing vs. Absorption Costing

1. While applying Marginal Costing only variable costs are considered for Product Costing and Inventory Valuation purposes whereas both fixed and variable costs are considered while using Absorption Costing.
2. Expenses are classified on the basis of their nature i.e, fixed or variable in Marginal Costing whereas the classification of expenses is done on the basis of functions while applying Absorption Costing.
3. Marginal Costing considers fixed costs as period costs whereas the same costs are considered to be inventoriable costs for Absorption Costing purposes.
4. Marginal Costing reports emphasise more on the Contribution quantum whereas Absorption Costing highlights Net Profits.
5. The difference in the magnitude of the opening and the closing stock does not effect the unit cost of production in case Product Costing is done using the Marginal Costing concepts. However, in case Absorption Costing is used the unit cost of production may be effected due to the impact of fixed overheads.
6. There is no related Volume Variance in case a Marginal Costing system is used. However, in case of an Absorption Costing system, Volume Variance plays a prominent role for decision making and control purposes.

Limitations of Marginal Costing

- ◆ The use of Marginal Costing necessitates the need to classify expenses as fixed and variable. Frequently most of the expenses are semi-variable and so need to be divided amongst their variable and fixed components. This is difficult in practical situations.
- ◆ Contribution by itself is not a guide towards attaining optimum profitability. It needs to be interpreted along with the key factor.
- ◆ It is not practical to exclude overheads of fixed nature for valuing work-in-progress of large contracts. The use of Marginal Costing does not provide with useful results for decision making purposes nor does it give a correct valuation of the work-in-progress in such cases.
- ◆ Marginal Costing ignores the time factor as well as the investment involved for decision making purposes. For example two products may have the same Marginal Cost , however one of them can be produced in a shorter time and hence it should be the preferable produce. However , Marginal Costing ignores this time factor. Similarly the quantum of investment involved for alternative uses available are not considered in Marginal Costing.

- 17 Using the 85% experience curve the cost of first five planes should be approximately

$$T_1 = \text{Rs. } 150,000,000 \times 1.0000 = \text{Rs. } 150,000,000$$

$$T_2 = \text{Rs. } 150,000,000 \times 0.8500 = \text{Rs. } 127,500,000$$

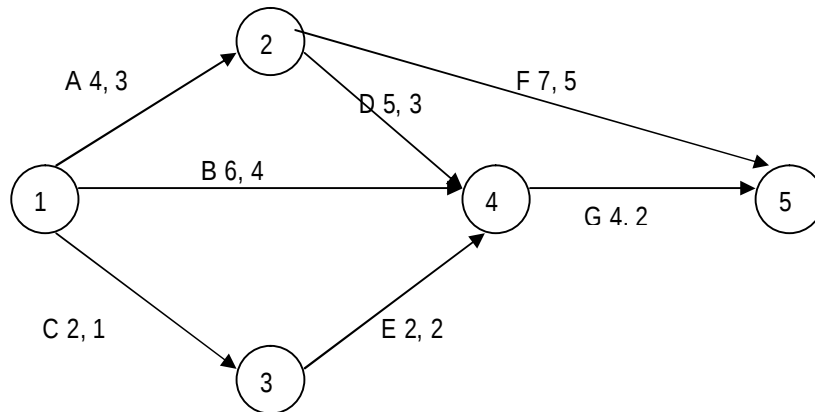
$$T_3 = \text{Rs. } 150,000,000 \times 0.7730 = \text{Rs. } 115,950,000$$

$$T_4 = \text{Rs. } 150,000,000 \times 0.7230 = \text{Rs. } 108,450,000$$

$$T_5 = \text{Rs. } 150,000,000 \times 0.6860 = \text{Rs. } 102,900,000$$

From the 85% column in table the total time factor for 25 units is 14.801, so the total cost for the 25 planes will be Rs. $150,000,000 \times 14.801 = \text{Rs. } 2,220,150,000$. Dividing this by 25 gives the average cost of Rs. 88,806,000.

- 18.



from the diagram we have:

Path	Length	
	Normal Time (days)	Crash Time (days)
1 – 2 – 5	11	8 (critical)
1 – 2 – 4 – 5	13 (critical)	8 (critical)
1 – 4 – 5	10	6
1 – 3 – 4 – 5	8	5

Thus the normal duration of completion is 13 days while the minimum (crash) completion time of the project is 8 days.

Cost slope: The per day cost slope for each activity can be obtained as follows:

$$\text{Cost slope} = (\text{Crash cost} - \text{Normal cost}) / (\text{Normal time} - \text{Crash time})$$

For activity A we have

$$\text{Cost slope} = (90 - 60) / (4 - 3) = \text{Rs. } 30 \text{ per day}$$

For the various activities the cost slopes are:

Activity	Node	Cost slope per day (Rs)
A	1 – 2	30
B	1 – 4	50
C	1 – 3	22

D	2 – 4	50
E	3 – 4	-
F	2 – 5	30
G	4 – 5	70

Crashing the step-wise crashing is given in the table 3 while the cost of completing the project in 13, 12 days is given in table 4

Table 3 : Crashing the project

Crashing	Critical Path	Options	Cost	Decisions	Duration after crashing
I	1 – 2 – 4 – 5	1 – 2	30	Crash 1 – 2	12
		2 – 4	50		
		4 – 5	70		
II	1 – 2 – 4 – 5	2 – 4	50	Crash 2 – 4	11
		4 – 5	70		
III	1 – 2 – 4 – 5	2 – 4	50	Crash 2 – 4	10
		4 – 5	70		
IV	1 – 2 – 5	2 – 5, 4 – 5	100	Crash 2 – 5, 4 – 5	9
	1 – 2 – 4 – 5				
	1 – 4 – 5				
	1 – 2 – 5				
V	1 – 2 – 4 – 5	2 – 5, 4 – 5	100	Crash 2 – 5, 4 – 5	8
	1 – 4 – 5				

The length of various paths after each crashing is given here

Path	Normal Length	Length after crashing				
		I	II	III	IV	V
1 – 2 – 5	11	10	10	10	9	8
1 – 2 – 4 – 5	13	12	11	10	9	8
1 – 4 – 5	10	10	10	10	9	8
1 – 3 – 4 – 5	8	8	8	8	7	6

Table 4: Determination of Total cost

Project Duration (days)	Direct Cost	Indirect Cost	Total Cost (Rs)		
	Normal	Crashing	Total		
13	713	0	713	400	1113
12	713	30	743	250	993
11	713	80	793	175	968
10	713	130	843	100	943 (MIN)
9	713	230	943	75	1018
8	713	330	1043	50	1093

19. Material A is not yet owned. It would have to be bought in full at the replacement cost of Rs. 6 per unit.

Material B is used regularly by the company. There are existing stocks (600 units) but if these are used on the contract under review a further 600 units would be bought to replace them. Relevant costs are therefore 1,000 units at the replacement cost of Rs. 5 per unit.

1,000 units of material C are needed and 700 are already in stock. If used for the contract, a further 300 units must be bought at Rs. 4 each. The existing stock of 700 will not be replaced. If they are used for the contract, they could not be sold at Rs. 2.50 each. The realisable value of these 700 units is an opportunity cost of sales revenue forgone.

The required units of material D are already in stock and will not be replaced. There is an opportunity cost of using D in the contract because there are alternative opportunities either to sell the existing stocks for Rs. 6 per unit (Rs. 1,200 in total) or avoid other purchases (of material E), which would cost $300 \times \text{Rs. } 5 = \text{Rs. } 1,500$. Since substitution for E is more beneficial, Rs.1,500 is the opportunity cost.

Summary of relevant costs

	Rs.
Material A (1,000×Rs. 6)	6,000
Material B (1,000×Rs. 5)	5,000
Material C (300×Rs. 4) plus (700×Rs. 2.50)	2,950
Material D	1,500
Total	15,450

20. The random number intervals are determined in the first place as shown in table 1 and 2

Table 1: Random Number Intervals for Demand (units)

Demand	No. of Days	Prob.	Cum. Prob.	Random No. Interval
5	15	.15	.15	00-14
6	25	.25	.40	15-39
7	30	.30	.70	40-69
8	18	.18	.88	70-87
9	8	.08	.96	88-95
10	4	.04	1.00	96-99

Table 2: Random Number Intervals for Lead Time (in days)

Lead time	Probability	Cum. Probability	Random Number Interval
3	.2	.20	00-19
4	.3	.50	20-49
5	.35	.85	50-84
6	.15	1.00	85-99

Table 3 : Simulation Worksheet

Trial	Opening Balance	Random No.	Demand	Closing Balance	Random No.	Lead Time	Ordering Cost	Holding Cost	Shortage Cost
1	25	69	7	18	81	5	100	54	
2	18	61	7	11				33	

3	11	83	8	3				9	
4	3	85	8	0					100
5	0	27	6	0					120
6	40	57	7	33				99	
7	33	81	8	25				75	
8	25	48	7	18	86	6	100	54	
9	18	67	7	11				33	
10	11	52	7	4				12	
11	4	23	6	0					40
12	0	11	7	0					100
13	0	59	5	0					140
14	40	3	5	35				105	
15	35	3	5	30				90	
16	30	74	8	22				66	
17	22	64	7	15	40	4	100	45	
18	15	70	8	7				21	
19	7	43	7	0					0
20	0	87	8	0					160
<i>Total Cost</i>							300	696	660

21. The random number intervals are determined in the first place as shown in table 1 and 2

Table 1 Random Number Intervals (rained previously)

Event	Probability	Cum. Probability	Random Number Interval
No rain	.50	.5	00-49
1 cm rain	.25	.75	50-74
2 cm rain	.15	.90	75-89
3 cm rain	.05	.95	90-94
4 cm rain	.03	.98	95-97
5 cm rain	.02	1.00	98-99

Table 2 Random Number Intervals (No. Rain previously)

Event	Probability	Cum. Probability	Random Number Interval
No rain	.75	.75	00-74
1 cm rain	.15	.90	75-89
2 cm rain	.06	.96	90-95
3 cm rain	.04	1.00	96-99

The rainfall can now be predicted in accordance with the random number generated

Table 3: Simulation Worksheet

Day	Random Numbers	Rainfall (cm)	Table References
1	76	1	Table 2
2	78	2	Table 1

3	84	2	Table 1
4	75	2	Table 1
5	02	No rain	Table 1
6	86	1	Table 2
7	02	No rain	Table 1
8	78	1	Table 2
9	07	No rain	Table 1
10	63	No rain	Table 2

Total days without rain are 4 and total rain is 9 cm

$$\begin{aligned}
 \text{22. 1. Single plantwide factory overhead rate} &= \frac{\text{Rs. 14,00,000}}{1,75,000 \text{ direct labour hours}} \\
 &= \text{Rs. 8 per direct labour hour}
 \end{aligned}$$

Factory overhead cost per unit:

	<i>Product K</i>	<i>Product L</i>	<i>Product M</i>
Number of direct labour hours	25,000	10,000	1,40,000
Single plant wide factory overhead rate	<u>× Rs.8/dlh</u>	<u>× Rs.8/dlh</u>	<u>× Rs.8/dlh</u>
Total factory overhead	Rs.2,00,000	Rs.80,000	Rs.11,20,000
Number of units	<u>÷ 10,000</u>	<u>÷ 2,000</u>	<u>÷ 50,000</u>
Cost per unit	<u>Rs. 20.00</u>	<u>Rs. 40.00</u>	<u>Rs. 22.40</u>

2. Under activity-based costing, an activity rate must be determined for each activity pool:

Activity	Activity Cost Pool Budget	÷ Estimated Activity Base	= Activity Rate
Set up	Rs. 4,28,750	÷ 125 set ups	= Rs. 3,430 per setup
Production control	Rs. 2,45,000	÷ 125 production orders	= Rs. 1,960 per production order

Activity	Activity Cost Pool Budget	÷ Estimated Activity Base	= Activity Rate
Quality control	Rs. 1,83,750	÷ 75 inspections	= Rs. 2,450 per inspection
Materials management	Rs. 3,67,500	÷ 750 requisitions	= Rs. 490 per requisition
Production	Rs. 1,75,000	÷ 1,75,000 direct labour hours	= Rs. 1 per direct labour hour

These activity rates can be used to determine the activity-based factory overhead cost per unit as follows:

Product K

Activity	Activity –Base Usage	× Activity Rate	= Activity Cost
Set up	80 setups	× Rs. 3,430	= Rs. 2,74,400
Production control	80 production orders	× 1,960	= 1,56,800

Quality control	35 inspections	×	2,450	=	85,750
Materials management	320 requisitions	×	490	=	1,56,800
Production	25,000 direct labour hours	×	1	=	<u>25,000</u>
Total factory overhead					Rs.6,98,750
Unit volume					<u>÷ 10,000</u>
Factory overhead cost per unit					<u>Rs. 69.88</u>

Product L

Activity	Activity –Base Usage	×	Activity Rate	=	Activity Cost
Set up	40 setups	×	Rs. 3,430	=	Rs. 1,37,200
Production control	40 production orders	×	1,960	=	78,400
Quality control	40 inspections	×	2,450	=	98,000
Materials management	400 requisitions	×	490	=	1,96,000
Production	10,000 direct labour hours	×	1	=	<u>10,000</u>
Total factory overhead					Rs.5,19,600
Unit volume					<u>÷ 2,000</u>
Factory overhead cost per unit					<u>Rs. 259.80</u>

Product M

Activity	Activity –Base Usage	×	Activity Rate	=	Activity Cost
Set up	5 setups	×	Rs. 3,430	=	Rs. 17,150
Production control	5 production orders	×	1,960	=	9,800
Quality control	0 inspections	×	2,450	=	0
Materials management	30 requisitions	×	490	=	14,700
Production	1,40,000 direct labour hours	×	1	=	<u>1,40,000</u>
Total factory overhead					Rs.1,81,650
Unit volume					<u>÷ 50,000</u>
Factory overhead cost per unit					<u>Rs. 3.63</u>

3. Activity-based costing is more accurate, compared to the single plant wide factory overhead rate method. Activity-based costing properly shows that Product M is actually less expensive to make, while the other two products are more expensive to make. The reason is that the single plant wide factory overhead rate method fails to account for activity costs correctly. The setup, production control, quality control, and materials management activities are all performed on products in rates that are different from their volumes. For example, Product L requires many of these activities relative to its actual unit volume. Product L requires 40 setups over a volume of 2,000 units (average production run size = 50 units), while Product M has only 5 setups over 50,000 units (average production run size = 10,000 units). Thus, Product L requires greater support costs relative to Product M.

Product M requires minimum activity support because it is scheduled in large batches and requires no inspections (has high quality) and few requisitions. The other two products exhibit the opposite characteristics.