

PAPER – 5 : COST MANAGEMENT

Question No. 1 is compulsory.

Answer any four questions from the rest.

Working notes should form part of the answer wherever appropriate, suitable assumptions should be made.

Question 1

- (a) What are the elements of a Balanced Score card? Also explain how it can be used as a Financial Planning model.
- (b) What is the concept of 'Value-chain' and why is it important for Cost Management?
- (c) Computo Ltd. manufactures two parts 'P' and 'Q' for Computer Industry.

P : annual production and sales of 1, 00,000 units at a selling price of Rs. 100.05per unit.

Q : annual production and sales of 50,000 units at a selling price of Rs. 150 per unit.

Direct and Indirect costs incurred on these two parts are as follows:

	(Rs. in thousand)		
	P	Q	Total
Direct Material cost (variable)	4,200	3,000	7,200
Labour cost (variable)	1,500	1,000	2,500
Direct Machining cost (See Note)*	700	550	1,250
Indirect Costs:			
Machine set up cost			462
Testing cost			2,375
Engineering cost			<u>2,250</u>
			<u>16,037</u>

Note: Direct machining costs represent the cost of machine capacity dedicated to the production of each product. These costs are fixed and are not expected to vary over the long-run horizon.

Additional information is as follows:

	P	Q
Production Batch Size	1,000 units	500 units
Set up time per batch	30 hours	36 hours
Testing time per unit	5 hours	9 hours
Engineering cost incurred on each product	8.40 lacs	14.10 lacs

A foreign competitor has introduced product very similar to 'P'. To maintain the company's share and profit, Computo Ltd. has to reduce the price to Rs. 86.25. The company calls for a meeting and comes up with a proposal to change design of product 'P'. The expected effect of new design is as follows:

- Direct Material cost is expected to decrease by Rs. 5 per unit.
- Labour cost is expected to decrease by Rs. 2 per unit.
- Machine time is expected to decrease by 15 minutes; previously it took 3 hours to produce 1 unit of 'P'. The machine will be dedicated to the production of new design.
- Set up time will be 28 hours for each set up.
- Time required for testing each unit will be reduced by 1 hour.
- Engineering cost and batch size will be unchanged.

Required:

- (a) Company management identifies that cost driver for Machine set-up costs is 'set up hours used in batch setting' and for testing costs is 'testing time'. Engineering costs are assigned to products by special study. Calculate the full cost per unit for 'P' and 'Q' using Activity-based costing.
- (b) What is the Mark-up on full cost per unit of P?
- (c) What is the Target cost per unit for new design to maintain the same mark up percentage on full cost per unit as it had earlier? Assume cost per unit of cost drivers for the new design remains unchanged.
- (d) Will the new design achieve the cost reduction target?
- (e) List four possible management actions that the Computo Ltd. should take regarding new design. (4 + 4 + 16 = 24 Marks)

Answer

- (a) The elements of a balanced score card are:
 - (i) Financial perspective
 - (ii) Customer perspective
 - (iii) Internal business process perspective
 - (iv) Learning and growth perspective.

The objective of the balanced score card is to provide a comprehensive framework for translating the company's strategic objectives into a coherent set of performance measures. It emphasizes the use of financial and non-financial measures as part of the programme to achieve future financial performance. It helps in planning, setting targets and aligning strategic initiatives.

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To evaluate the success of the implementation of the strategy, the company can assess the change in the operating income by comparing the targeted operating income with the actual operating income. The change in the operating income may arise due to growth factor, change in the price of inputs and outputs and productivity factor. The company is said to be successful in implementation of strategy only if the change in the operating income closely aligns with that strategy.

- (b) Value chain is the linked set of value creating activities from the basic raw materials and components sources to the ultimate end use of the product or service delivered to the customer.

The six business functions contained in the value chain are (i) Research and Development, (ii) Design (iii) Production (iv) Marketing (v) Distribution and (vi) Customer service.

The objective of value chain is to serve as means of increasing the customer satisfaction and managing costs effectively. Coordination of the individual parts of the value chain activities creates conditions to improve customer satisfaction in terms of cost efficiency, quality and delivery. A firm which performs value chain activities more efficiently and at a lower cost than its competitors will be able to gain competitive advantage. The following methodology should be adopted.

1. The firm should identify the industry value chain and then assign costs, revenues and assets to value activities.
2. Diagnose the cost drivers regulating each value activity.
3. Develop sustainable cost advantage either by controlling cost drivers better than competitors or by reconfiguring the chain value.

By analyzing costs, revenues and assets in each activity systematically a company can achieve low cost. Thus value chain helps managers in deciding how to apply the organization's valuable physical and human resources to each linked process so as to achieve cost effectiveness.

- (c) Working Notes:

	<i>Particulars</i>	<i>P</i>	<i>Q</i>
(a)	Production/Sales Quantity (units)	1,00,000	50,000
(b)	Batch Size (units)	1000	500
(c)	No of batches $\left(\frac{a}{b}\right)$	100	100
(d)	Set up time per batch (hours)	30	36
(e)	Total set up hours (c×d) (hours)	3,000	3,600
(f)	Machine set up cost (Rs.)		4,62,000

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(c) Target cost of Product P after new design is implemented

	Rs.
Target price (given)	86.25
Mark-up $\frac{86.25 \times 15}{115}$	11.25
Target cost per unit (Rs.)	75.00

(d) Statement of cost for new design of P

Particulars	Basis	Cost P.U.	Total Cost
Direct Material	Decreased by Rs. 5 p.u.	37.00	37,00,000
Direct Labour	Decreased by Rs. 2 p.u.	13.00	13,00,000
Direct Machining cost	No change as machine is dedicated	7.00	7,00,000
Machine set up cost	100 set up $\times$ 28 hours $\times$ Rs. 70	1.96	1,96,000
Testing cost	1,00,000 units $\times$ Rs. 2.5 $\times$ 4 hours	10.00	10,00,000
Engineering cost	No change	8.40	8,40,000
Total cost		77.36	77,36,000

The target cost is Rs. 75 p.u. and estimated cost of new design is Rs. 77.36 p.u. The new design does not achieve the target cost set by Computo Ltd. Hence the target mark up shall not be achieved.

(e) Possible Management Action:

- Value engineering and value analysis to reduce the direct material costs.
- Time and motion study in order to redefine the direct labour time and related costs.
- Exploring possibility of cost reduction in direct machining cost by using appropriate techniques.
- Identification of non-value added activities and eliminating them in order to reduce overheads.
- The expected selling price based on estimated cost of Rs. 77.36 per unit is (Rs. 77.36 + 15%) Rs. 88.96. Introduce sensitivity analysis after implementation of new design to study the sales quantity changes in the price range of Rs. 86.25 to Rs. 88.96.

Question 2

- (a) Zilmil Ltd. makes two products 'Brightly' and 'Lightly'. Both the products use the same labour force, the size of which is restricted to 78,000 hours per month. Brightly needs 2 hours per unit to make whereas lightly needs one hour. The estimated production and sales, manufacturing and selling expenses per month are as follows:

	Brightly		Lightly	
Production and Sales (in Nos.)	12,000	16,000	40,000	48,000
Cost per month (Rs.)	34,00,000	38,00,000	62,00,000	66,80,000

The Company is considering pricing option in a highly competitive market. It has estimated sales demand at various selling prices:

Brightly:

Selling Price per unit (Rs.)	276	272	268	264	260	254
Sales demand per month	12,000	14,000	16,000	18,000	20,000	22,000

Lightly:

Selling Price per unit (Rs.)	163	162	161	160	156	152
Sales demand per month	40,000	42,000	44,000	46,000	48,000	50,000

You are required to compute profit maximizing price and quantity for each product.

- (b) What are some goals of a 'transfer-pricing' system in an organization?
- (c) "Overhead variances should be viewed as interdependent rather than independent". Explain. (11 + 4 + 4 = 19 Marks)

Answer

- (a) Brightly

Unit price Rs.	Contribution per unit Rs.	Volume Units	Total contribution (Rs. in 000)	Incremental contribution (Rs. 000)	Labour hours	Incremental labour hours	Incremental contribution per labour hour Rs.	Rank
276	176	12000	2112	2112	24000	24000	88	2
272	172	14000	2408	296	28000	4000	74	6
268	168	16000	2688	280	32000	4000	70	7
264	164	18000	2952	264	36000	4000	66	8
260	160	20000	3200	248	40000	4000	62	9
254	154	22000	3388	188	44000	4000	47	10

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Lightly

Unit price	Contribution per unit	Volume	Total contribution (Rs. in 000)	Incremental contribution (Rs. 000)	Labour hours	Incremental labour hours	Incremental contribution per labour hour	Rank
163	103	40,000	4120	4,120	40,000	40,000	103	1
162	102	42,000	4284	164	42,000	2,000	82	3
161	101	44,000	4444	160	44,000	2,000	80	4
160	100	46,000	4600	156	46,000	2,000	78	5
156	96	48,000	4608	8	48,000	2,000	4	11
152	92	50,000	4600	(8)	50,000	2,000	(4)	Loss

As the labour time is scarce source (time available 78,000 hours), the decision has to be taken on the basis of ranks based upon incremental contribution per labour hour.

Product	Price	Incremental volume	Incremental labour hours	Balance hours	Incremental Contribution (in 000 Rs.)
Lightly	163	40,000	40,000	38,000	4120
Brightly	276	12,000	24,000	14,000	2112
Lightly	162	2,000	2,000	12,000	164
Lightly	161	2,000	2,000	10,000	160
Lightly	160	2,000	2,000	8,000	156
Brightly	272	2,000	4,000	4,000	296
Brightly	268	2,000	4,000		280
Total					7,288

Hence product mix is Brightly – 16,000 units and Lightly 46,000 units

Optimal contribution per month	Rs. 72,88,000
Fixed costs per month	Rs. 60,00,000
Optimal profit per month	Rs. 12,88,000

Working Notes:

	<i>Brightly</i>	<i>Lightly</i>
Variable cost (p.u.)	$\frac{(38,00,000 - 34,00,000)}{(16,000 - 12,000)} = \text{Rs. } 100$	$\frac{(66,80,000 - 62,00,000)}{(48,000 - 40,000)} = \text{Rs. } 60$
Fixed cost (Rs.)	22,00,000	38,00,000

Contribution = Unit selling price less variable cost per unit.

- (b) The goals of transfer pricing are that it should:
1. provide information that motivates divisional managers to take good economic decisions which will improve the divisional profits and ultimately the profits of the company as a whole.
 2. provide information which will be useful for evaluating the divisional performance.
 3. seek to achieve goal congruence.
 4. ensure that divisional autonomy is not undermined.
- (c) The operations of a firm are so inter linked that the level of performance in one area of operation will affect the performance in other areas. Improvements in one area may lead to improvements in other areas. A sub-standard performance in one area may be compensated by a favourable performance in another area. Because of such interdependency among activities in the firm, the managers should not jump to conclusions merely based on the label of variances namely favourable or unfavourable. They should remember that there is a room for trade off amongst variances. Hence, variances need to be viewed as 'attention directors' rather than problem solvers. Thus, a better picture will be captured when overhead variance are not viewed in isolation but in an integrated manner.

Question 3

- (a) *Jay Kay Limited is a single product manufacturing company. The following information relates to the months of May and June, 2003:*

	May	June
	Rs.	Rs.
(i) <i>Budgeted Costs and Selling prices:</i>		
Variable manufacturing cost per unit	2.00	2.20
Total fixed manufacturing cost		
(based on budgeted output of 25,000 units per month)	40,000	44,000
Total fixed marketing cost	14,000	15,400
Selling price per unit	5.00	5.50
(ii) <i>Actual production and sales:</i>		
	Units	Units
Production	24,000	24,000
Sales	21,000	26,500

- (iii) *There was no stock of finished goods at the beginning of May, 2003. There was no wastage or loss of finished goods during May or June, 2003.*
- (iv) *Actual costs incurred corresponded to those budgeted for each month.*

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You are required to calculate the relative effects on the monthly operating profits of applying: (a) Absorption costing and (b) Marginal costing.

- (b) *What is total-life-cycle costing approach? What is it important?*
- (c) *Why are conventional product costing systems more likely to distort product costs in highly automated plants? How do activity-based costing systems deal with such a situation?*
(11 + 4 + 4 = 19 Marks)

Answer

- (a) *Quantity tally:*

		May 2003	June 2003
Opening Stock	units	—	3,000
Production	units	24,000	24,000
Total	units	24,000	27,000
Sales	units	21,000	26,500
Closing Stock	units	3,000	500
Fixed manufacturing overheads	Rs.	40,000	44,000
Budgeted output	units	25,000	25,000
Fixed overheads absorption rate per unit	Rs.	1.60	1.76

- (i) *Profitability based on absorption costing:*

	May 2003	June 2003
	Rs.	Rs.
Sales:		
May: 21,000 units @ Rs. 5.00	1,05,000	
June: 26,500 units @ Rs. 5.50		1,45,750
Production Costs:		
Variable: May 24,000 units @ Rs. 2.00	48,000	
June 24,000 units @ Rs. 2.20		52,800
Fixed: May 24,000 units @ Rs. 1.60	38,400	
June 24,000 units @ Rs. 1.76		42,240
Total production costs	86,400	95,040
Add: Opening stock		
May Nil		
June 3,000 units @ Rs. 3.60*		10,800
Total	86,400	1,05,840

Less: Closing stock		
May 3,000 units @ Rs. 3.60*	10,800	
June 500 units @ Rs. 3.96*		1,980
Production cost of goods sold	75,600	1,03,860
Marketing fixed costs	14,000	15,400
Total cost of goods sold	<u>89,600</u>	<u>1,19,260</u>
Profit (Sales – COGS)	15,400	26,490
Budgeted output	25,000 units	
Actual output	24,000 units	
Shortfall	1,000 units	
Under recovery of fixed overheads		
May 1,000 units @ Rs. 1.60	1,600	
June 1,000 units @ Rs. 1.76		1,760
Net profit	<u>13,800</u>	<u>24,730</u>

*Total cost = VC + FC

May 2.00 + 1.60 = 3.60

June 2.20 + 1.76 = 3.96

(ii) Profitability based on marginal costing:

	May 2003	June 2003
	Rs.	Rs.
Sales	1,05,000	1,45,750
Production cost – variable	48,000	52,800
Add: Opening stock		
May Nil		
June 3,000 units @ Rs. 2.00		<u>6,000</u>
Total	48,000	58,800
Less: Closing stock		
May 3,000 units @ Rs. 2.00	6,000	
June 500 units @ Rs. 2.20		1,100
Variable cost of goods sold	42,000	57,700
Contribution	63,000	88,050

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<i>Fixed costs:</i>	May	June		
Production	40,000	44,000		
Marketing	14,000	15,400	54,000	59,400
Net profit			9,000	28,650

(b) Total life cycle costing approach:

Life cycle costing estimates, tracks and accumulates the costs over a product's entire life cycle from its inception to abandonment or from the initial R & D stage till the final customer servicing and support of the product. It aims at tracing of costs and revenues on product by product basis over several calendar periods throughout their life cycle. Costs are incurred along the product's life cycle starting from product's design, development, manufacture, marketing, servicing and final disposal. The objective is to accumulate all the costs over a product life cycle to determine whether the profits earned during the manufacturing phase will cover the costs incurred during the pre and post manufacturing stages of product life cycle.

Importance:

Product life cycle costing is important for the following reasons:

- (i) When non-production costs like costs associated with R & D, design, marketing, distribution and customer service are significant, it is essential to identify them for target pricing, value engineering and cost management. For example, a poorly designed software package may involve higher costs on marketing, distribution and after sales service.
- (ii) There may be instances where the pre-manufacturing costs like R & D and design are expected to constitute a sizeable portion of life cycle costs. When a high percentage of total life cycle costs are likely to be so incurred before the commencement of production, the firm needs an accurate prediction of costs and revenues during the manufacturing stage to decide whether the costly R & D and design activities should be undertaken.
- (iii) Many costs are locked in at R & D and design stages. Locked in or Committed costs are those costs that have not been incurred at the initial stages of R & D and design but that will be incurred in the future on the basis of the decisions that have already been taken. For example, the adoption of a certain design will determine the product's material and labour inputs to be incurred during the manufacturing stage. A complicated design may lead to greater expenditure on material and labour costs every time the product is produced. Life cycle budgeting highlights costs throughout the product life cycle and facilitates value engineering at the design stage before costs are locked in.

Total life-cycle costing approach accumulates product costs over the value chain. It is a process of managing all costs along the value chain starting from product's design, development, manufacturing, marketing, service and finally disposal.

- (c) The conventional product cost system was in vogue when companies manufactured narrow range of products, overhead costs were relatively small and distortions arising from inappropriate overhead allocations were not significant. It used volume measures like direct labour hours or machine hours for charging overhead costs to products. In the case of a company using highly automated plant, direct labour is a small fraction of cost when compared with overheads (because of higher amount of depreciation). In case where such a company is multi product, overheads which are large in proportion to direct labour are influenced by number of set up, inspection, number of purchases etc. In these circumstances, the volume based method of recovery of overheads is no longer appropriate and such a measure will report inaccurate product costs. Hence, the traditional system of costing was found to over cost high volume products and under cost low volume products.

Activity Based Costing (ABC) system aims at refining the costing system used in automated plants in the following manner:

1. ABC systems trace more costs as direct costs.
2. ABC systems create homogeneous cost pools linked to different activities.
3. For each activity cost pool, ABC systems seek a cost allocation base that has a cause-and-effect relationship with costs in the cost pool.

Question 4

- (a) *An organisation manufactures a product, particulars of which are detailed below:*

<i>Annual Production (Units)</i>	<i>20,000</i>
<i>Cost per annum (Rs.)</i>	
<i>Material</i>	<i>50,000</i>
<i>Other variable cost</i>	<i>60,000</i>
<i>Fixed cost</i>	<i><u>40,000</u></i>
<i>Apportioned Investment (Rs.)</i>	<i><u>1,50,000</u></i>

Determine the unit selling price under two strategies mentioned below. Assume that the organisation's Tax rate is 40%—

- (a) *20% return on investment.*
- (b) *6% profit on list sales, when trade discount is 40%.*
- (b) *"Sunk cost is irrelevant in decision-making, but irrelevant costs are not sunk costs". Explain with example.*
- (c) *How will you apply customer costing in service sector? Explain with the help of a suitable example.*

(11 + 4 + 4 = 19 Marks)

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Answer

(a) (i) Selling price to yield 20% return on investment:

	<i>Rs.</i>
Investment	1,50,000
After tax required ROI 20%	30,000
Tax 40%	
After tax profit $100 - 40 = 60\%$	
Pre tax profit (return) $(30,000 \div 60) \times 100$	50,000
Sales = cost + return or $1,50,000 + 50,000$	2,00,000
Number of units produced	20,000
Selling price $\text{Rs. } 2,00,000 \div 20,000 = \text{Rs. } 10 \text{ per unit}$	

Alternative solution

$$(\text{Sales} - \text{cost}) (1 - \text{Tax}) = \text{ROI}$$

$$(\text{Sales} - 1,50,000) (1 - 0.40) = 1,50,000 \times 20\%$$

$$(0.60 \text{ Sales} - 90,000) = 30,000$$

$$0.60 \text{ Sales} = 1,20,000$$

$$\text{Sales} = 1,20,000 \div 0.60 = \text{Rs. } 2,00,000$$

$$\text{Number of units} = 20,000$$

$$\text{Selling price} \text{ Rs. } 2,00,000 \div 20,000 = \text{Rs. } 10.$$

(ii) Selling price to yield 6% profit on list price.

	<i>Rs.</i>	<i>Rs.</i>
Investment		1,50,000
Let the list price be	100	
Desired after tax profit of 6%	6	
Pre-tax profit $(1 - 0.40) = 0.60 = (6 \div 0.60) =$	10	
List price		100
Discount		40
Net price		60
Profit desired		10
Cost		50

Cost of 50% = Rs. 1,50,000

Sales = $(Rs.1,50,000 \div 50) \times 100 = Rs. 3,00,000$

Number of units 20,000

List selling price $(3,00,000 \div 20,000) = Rs. 15$

Discount 40%

Net price $(15 \times 60\%) \quad Rs. 9 \text{ per unit}$

Alternative solution

Let s be the list sales

$[List \text{ Sales } (1 - \text{tax discount}) - \text{cost}] (1 - \text{Tax rate}) = 0.60s$

$[s (1 - .40) - 1,50,000] (1 - 0.40) = .06s$

$s = Rs. 3,00,000$

List sales price per unit is Rs. $15 \left(\frac{3,00,000}{20,000} \right)$

Net selling price per unit is Rs. 9 (Rs. 15 – 40% of 15%).

- (b) Sunk costs are costs that have been created by a decision made in the past and that cannot be changed by any decision that will be made in the future. For example, the written down value of assets previously purchased are sunk costs. Sunk costs are not relevant for decision making because they are past costs.

But not all irrelevant costs are sunk costs. For example, a comparison of two alternative production methods may result in identical direct material costs for both the alternatives. In this case, the direct material cost will remain the same whichever alternative is chosen. In this situation, though direct material cost is the future cost to be incurred in accordance with the production, it is irrelevant, but, it is not a sunk cost.

- (c) Customer costing analyses the costs incurred to earn the revenues from customers. A customer cost hierarchy, categorising the costs relating to the customers into different cost pools on the basis of different types of cost drivers or different degrees of difficulty in determining cause and effect relationship, is used. The details of activities involved in customer costing, for example, are sales order processing, sales visits, normal delivery costs, special orders, and credit collection charges. The central theme of this approach is customer satisfaction. The profitability of different customers or groups of customers will differ.

Customer costing can be introduced in a company engaged in courier service where the costs to serve the customers vary with the type of service selected by customers (how fast the package is to be delivered), the destination, weight, size of package and whether the package is to be collected from customers' location or will be dropped at the office of the courier firm. The firm could use an efficient system of internet strategy to accomplish

the tasks like preparing labels at the customers' site, arranging for pick up, dropping at the destination and tracking and tracing packages. The system calculates the freight charges, invoices customers daily and produces customized reports. These parameters can be used with the objective of determining customer profitability and based on the costs involved in handling each customer, the firm can even offer volume discounts to customers who use the services heavily.

Question 5

- (a) A Company is engaged in manufacturing two products 'X' and 'Y'. Product X uses one unit of component 'P' and two units of component 'Q'. Product 'Y' uses two units of component 'P', one unit of component 'Q' and two units of component 'R'. Component 'R' which is assembled in the factory uses one unit of component 'Q'.

Component 'P' and 'Q' are purchased from the market. The company has prepared the following forecast of sales and inventory for the next year:

	Product 'X'	Product 'Y'
Sales (in units)	80,000	1,50,000
At the end of the year	10,000	20,000
At the beginning of the year	30,000	50,000

The production of both the products and the assembling of the component 'R' will be spread out uniformly throughout the year. The company at present orders its inventory of 'P' and 'Q' in quantities equivalent to 3 months production. The company has compiled the following data related to two components:

	P	Q
Price per unit (Rs.)	20	8
Order placing cost per order (Rs.)	1,500	1,500
Carrying cost per annum	20%	20%

Required:

- (a) Prepare a Budget of production and requirements of components during next year.
 (b) Suggest the optimal order quantity of components 'P' and 'Q'.
 (b) Differentiate between 'Value-added' and 'Non-value-added' activities in the context of Activity-based costing.

Give examples of Value-added and Non-value-added activities.

- (c) "The use of Absorption costing method in decision-making process leads to anomalies." Discuss. (11 + 4 + 4 = 19 Marks)

Answer

(a) Production Budget for product X and Y

	X units	Y units
Inventory at the end of the year	10,000	20,000
Sales forecast	80,000	1,50,000
Total requirements	90,000	1,70,000
Less: Beginning inventory	30,000	50,000
Production	60,000	1,20,000

Budgeted requirements of components P, Q and R

Components	P	Q	R
For Product X: Production 60,000 units			
P: 60,000 × 1 per unit	60,000		
Q: 60,000 × 2 per unit		1,20,000	
For Product Y: Production 1,20,000 units			
P: 1,20,000 × 2 per unit	2,40,000		
Q: 1,20,000 × 1 per unit		1,20,000	
R: 1,20,000 × 2 per unit			2,40,000
For comp R: Production 2,40,000 comp			
Q: 2,40,000 × 1 per component R		2,40,000	
Total requirements	3,00,000	4,80,000	2,40,000

(a) The company is advised to adopt EOQ system.

$$\begin{array}{cc}
 \text{P} & \text{Q} \\
 \text{EOQ} \sqrt{\frac{2 \times 3,00,000 \times 1,500}{20 \times 20\%}} & \sqrt{\frac{2 \times 4,80,000 \times 1,500}{8 \times 20\%}} \\
 = 15,000 \text{ components} & = 30,000 \text{ components}
 \end{array}$$

(b) A value added activity is an activity that customers perceive as adding usefulness to the product or service they purchase. In other words, it is an activity that, if eliminated, will reduce the actual utility or usefulness which customers obtain from using the product or service. For example, painting a car in a company manufacturing cars or a computer manufacturing company making computers with preloaded software.

A non-value added activity is an activity where there is an opportunity of cost reduction without reducing the product's service potential to the customer. In other words, it is an activity that, if eliminated, will not reduce the actual or perceived value that customers

obtain by using the product or service. For example, storage and moving of raw materials, reworking or repairing of products, etc.

Value-added activities enhance the value of products and services in the eyes of the organisation's customers while meeting its own goals. Non-value added activities on the other hand do not contribute to customer-perceived value.

- (c) In absorption costing, fixed overheads are assigned to products by establishing overhead absorption rates based on budgeted or normal output. By using absorption costing principles, it is possible for profit to decline when sales volume increases. If the stock levels fluctuate significantly, profits may be distorted because stock changes will significantly affect the amount of fixed overheads allocated to a period. If profits are measured on monthly or quarterly or on periodical basis, seasonal variations in sales may cause significant fluctuations in profits.

Internal profit statements on monthly or quarterly basis are used for measuring the managerial performance. In the circumstances, managers may deliberately alter inventory levels to influence profit, if absorption costing is used. When sales are less and the closing inventory increases, a part of the fixed overheads contained in the value of the closing stock is reduced from the fixed costs allocated to production for the period. Thus, if sales are reduced, inventories will increase and absorption cost will post higher profits. Similarly, if sales are increased as compared to production, inventories will be reduced and absorption costing will return lower profits.

Question 6

- (a) A Company manufactures two products 'X' and 'Y'. Company's fixed cost per annum is Rs. 5 lacs. These products are sold for Rs. 288 per unit of 'X' and Rs. 432 per unit of 'Y'. Standard cost data are:

	Product 'X'	Product 'Y'
	Rs.	Rs.
Direct Raw Material	40	80
Direct wages Rs. 8 per hour in Departments:		
1	48	72
2	24	48
3	72	—
4	—	96
Variable overhead	32	28

The Company operates 8 hours shift for 300 days in a year. Number of workers engaged by each department is given below:

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Department	1	2	3	4
No. of Workers	45	24	27	36

Required:

- (a) How many units of each product should be manufactured and what is the resultant maximum profit, if numbers of employees cannot be increased or transferred?
- (b) If only one product is to be manufactured by the Company, which of the products would give the maximum profit and what is the amount of such profit?
- (b) How has the composition of manufacturing costs changed during recent years? How has this change affected the design of cost accounting systems?
- (c) Explain the concept 'Learning curve'. How can it be applied for Cost management?

(11 + 4 + 4 = 19 Marks)

Answer

- (a) Contribution analysis:

	Product X	Product Y
	Rs.	Rs.
Selling price	288	432
Variable costs:		
Direct materials	40	80
Direct Labour: Dep't. 1	48	72
Dep't. 2	24	48
Dep't. 3	72	—
Dep't. 4	—	96
Variable overheads	32	28
Total variable costs	216	324
Contribution per unit	72	108

The direct labour hours required to manufacture the two products in each of the four departments at the wage rate of Rs. 8 per hour are as under:

Department	Product X		Product Y	
	Wage cost	Hours/unit	Wage cost	Hours/unit
1	48	6	72	9
2	24	3	48	6
3	72	9	—	—
4	—	—	96	12

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Department 3 is used only for product X and department 4 is used only for product Y. Hence, these two departments will determine the maximum production of these two products as under:

Department 3 : Maximum available hours:

$$\begin{array}{rclclcl}
 \text{Workers} & \times & \text{Hours/day} & \times & \text{days/year} & & \\
 27 & \times & 8 & \times & 300 & = & 64,800 \text{ hours}
 \end{array}$$

$$\text{Maximum possible production of product X: } \frac{64,800}{9 \text{ hrs per unit}} = 7,200 \text{ units}$$

Department 4 : Maximum available hours:

$$\begin{array}{rclclcl}
 \text{Workers} & \times & \text{Hours/day} & \times & \text{days/year} & & \\
 36 & \times & 8 & \times & 300 & = & 86,400 \text{ hours}
 \end{array}$$

$$\text{Maximum possible production of product Y: } \frac{86,400}{12 \text{ hrs per unit}} = 7,200 \text{ units}$$

The company can produce 7,200 units each of products X and Y provided departments 1 and 2 have capacity to process this quantity of output.

We can check the capacity of departments 1 and 2 as under:

Department 1: Maximum available hours:

$$\begin{array}{rclclcl}
 \text{Workers} & \times & \text{Hours/day} & \times & \text{days/year} & & \\
 45 & \times & 8 & \times & 300 & = & 1,08,000 \text{ hours}
 \end{array}$$

Hours required to produce 7,200 units each of X and Y:

Product X	$7,200 \times 6 \text{ hours}$	=	43,200 hours
Product Y	$7,200 \times 9 \text{ hours}$	=	64,800 hours
Total		=	1,08,000 hours

Department 1 has capacity to produce 7,200 units each of products X and Y.

Department 2 : Maximum available hours:

$$\begin{array}{rclclcl}
 \text{Workers} & \times & \text{Hours/day} & \times & \text{days/year} & & \\
 24 & \times & 8 & \times & 300 & = & 57,600 \text{ hours}
 \end{array}$$

Hours required to produce 7,200 units each of X and Y:

Product X	7,200 × 3 hours	=	21,600 hours
Product Y	7,200 × 6 hours	=	43,200 hours
Total		=	64,800 hours

Department 2 has scarce capacity.

Since department 2 capacity is scarce, link the contribution to the key factor of department 2 hours as under:

		Product X	Product Y
Contribution per unit	Rs.	72	108
Department 2 hours per unit	Hours	3	6
Contribution per hour of Department 2	Rs.	24	18
Rank		1	2

Optimal product mix:

Product	Max. units	Lab. Hours/unit	Prod. units	Hours used	Balance hours	Cont./unit Rs.	Total cont. Rs.
X	7,200	3	7,200	21,600	36,000	72	5,18,400
Y	7,200	6	6,000	36,000	—	108	6,48,000
Total optimal contribution							11,66,400
Fixed costs							5,00,000
Optimal profit							6,66,400

Alternative Solution:

The maximum possible production of product X is 7,200 units and that of product Y is 7,200 units. The following two methods shall be used to determine the optimal profit:

- Produce 7,200 units of product X and use the balance capacity to produce product Y.
- Produce 7,200 units of product Y and use the balance capacity to produce product X.

Profitability based on (a):

Direct labour hours are scarce in Department 2.

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Maximum available hours in Department 2	57,600
Product X requires $7,200 \times 3 =$	21,600 hours
Balance hours on Y	36,000
Production of Y $36,000 \div 6 =$	6,000 units

<i>Contribution:</i> X 7,200 units @ Rs. 72	Rs. 5,18,400
Y 6,000 units @ Rs. 108	Rs. 6,48,000
Total	Rs. 11,66,400
Fixed costs	Rs. 5,00,000
Profit	Rs. 6,66,400

Profitability based on (b):

Maximum available hours in Department 2	57,600
Product Y requires $7,200 \times 6 =$	43,200 hours
Balance hours on X	14,400
Production of X $14,400 \div 3 =$	4,800 units

<i>Contribution:</i> X $4,800 \times 72$	Rs. 3,45,600
Y $7,200 \times 108$	Rs. 7,77,600
Total	Rs. 11,23,200
Fixed costs	Rs. 5,00,000
Profit	Rs. 6,23,200

Profitability of (a) is better.

- (b) Traditionally, manufacturing companies classified the manufacturing costs to be allocated to the products into (a) direct materials. (b) direct labour and (c) indirect manufacturing costs. In the present day context, characterised by intensive global competition, large scale automation of manufacturing process, computerization and product diversification to cater to the changing consumer tastes and preferences has forced companies to refine their costing systems to provide better measurement of the overhead costs used by different cost objects. Accordingly, manufacturing costs are classified in to three broad categories as under:

1. *Direct cost:* As many total costs relating to cost objects as feasible are classified into direct cost. The objective is to trace as many costs as possible in to direct and to reduce the amount of costs classified into indirect because the greater the proportion of direct costs the greater the accuracy of the cost system.

2. *Indirect cost pools*: Increase the number of indirect cost pools so that each of these pools is more homogeneous. In a homogeneous cost pool, all the costs will have the same cause-and-effect relationship with the cost allocation base.
3. Use cost-and-effect criterion for identifying the cost allocation base for each indirect cost pool.

The change in the classification of manufacturing costs as above has led to the development of Activity Based Costing (ABC). Activity Based Costing refines a costing system by focusing on individual activities as the fundamental cost objects. An activity is an event, task or unit of work with a specified purpose as for example, designing, set up, etc. ABC system calculates the costs of individual activities and assigns costs to cost objects such as products or services on the basis of the activities consumed to produce the product or provide the service.

- (c) The first time when a new operation is performed, both the workers and the operating procedures are untried. As the operation is repeated and the workers become more familiar with work, labour efficiency increases and the labour cost per unit declines. This process continues for some time and a regular rate of decline in cost per unit can be established. This rate can be used to predict future labour costs. The learning process starts from the point when the first unit comes out of the production line. In other words 'Learning curve' is a function that measures how labour hours per unit decline as units of production increase because workers are learning and becoming better at their jobs.

Cost Management Application:

1. Learning curve is useful in analysing cost volume profit relationship. The company can set low price of its product to generate high demand. As the production increases, cost per unit drops.
2. It helps in budgeting and profit planning.
3. It enables the company in price fixation. In particular, the company can fix a lower price for repeat orders.
4. It helps the design engineers to take suitable decisions based on expected rates of improvement.
5. It helps in price negotiations.
6. It is useful in setting standards and in performance evaluation.