

Total No. of Questions—6]
Time Allowed—3 Hours

[Total No. of Printed Pages—8
Maximum Marks—100

Answers to questions are to be given only in English except in the case of candidates who have opted for Hindi medium. If a candidate who has not opted for Hindi medium, answers in Hindi, his answers in Hindi will not be valued.

Question No. 1 is compulsory. Answer any **four** questions from the rest.
Working notes should form part of the answer.

1. (a) State the general guidelines to be used in adopting a pricing policy in a manufacturing organization. **(3 marks)**

Answer:- (a) PRICING POLICY

Pricing policy plays an important role in a business because the long run survival a business depends upon the firm's ability to increase its sales and device the maximum profit from the existing and new capital investment. Although cost is an important aspect of pricing, consumer demand and competitive environment are frequently far more significant in pricing decisions. Thus costs alone do not determine prices. Cost is only one of the many complex factors which determine prices. There must however, be some margin in prices over total cost if capital is to be unimpaired 1 production maximised by the utilisation of internal surplus.

The cost plus pricing method though common is not the best method because it ignores demand and fails to adequately reflect competition. The pricing policy and the relative structure should:

- a) provide an incentive to producer for adopting improved technology and maximising production;
- b) encourage optimum utilisation of resources;
- c) work towards better balance between demand and supply;
- d) promote exports; and
- e) avoid adverse effects on the rest of the economy.

Due to above characteristics, a monopolist can raise the price of its products without frightening away all his customers. How much he can raise from his customers, depends the elasticity of demand for his particular product.

Under monopolistic condition, consumers may buy more at a lower price than at higher be. The profit can be maximised by equating marginal revenue with marginal cost. This cost be seen from the following diagram.

(b) A company which has developed a new machine has observed that the time taken to manufacture the first machine is 600 hours. Calculate the time which the company will take to manufacture the second machine if the actual learning curve rate is (i) 80%; and (ii) 90%. Explain which of the two learning-rates will show faster learning. **(3 marks)**

Answer:- (b) Given:

Machine time taken to manufacture the first machine = 600 hrs.

Case (i) Learning Curve = 80%

Time taken to manufacture the 2nd machine = $600 \times 80\%$
= 480 hours

Case (ii) Learning Curve = 90%

Time taken to manufacture the 2nd machine = $600 \times 90\%$
= 540 hours

Of the two learning rates 80% will show the faster learning because the amount of production improvement in the manufacture of an article (i.e. 20%) is more as compared to the 90%(where the percentage improvement = 10%).

(c) A company manufactures three types of products namely P, Q and R. The data relating to a period are as under:

	P	Q	R
Machine hours per unit	10	18	14
Direct labour hours per unit @ Rs. 20	4	12	8
Direct Material per unit Rs.	90	80	120
Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overheads' is Rs. 6 per hour.

The company proposes to use activity based costing system and the activity analysis is as under:

	P	Q	R
Batch size (units)	150	500	1,000
Number of purchase orders per batch	3	10	8
Number of inspections per batch	5	4	3

The total production overheads are analysed as under:

Machine set up costs	20%
Machine operation costs	30%

Inspection costs	40%
Material procurement related costs	10%

Required:

- (iii) Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis, of machine hours.
- (iv) Calculate the cost per unit of each product using activity based costing principles. **(7 marks)**

Answer:

(c) (i) Statement showing cost per unit of each product by using traditional method (i.e. on the basis of machine hour.)

Particulars	Product		
	P	Q	R
Production (in units)	<u>3000</u>	<u>5000</u>	<u>20000</u>
Direct material cost. Per unit	90.00	80.00	120.00
Direct Labour Cost per unit	80.00	240.00	160.00
	(4 x 20.00)	(12 x 20.00)	(8 x 20.00)
Overheads. Cost per unit (On the basis of machine hour)	60.00	108.00	84.00
	<u>(10x6.00)</u>	<u>(18x6.00)</u>	<u>(14x6.00)</u>
Total Cost Per unit.	<u>230.00</u>	<u>428.00</u>	<u>364.00</u>

Working Notes.

1. Calculation of total overheads.

	Product		
	P	Q	R
(a) Production (in unit)	<u>3000</u>	<u>5000</u>	<u>20000</u>
(b) Machine hour per unit	10 hr.	18 hr.	14 hr.
(c) Total machine hours required (a x b)	30000	90000	280000
(d) Machine hour rate of overheads (given)	Rs. 6/-	Rs. 6/-	Rs. 6/-
(e) Total cost of machine hours (d x c)	1,80,000/-	540000/-	16,80,000/-
Hence Total Cost of Machine Hours (P + Q + R)	= 24,00,000/-		
Total hour (P + Q + R)	= 4,00,000/-		

2. Apportionment of overheads on the basis of Activity based costing

			Rs.
Machine set up cost	20% x 24,00,000	=	4,80,000
Machine operation cost	30% x 2,40,000	=	7,20,000
Inspection cost	40% x 2,40,000	=	9,60,000
Material Procurement	10% x 2,40,000	=	<u>2,40,000</u>
			<u>24,00,000</u>

3. Apportionment of Cost Activity wise

	Product			Total
	P	Q	R	
(a) Batch size (in unit)	150	500	1000	---
(b) Product (in unit)	3000	5000	20000	---
(c) No. of Batch (b/a)	20	10	20	50
(d) Total no. of purchase order.	60	100	160	320
	(20x3)	(10x10)	(20x8)	
(e) Total no. of Inspection	100	40	60	200
	(20x5)	(10x4)	(20x3)	

◆ Cost per purchase order	=	$\frac{2,40,000}{320}$	=	Rs. 750/- per order
◆ Cost per inspection	=	$\frac{960000}{200}$	=	Rs. 4800/- per inspection
◆ Machine set up cost (on the basis of machine hour)	=	$\frac{4,80,000}{4,00,000}$	=	Rs. 1.20/- per machine hour
◆ Machine operation cost	=	$\frac{7,20,000}{4,00,000}$	=	Rs. 1.80/- per machine hour

(ii) Statement showing cost per unit of each product by using Activity based costing principles.

Particulars	Product		
	P	Q	R
Direct material cost per unit	90.00	80.00	120.00
Direct Labour Cost per unit	80.00 (4 x 20.00)	240.00 (12 x 20.00)	160.00 (8 x 20.00)
Overheads (W.N.1)			
(i) Machine set up Cost	12.10 (1.20x10)	21.60 (1.20x18)	16.80 (1.20x14)
(ii) Machine operation Cost	18.00 (1.80x10)	32.40 (1.80x18)	25.20 (1.80x14)
(iii) Inspection Cost	160.00 $\left[\frac{4800 \times 100}{3000} \right]$	38.40 $\left[\frac{4800 \times 40}{5000} \right]$	14.40 $\left[\frac{4800 \times 60}{20,000} \right]$
(iv) Material Procurement related cost	15.00 $\left[\frac{750 \times 60}{3000} \right]$	15.00 $\left[\frac{750 \times 100}{5000} \right]$	6.00 $\left[\frac{750 \times 160}{20,000} \right]$
Cost Per Unit	375 /-	427.40 /-	342.40 /-

(d) A single product manufacturing company has an installed capacity of 3,00,000 units per annum. The normal capacity utilization of the company is 90%. The company has prepared the following budget for a year:

Variable costs:

Factory costs Rs. 33 per unit

Selling and Administration costs Rs. 9 per unit

Fixed Cost

Factory costs Rs. 21,60,000

Selling and Administration costs Rs. 7,56,000

Selling Price

Selling price per unit Rs. 60

The actual production, sales, price and cost data relating to the year under review are as given below:

Production 2,40,000 units

Sales 2,25,000 units

Finished goods stock in the beginning of the year : 15,000 units

Actual factory variable costs exceeded the budget by Rs. 1,20,000

Required:

(i) Calculate the budgeted profit and break-even point in units.

(ii) What increase in selling price .was necessary during the year under preview to maintain the budgeted profit?

(iii) Prepare statements showing the actual profit during the year under review by using

(1) absorption costing method and (2) marginal costing method.

11 Marks

Answer: (d)

(a) Statement showing calculation of the budgeted profit

Selling price per unit 60.00 /-

Production Cost

(1) Variable Cost

Factory Costs 33/- per unit

Selling and administration cost 9/- per unit 42.00/-

(2) Fixed cost

Factory cost. $\left(\frac{21,60,000}{2,70,000} \right)$ = 8.00/-

Selling and Administration Cost

$\left(\frac{7,56,000}{2,70,000} \right)$ = 2.80/- 10.80/- 52.80/-

Budgeted profit per unit 7.20/-

(b) Statement showing computation of Break Even point

$$\begin{aligned}
 \text{Breakeven point (in unit)} &= \frac{\text{Total Fixed Cost}}{\text{Contribution per unit}} \\
 &= \frac{21,60,000 + 7,56,000}{(60.00 - 42.00)} \\
 &= \frac{29,16,000}{18} \\
 &= 1,62,000 \text{ units}
 \end{aligned}$$

(ii) Statement showing computation of increase in selling price required.

Production (in units) = 2,40,000 units

Production Cost

(i) Variable Cost

Rs.

Factory Cost (2,40,000 x 33/-) = 79,20,000 /-

Add: Increased in Factory Cost = 1,20,000 /-

Fixed Factory Cost = 21,60,000 /-

Cost of Production = 1,02,00,000 /-

Add: Opening stock = 6,15,000 /-

(15000 unit) [15000 x (33/- + 8/-)]

Less: Closing Stock (WN 1)

$\left(30000 \times \frac{1,02,00,000}{2,40,000} \right) = (12,75,000) /-$

Cost of Goods Sold = 95,40,000 /-

Add: Variable Selling and Administration Cost

(2,25,000 x 9/-) = 20,25,000 /-

Fixed Selling and Administration Cost = 7,56,000 /-

Total Cost = 1,23,21,000 /-

Add: Profit (2,25,000 x 7.20 /-) = 16,20,000 /-

Required Sales = 1,39,41,000 /-

Required Selling Price $\left(\frac{1,39,41,000}{2,25,000} \right) = \text{Rs. } 61.96$

WN1. Calculation of Closing Stock

Op. Stock 15,000

Production 2,40,000

2,55,000

Less : Sales 2,25,000

Closing Stock 30,000

Trading and P/L A/c (Absorption Costing)

To Opening Stock (15000 x [33 + 8])	6,15,000	By Sale (2,25,000 x 60/-)	1,35,00,000/-
To Factory Cost [240000 x (33 + 8)]	98,40,000		
To Additional Cost Factory	1,20,000	By Closing Stock 30000 x [33.5 + 8]	12,45,000/-
	41,70,000		
	1,47,45,000		1,47,45,000
To under Recovery of Fixed Factory Cost. (30,000 x 8)	2,40,000	By Gross Profit	41,70,000
To selling and Administration Cost			
Variable (2,25,000 x 9)	20,25,000		
Fixed (2,25,000 x 2.8)	6,30,000		
To under recovery of selling & Administration (45000 x 2.80)	1,26,000		
To Net Profit	11,49,000		
	41,55,000		41,55,000

Trading and P/L A/c (Marginal Costing Method)

To Opening Stock (15000 x 33)	4,95,000	By Sale (2,25,000 x 60/-)	1,35,00,000
To Variable Factory Cost (240000 x 33)	79,20,000		
To Additional variable Factory cost	1,20,000	By Closing Stock (30000 x 33.5)	10,05,000
To fixed Factory Cost	21,60,000		
To Variable Setting & Administration Cost (2,25,000 x 9)	20,25,000		
To Fixed Selling & Administration cost	7,56,000		
To Net Profit	10,29,000		
	<u>1,45,05,000</u>		<u>1,45,05,000</u>

2.

(a) Discuss the benefits accruing from the implementation of a Total Quality Management programme in an organization. **4 Marks**

Ans Benefits accruing from the implementation of a Total Quality Management programme in an organization are:-

Continuous Improvement. People wish to improve themselves and get a better lifestyle. If the desire for individual improvement is transferred to systems within the workplace, then these systems will improve. Management can, at times, be a restraint to innovation through relying on historical systems. This will result in "always do what you have always done and you will always get what you have always got".

Multifunctional Teams. Within the hotel, departments are customers and suppliers for each other. A waiter is the chef's supplier giving information on what has been ordered from the menu including any special requests about how the food should be prepared (medium, well done etc). When the food is ready, the roles are reversed. The chef becomes the waiter's supplier providing the food. If the hotel's organization is structured in such a way, that people in different departments work with each other to solve problems as a team, traditional inter departmental barriers will be removed. Inter departmental communication on a day to day basis is essential for effective management.

Multifunctional teamwork allows the problems and requirements of each department to be passed on at worker level, throughout the hotel. This will lead to a better understanding of how the hotel systems work, by all employees.

Individuals will work with each other identifying causes of problems rather than blaming each other for the results of a problem. This will remove the blame culture.

This can be achieved by documenting systems. Giving workers the opportunity to own their processes by letting them do this documentation boosts morale. Also, the documentation will accurately reflect what is actually done rather than what management thinks is done. Initially this will lead to guests receiving a known standard of service which will result in repeat business.

Supplier Integration. By involving your suppliers directly with your staff, two way communication can be established. Your chef can explain the standard of food required. Your supplier can explain the difficulties in supplying such food. Any problems that arise can be solved jointly, using your knowledge of hotel systems, the chef's knowledge of food and the suppliers expertise in supply systems.

Education and Training. Through education, management and staff are given the tools to achieve all the above. Education provides for guided innovation from all levels.

(b) Explain the concept of relevancy of cost by citing three examples each of relevant costs and non-relevant costs

4 Marks

Answer:- Relevant Costs: It refer to those costs which are pertinent to the decision on hand. They represent expected future costs which are essential and which differ for alternative courses of action. Irrelevant costs as opposed to relevant costs do not play any role in decision making?. In other words relevant costs are future cost that would arise as a direct consequence of the decision under-review. The relevant cost of a unit of production is usually the variable cost of that unit plus (or minus) any change in the total expenditure on fixed costs. Identification of relevant costs is very important for arriving at correct conclusion in the area of decision making. While considering a proposal for plant replacement by discarding the existing plant, the original cost and the present depreciated book value of the old plant are irrelevant as they have no impact on the decision for replacement just going to be taken. However, the expected sales value of the discarded plant is relevant, as it just goes to reduce the amount of investment to be made in the new plant and so it has an influence on the decision. Relevant cost analysis helps in drawing the *attention* of managers to those elements of cost which are relevant for the decision.

Examples of irrelevant Cost :-

1. Fees paid to engineer for consultancy.
2. Fixed Assets purchased
3. Depreciation

Examples of Relevant Cost :-

1. Imputed Rent
2. Interest on loan Borrowed
3. Additional Fixed Cost arising due to decision.

- (c) A manufacturing company has furnished the following financial data relating to the actual output of 9,600 units produced in the last quarter:

Rs.

4,45,500

Sales

Costs :

Direct Materials 59,400

Direct Wages 89,400

Variable Overheads 1,45,500

Fixed Overheads 78,000

3,72,300

Profit

73,200

The standard wage rate is Rs. 4.50 per hour and the standard variable overhead rate is Rs. 7.50 per hour. The company uses a JIT system and the budgeted production and sales quantity is 10,000 units.

The following are the variances from standard costs recorded during the last quarter:

		Rs.
Direct materials	Price V	600 A
	Usage V	1,200 A
Direct Wages	Rate V	1,500 F
	Efficiency V	4,500 A
Variable overheads	Expense V	6,000 F
	Efficiency V	7,500 A
Fixed overheads	Expense V	3,000 A
Sales	Price V	13,500 F

You are required to :

- (i) Prepare the Original budget and Standard cost sheet per unit of output;
- (ii) Produce a statement reconciling the budgeted profit with actual profit.

11 Marks

Answer:- (c) Statement showing Standard Cost Sheet & Budget.

	Per unit	Budget for 10,000 units
Sales (A) (Refers working note 5)	45	450000
Direct material Cost (Refers to working note 1)	6	60000
Direct Labour Cost (2 x 4.50) (Refer to working note 2)	9.00	90000
Variable overheads (2 x 7.50) (Refer working note 3)	15.00	150000
Fixed overheads. (2 x 3.725) (Refer working notes 4)	<u>7.5</u>	<u>75000</u>
	<u>Total Cost (B)</u>	<u>376250</u>
Standard Gross margin (A – B)	<u>7.5</u>	<u>75000</u>

(ii)

Operating Statement
(Reconciling the budgeted profit + with Actual Profit)

Budgeted Profit	75000
Gross margin volume variance	
(Refer working note 6)	<u>2950 (A)</u>
Standard Profit	<u>72000</u>
Sale Price variance	<u>13500 (F)</u>

Cost Variance

		<u>ADV</u>	<u>FDV</u>	
Direct material –	Price V	600	--	
	Uses V	1200	--	
Direct Wages -	Rate V	--	1500	
	Efficiency V	4500	--	
Variance overheads – expenses V			6000	
	Efficiency V	7500	---	
Fixed Overheads Expenses V		3000	---	
	Volume V	<u>3000</u>	-----	(12300)
		19800	7500	
		-----	-----	

Actual Profit

73200

Working Notes

1. Computation of Standard price per unit and standard quantity of material for Actual output

Set x and y to the standard price per unit and standard quantity of material by Actual output. We know that

(i) $SP \times SQ - AP \times AQ = \text{Direct material cost variance.}$

$$SP \times SQ - 59400 = 1800$$

$$\text{Standard cost} = 57600$$

$$\mathbf{SP = 6 /- (57600 / 9600)}$$

$$\text{Material Price Variance} + \text{Material Usage Variance} = 600 (A) + 1200(A) = 1800 (A)$$

2. Computation of standard labour hour and Actual labour hours per unit

i) let x be the standard labour hours per unit and y be the actual labour hours per unit for actual output. We know that
direct rate variance + Direct labour efficiency variable

$$= \text{Direct labour Cost variance}$$

$$\text{Or } 1500 (F) + 4500 (A) = 3000 (A)$$

$$\text{Or Direct Labour Cost variance} = 3000 (A)$$

$$\text{Or } (SR \times ST) - (AR \times ATP) = 3000 (A)$$

$$\text{Or } (4.50 \times ST) - (89400) = 3000 (A)$$

$$\text{Or } 4.50 ST = -3000 + 89400$$

$$86400$$

$$\text{Or } ST = \text{-----}$$

$$4.50$$

$$\text{Or } ST = 19200 \text{ hours.}$$

$$19200$$

$$\text{Or Hours Per Unit} = \text{-----} = 2$$

$$9600$$

Have Standard labour hour per unit are 2

ii) Direct Labour efficiency variance = (Standard - Actual hour) x Standard rate

$$\text{Or } 4500 (A) = (19200 - \text{Actual hour}) \times 4.50$$

$$\text{Or } -100 = 19200 - \text{Actual hour}$$

$$\text{Or Actual hour} = 20200 \text{ hour.}$$

$$\text{Actual labour per unit} = 20200/9600$$

$$= 2.104 \text{ hour}$$

3. Computation of standard / budgeted variable overhead rate per hour

Let x be the standard variable overheads rate per hour then efficiency variance is

$$= \text{Standard variable overhead rate per hour} [\text{Standard hours for Actual output} - \text{Actual hour for Actual output}]$$

$$= 7500 (A)$$

$$\text{Or } x (19200 - 20,200) = 7500 (A) \text{ (Refers W.N.2)}$$

$$\text{Or } x \times x + 1000 = + 7500$$

$$\text{Or } x = 7.50 /- \text{ Per hour}$$

4. Computation of standard fixed overhead rate per unit per hours

$$\text{Fixed overhead expenses variance} = [\text{Budgeted Fixed overheads} - \text{Actual Fixed overhead}]$$

$$\text{Or } 3000 (A) = x - 78000 /-$$

$$\text{Or } x = -3000 + 78000$$

$$\text{Or } x = 75000$$

$$\text{Standard fixed overheads rate per unit} = 7.5/-$$

75000

10000

Standard Fixed overheads rate per hour = $7.5/2 = 3.75$ per hour.

5. Computation of budgeted selling price per unit

Budgeted Sale data			Actual Sale Data		
Qty (Unit)	Price Rs./Unit	Amount Rs.	Qty (Unit)	Price Rs./unit	Amount (Rs.)
10000	Y	10000 Y	9600	46.406	4,45,500

Sale price variance = Actual Qty [Actual selling price – Budgeted selling price]

$$13500 (F) = 9600 (46.406 - Y) =$$

$$1.40625 = 46.406 - y$$

$$Y = 45$$

Budgeted Selling Price = 45

6. Computation of Gross margin volume variance and Fixed overhead volume variance

Sales Gross margin volume variance = Standard Margin per unit (Actual Qty – Budgeted Qty)

$$= 7.5 (9600 - 10000)$$

$$= 3000 (A)$$

Fixed overhead volume variance = Standard fixed overhead rate per unit (Actual output - Budgeted output)

$$= 7.5 (9600 - 10000)$$

$$= 3000 (A)$$

3.

(a) Describe the four types of bench marking of critical success factors.

4 Marks

Answer Types of Benchmarking : The benchmarking is a, versatile tool that can be applied in a variety of ways to meet a range of requirements. The distinct types of benchmarks have been evolved over a period of time. Each has its own benefits and shortcomings and therefore each one is appropriate in certain circumstances then others. The Benchmarking is of following types :

(1) **Competitive Benchmarking** : It involves the comparison of competitors products, processes and business results with own. Benchmarking partners are drawn from the same sector. However, to protect confidentiality it is common for the companies to undertake this type of benchmarking through trade associations or third parties.

(2) **Strategic Benchmarking**: It is similar to the process benchmarking in nature but differs in its scope and depth. It involves a systematic process by which a company seek to improve their overall performance by examining the long term strategies .It involves comparing high level aspects such as developing new products and services, core competencies etc.

(3) **Global benchmarking** : It is a benchmarking through which distinction in¹ international culture, business processes and trade practices across companies are bridged and their ramification for business process improvement are understood and utilised. Globalisation advances in information technology leads to use this type of benchmarking.

(4) **Process benchmarking** : It involves the comparison of an organization critical business :processes and operations against best practice organisation that performs similar work or deliver similar services.

(5) **Functional benchmarking** : This type of benchmarking is used when organisations look benchmark with partners drawn from different business sectors or areas of activity to ways of improving similar functions or work processes. This sort of benchmarking can to innovation and dramatic improvements.

(6) **Internal Benchmarking** involves seeking partners from within the same organisation, for pie, from business units located in different areas. The main advantages of internal benchmarking are that access to sensitive data and information are easier; standardized data is often readily available; and, usually less time and resources are needed. There may fewer be barriers to implementation as practices may be relatively easy to transfer across same organisation. However, real innovation may be lacking and best in class performance is more likely to be found through external benchmarking.

(b) Explain, how the implementation of JIT approach to manufacturing can be a major source of competitive advantage.

4 Marks

Answer:- A characteristic of the JIT system is its continuous focus on eliminating all waste from a system, This can be a waste of assets, excessive inventory. It can also be a waste of time, in the case of assets it may include unused assets for long periods of time (e.g., work-in-process inventor} held in production queue). It can also be a waste of materials, such

as unnecessary levels of obsolete inventory, defective products, rework, and the like. When fully installed, a JIT system vastly reduce all these types of waste. When this happens, there is a sharp drop in several aspects of a product's costs. For example, by reducing the amount of work in process, machine operators can make out immediately, if an incoming part from another workstation is defective and can notify the preceding workstation of the problem before it makes any more parts, which reduces the quantity of rework that must be done. Since a standard quantity of rework labour is frequently included in a product's labour routing, a reduction here lowers the amount of labour cost charged to a product. Similarly, any material that would have been scrapped because of improper rework is no longer lost, so the standard amount of scarp noted on a product's bill of materials can now be reduced. This also decreases a product's cost.

Overhead costs charged to a product also reduces as other types of waste decline. For example, by clustering machines into cells, the materials handling costs previously incurred in shifting materials between widely scattered machines can be eliminated. This reduces the amount of materials handling costs that used to be charged to overhead. Also, machine cells tend to reduce the amount of floor space needed since there is no longer a need for large aisles for the materials handling people to drive their forklifts through; by reducing floor space, one can also reduce facility costs, which no longer appear in the overhead cost pool. Another form of waste is the quality inspections once performed on many machines. Under the JIT system machine-operators conduct their own quality checks, so there is less need for a separate group of supervisors/inspectors; accordingly, the cost of their pay can be eliminated from overhead costs. All these costs (and more) do not directly add value to a product, so they are wasteful costs that are subject to elimination. By doing so with a JIT system, there are fewer costs left to be charged to a product.

A key focus of any JIT system is on reducing various kinds of wastage of time, so that the entire production process is concentrated on the time spent in actually producing products. For example, all inspection time is eliminated from the system as operators conduct their own quality checks. Similarly, all movement, which involves shifting inventory and work in process throughout various parts of the plant, can be eliminated by clustering machines together in logical groupings. Third, queue time is eliminated by not allowing inventory to build up in front of machines. Finally, one can eliminate storage time by clearing out excessive stocks of inventory and having suppliers deliver parts only as and when needed. By shrinking the amount of wastage time out of the manufacturing process, a company effectively eliminates activities that do not contribute to the value of a product, which in turn reduces the costs associated with them.

Another way in which waste is eliminated in a JIT system is to charge cost drivers to wasteful activities that accumulate costs. For example, overhead costs can be charged out based on the number of components in a product (since more parts require more purchasing activity and materials handling), the number of material moves (which is not a value-added activity), or the number of units scrapped. In this way the cost of these activities becomes apparent to management, and as a result, there will be considerable focus on reducing these cost drivers since the accounting system places so much emphasis on their total burdened costs. Then, when these cost drivers have been reduced to significant levels, the cost accountants can find other wasteful cost drivers and shift the allocation system to place the most emphasis on them. This directs management's attention toward their elimination, too. And so on. In this way the cost accounting system can be continually altered so that it has a direct, active role in reducing wasteful activities

(c) A project consists of seven activities and the time estimates of the activities are furnished as under :

Activity	Optimistic Days	Most likely Days	Pessimistic Days
1-2	4	10	16
1-3	3	6	9
1-4	4	7	16
2-5	5	5	5
3-5	8	11	32
4-6	4	10	16
5-6	2	5	8

Required :

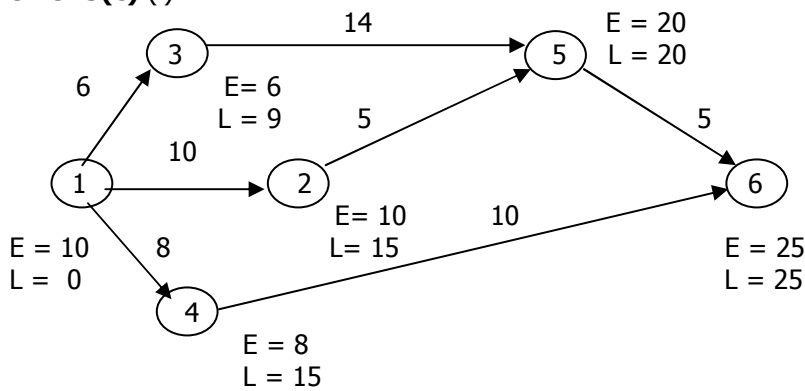
- Draw the network diagram.
- Identify the critical path and its duration.
- What is the probability that the project will be completed in 5 days earlier than the critical path duration?
- What project duration will provide 95% confidence level of completion ($Z_{0.05} = 1.65$) ?

Given

Z	1.00	1.09	1.18	1.25	1.33
Probability	0.1587	0.1379	0.1190	0.1056	0.0918

11 Marks

Answer 3(c) (i)



ii)

Activity	expected duration $\epsilon_0 + 4\epsilon_m + \epsilon_p$			variance $\epsilon_p - \epsilon_0$
	ϵ_0	ϵ_m	ϵ_p	
1-2	4	10	16	6
1-3	3	6	9	4
1-4	4	7	16	1
2-5	5	5	5	4
3-5	8	11	32	0
4-6	4	10	16	16
5-6	2	5	8	4
				1

Critical path = 1 – 3 – 5 – 6

Expected project duration = 25 days

(iv) Probability of Project Completion in 20 days

$$\sigma^2 = 1 + 16 + 1 = 18$$

$$\sigma = \sqrt{18} = 4.2426$$

$$Z = \frac{20 - 25}{4.2426} = \frac{-5}{4.2426} = -1.1785$$

Value of Z = 1.1785 in Z table is 0.1190

$$P(z) = 0.50 - 0.1190 = 0.381$$

Probability of Project Completion in 20 day's is 38.10%

(iv) Project duration (Say x day's) with 95% chances of completion :-

$$1.65 = \frac{x - 25}{4.2426}$$

$$\text{Or } y = x - 25$$

$$\text{Or } x = 32 \text{ day's}$$

4.(a) State the methods in which initial feasible solution can be arrived at in a transportation problem. **4 Marks**

Answer :- METHODS OF FINDING INITIAL SOLUTION TO TRANSPORTATION PROBLEMS

Northwest Corner Rule : The idea is to find an initial basic feasible solution *i.e.*, set of allocations that satisfies the row and column totals. This method simply consists of making allocations to each row in turn, apportioning as much as possible to its first cell and proceeding in this manner to its following cells until the row total is exhausted the algorithm involved under north-west corner rule consists of the following steps: is :

Before allocation ensure that the total of availability and requirement is equal. If not then make same equal.

The first allocation is made in the cell occupying the upper left hand corner of the matrix. The assignment is made in such a way that either the resource availability is exhausted or the demand at the first destination is satisfied.

(a) If the resource availability of the row one is exhausted first, we move down the second row and first column to make another allocation which either exhausts the resource availability of row two or satisfies the remaining destination demand of column one.

(b) If the first allocation completely satisfies the destination demand of column one, we move to column two in row one, and make a second allocation which either exhausts the remaining resource availability of row one or satisfies the destination requirement under column two.

The above procedure is repeated until all the row availability and column requirements are satisfied.

The Least Cost Method :

(i) Before starting the process of allocation ensure that the total of availability and demand is equal. The least cost method starts by making the first allocation in the cell whose j shipping cost (or transportation cost) per unit is lowest.

(ii) This lowest cost cell is loaded or filled as much as possible in view of the original capacity of its row and the destination requirements of its column.

(iii) We move to the next lowest cost cell and make an allocation in view of the remaining, capacity and requirement of its row and column. In case there is a tie for the lowest cost cell during any allocation, we can exercise our judgement and we arbitrarily choose a cell for allocation.

(iv) The above procedure is repeated till all row requirements are satisfied.

Vogel's Approximation Method (VAM)

The Vogel's Approximation Method (VAM) is considered to be superior to the! northwest corner rule in that it usually provides an initial solution that is optimal or nearly so. Therefore, we shall also stick to it for the discussion ahead. However, the readers may like to try their hand on the following solved examples by the northwest corner rule and least-cost method for sake of practice. But we here apply VAM method.

VAM entails the following steps:

Step 1. For each row of the transportation table identify the smallest and next smallest costs. Find the difference between the two costs and display it to the right of that row as "Difference" (Diff.). Likewise, find such a difference for each column and display it below that column. In case two cells contain the same least cost then the difference will be taken

Step 2. From amongst these row and column differences, select the one with the largest difference. Allocate the maximum possible to the *least cost cell* in the selected column or row. If there occurs a tie amongst the largest differences, the choice may be made for a row or column which has least cost. In case there is a tie in cost cell also, choice may be made for a row or column by which maximum requirement is exhausted. Match that column or row containing this cell whose totals have been exhausted so that this column or row is ignored in further consideration.

Step 3. Recompute the column and row differences for the reduced transportation table and go to step 2. Repeat the procedure until all the column and row totals are exhausted.

(b) State the advantages and limitations of Zero Based Budgeting.

4 Marks

Answer:- Advantages of zero-base budgeting : The advantages of zero-base budgeting are as follows :

1. It provides a systematic approach for the evaluation of different activities-and rank them in order of preference for the allocation of scarce resources.
 2. It ensures that the various functions undertaken by the organisation are critical for the achievement of its objectives and are being performed in the best possible way.
 3. It provides an opportunity to the management to allocate resources for various activities only after having a thorough cost-benefit-analysis. The chances of arbitrary cuts and enhancement are thus avoided.
 4. The areas of wasteful expenditure can be easily identified and eliminated.
 5. Departmental budgets are closely linked with corporate objectives.
 6. The technique can also be used for the introduction and implementation of the system of management by objective.
- Thus , it cannot only be used for fulfillment of the objectives of traditional budgeting but it can also be used for a variety of other purposes.

Even though ZBB is very beneficial for the efficiency and effectiveness of the organisation, it suffers from the following limitations:

Limitations of zero-base budgeting : The Limitations of zero-base budgeting are as follows:

1. Various operational problems are likely to be faced in implementing the technique of ZBB. It requires the whole hearted support from the top management.

2. It is time consuming as well as costly. It needs properly trained managerial personnel to do the required job.

Inspite of the above limitations, the importance of ZBB technique is not diluted and it is considered to be an effective tool/technique for improving managerial efficiency.

(c) A large business consultancy firm is organized in to several divisions. One of the 11 divisions is the Information Technology (IT) division which provides consultancy services to its clients as well as to the other divisions of the firm. The consultants in the IT divisions always work in a team of three professional consultants on each day of consulting assignment. The external clients are charged a fee at the rate of Rs. 4,500 for each consulting day. The fee represents

the cost plus 150% profit mark up. The break up of cost involved in the consultancy fee is estimated at 80% as being variable and the balance is fixed.

The textiles division of the consultancy firm which has undertaken a big assignment requires the services of two teams of IT consultants to work five days in a week for a period of 48 weeks. While the director of the textiles division intends to negotiate the transfer price for the consultancy work, the director of IT division proposes to charge the textiles division at Rs. 4,500 per consulting day.

In respect of the consulting work of the textiles division, IT division will be able to reduce the variable costs by Rs. 200 per consulting day. This is possible in all cases of internal consultations because of the use of specialized equipment.

You are required to explain the implications and set transfer prices per consulting day at which the IT division can provide consultancy services to the textiles division such that the profit of the business consultancy firm as a whole is maximized in each of the following scenarios :

- (i) Every team of the IT division is fully engaged during the 48 week period in providing consultancy services to external clients and that the IT division has no spare capacity of consultancy teams to take up the textiles division assignment.
- (ii) IT division will be able to spare only one team of consultants to provide services to the textiles division during the 48 week period and all other teams are fully engaged in providing services to external clients.
- (iii) A new external client has come forward to pay IT division a total fee of Rs. 15,84,000 for engaging the services of two teams of consultants during the aforesaid period of 48 weeks.

11 Marks

Answer 4(c) Statement showing computation of transfer price

(Incremental approach)	Rs.
(i) Variable	-
(ii) Fixed cost	-
(iii) Profit forgone for 2 consulting days (2,700 x 2)	5,400

	5,400
(iv) (-) Saving in variable cost (200 x 2)	400

	5,000
(v) Per day cost [5000/2]	2,500
(vi) Given transfer price as demanded	<u>4,500</u>
Profit (vi - v)	<u>2,000</u>
	=====

(iii) Statement showing computation of transfer price and cost under situation of. It division able to spare only one team of consultants.

(i) Variable cost (1240)	1,240
(ii) Fixed cost	-

	1,240
(iii) Profit forgone	2,700

	3,940
(iv) (-) Saving in Variable Cost	200

Cost of 2 days	3,700
(v) Per day cost [4100/2]	2,050
(vi) Transfer price demand	<u>4,500</u>

Profit = (vi - v)	<u>2,450</u>
	=====

(iii) Statement showing computation of viability transfer price demanded as against offer of new external client

(i) Year cost (1440 - 200) x	2480
(ii) Fixed cost	-
(iii) Profit forgone	<u>3000</u>
	<u>5430</u>
Per day Cost	2740
(-) Demanded transfer cost	<u>4500</u>
Profit	<u>1760</u>

Statement showing computation of Profit per day

No. of days	= 48 x 5 = 240 Days
Total Fees	= Rs. 1584000
Per Day Fee	= Rs. 6600
(-) Consultant day (1800 x 2)	= Rs.3600
	<u>Rs. 300</u>

Working Notes:-

1) Enactment showing computation of profit in the transfer price

Transfer price	Rs 4500
(-) Profit (4500×150)	<u>Rs.2700</u>
	250
Cost	<u>Rs.1800</u>

2) Working note showing computation of apportionment of cost into variable and fixed

Cost 1800	
Variable (80%) Rs. 1440	Fixed (20%) Rs. 360

5. (a) State the characteristic features of a database created for operational control and decision making. **4 Marks**

Answer:- Operational Data Bases : There are two general classes of data base usage viz., operational activities usage and managerial activities usage. The advantages of operational data bases for operational activities are explored in the following paragraphs.

Generally, operational activities require full detail about the transactions involved. At the -operational level, the key attributes of data bases, many of which also have relevance to managerial activities, are as described below :

1. Consistency of related information elements. Operating personnel (as well as managers) are alert for information that is inconsistent with information they already possess. If information from different sources about the same transaction is consistent (one source tends to confirm and support the other), this information, as well as the information system, has greater validity. On the other hand, inconsistency of information acquired from different sources provides ample reasons to wonder about the quality of the information system. If these inconsistencies are pervasive, operations personnel may develop time-consuming supplemental information systems of their own.

2. Timeliness of transactions information and of managerial reports. The more closely that information pertaining to operations in process, as well as information for managers, can be provided on a real-time basis, the more useful the information is. Because of simultaneous updating of all records affected by a transaction and the frequent use of on-line transaction entry, data base records are more likely than conventional files to be up to date, and data base information for all purposes is more apt to be the most current. Also, because with data bases, multiples files do not have to be processed sequentially for the preparation of a report, reporting can be provided on a more timely basis.

3. Backup detail provided by inquiry capability. Operations personnel must refer backup details, such as transactions with a vendor in a preceding period, that are needed to answer customer questions about account status. Also, all managers can cite many instances when they have received highly summarized routine reports and then found that greater detail was needed to follow up on an unexplained circumstance, such as a production cost variance. Frequently the data needed exists in the computer system but is not quickly available.

If the detailed backup data is retained within an on-line data base that has a query language, the details needed can usually be accessed rapidly through the "window" provided by the data base query language.

4. Data sharing. The sharing of a large pool of operations data among multiple user departments is possible with a data base. For example, production engineering and inventory personnel may need information related to one another's current activities that can be made available as needed. Without a data base, information about other departments' activities probably would be available only several days after the end of each accounting period, if at all.

(b) Discuss, how target costing may assist a company in controlling costs and pricing of products. **4 Marks**

Answer:- Target costing assist a company in controlling costs and pricing of products. Target costing is most useful in situations where the majority of product costs are locked in during the product design phase. This is the case for most manufactured products, but few services. In the services area, such as consulting, the bulk of all activities can be

configured for cost reduction during the "production" phase, which is when services are being provided directly to the customer. In the services environment the "design team" is still present but is more commonly concerned with streamlining the activities conducted by the employees providing the service, which can continue to be enhanced at any time, not just when the initial services process is being laid out.

For example, design team can lay out the floor plan of a fast-food restaurant, with the objective of creating an arrangement that allows employees to cover the shortest possible distances while preparing food and serving customers; this is similar to the design of a new product. However, unlike a product design, this layout can be readily altered at any time if the design team can arrive at a better layout, so that the restaurant staff can continue to experience high levels of productivity improvement even after the initial design and layout of the facility. In this situation costs are not locked in during the design phase, so there is less need for target costing.

Another situation where target costing results in less value is the production of raw materials, such as chemicals. In this case there are no design features for a design team to labour over; instead, the industrial engineering staff tries to create the most efficient possible production process, which has little to do with cost reduction through the improvement of customer value by creating a product with a high ratio of features to costs.

A target costing program eventually results in major cost reductions if design teams are given an unlimited amount of time to carry out a multitude of design iterations. However, there comes a point where the cost of maintaining the design team exceeds the savings to be garnered from additional iterations. Also, most product must be released within a reasonably short time frame or they will miss the appropriate market window when they can beat the delivery of competing products to the market. To avoid both these cost and time delays, we use milestones as the principal control point over the course of a target costing program.

Several milestone reviews should be incorporated into a target costing program. Each one should include a thorough analysis of the progress of the design team since the last review, such as a comparison of the current cost of a design with its target cost. The main issue here is that the amount of cost yet to be worked out of a product must shrink, on a dollar or percentage basis, after each successive milestone review, or else management has the right to cancel the design project. For example, there may be a standard allowable cost variance of 12% for the first milestone meeting, 10% at the next meeting, and so on until the target cost must be reached by a specific future milestone data. If a design team cannot quite reach its target cost, but comes close, the management team should be required to make a "go/no go" decision at that time which overrides the cost target and sends the design into production, allows time of additional design iterations, or terminates the project.

A milestone can be based on a time budget (e.g., one per month) or on the points in the design process at which specific activities are completed.

(c) The costs and selling prices per unit of two products manufacturing by a company are as under :

Product	A (Rs.)	B (Rs.)
Selling Price	500	450
Variable costs :		
Direct Materials @ Rs. 25 per kg.	100	100
Direct Materials @ Rs. 20 per kg.	80	40
Painting.® Rs. 30 per hour	30	60
Variable overheads	190	175
Fixed costs @ Rs. 17.50/D.L.Hr.	70	35
Total costs	470	410
Profit	30	40

In any month the maximum availability of inputs is limited to the following :

Direct Materials	480 kg
Direct Labour hours	400 hours
Painting hours	200 hours

Required :

- Formulate a linear programme to determine the production plan which maximizes the profits by using graphical approach.
- State the optimal product mix and the monthly profit derived from your solution in (i) above.
- If the company can sell the painting time at Rs. 40 per hour as a separate service, show what modification will be required in the formulation of the linear programming problem. You are required to re-formulate the problem but not to solve.

11 Marks

Answer 5 (c)**(i)** Objective max $Z = 30x_1 + 40x_2$ Constraints

I) $4X_1 + 4X_2 \leq 480$

II) $4X_1 + 2X_2 \leq 400$

III) $X_1 + 2X_2 \leq 200$

IV) $X_2 \geq 0$

V) $X_1 \geq 0$

Conversion of inequality into equality

(i) $4x_1 + 4x_2 = 480$

If $x_1 = 0$ then $x_2 = 120$

If $x_2 = 0$ then $x_1 = 120$

(ii) $4x_1 + 2x_2 = 400$

If $x_1 = 0$ then $x_2 = 200$

If $x_2 = 0$ then $x_1 = 100$

(iii) $x_1 + 2x_2 = 200$

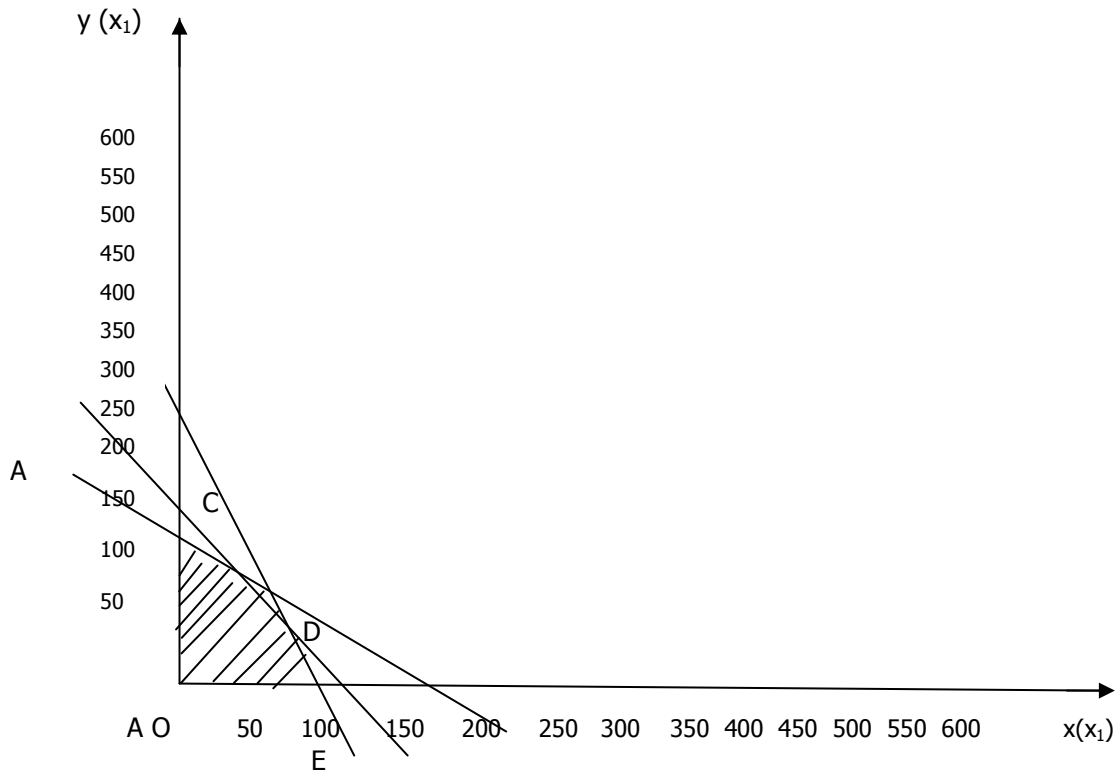
If $x_1 = 0$ then $x_2 = 100$

If $x_2 = 0$ then $x_1 = 200$

$x(x_1)$	0	120
$y(x_2)$	120	0

$x(x_1)$	0	100
$y(x_2)$	120	0

$x(x_1)$	0	200
$y(x_2)$	100	0



Feasible combination

Option	$x_1(x)$	$x_2(y)$	Maximum Profit
A	0	0	0
B	0	100	4000
C	40	80	4400
D	85	35	3950
E	100	0	3000

Maximum profit in option C is Rs. 4400

Have we should produce

Product A = 40

Product B = 80

(ii) Optimal Product mix = A : B
 = 40 : 80
 = 4 : 8
 Product mix or 1 : 2

6. (a) Enumerate the uses of Pareto Analysis.

3 Marks

Answer:- Usefulness of Pareto Analysis : It provides the mechanism to control and direct effort by fact, not by emotions. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets. Pareto analysis is useful to:

- Prioritize problems, goals, and objectives
- Identify root causes
- Select and define key quality improvement programs
- Select key customer relations and service programs
- Select key employee relations improvement programs
- Select and define key performance improvement programs
- Maximize research and product development time
- Verify operating procedures and manufacturing processes
- Product or services sales and distribution
- Allocate physical, financial and human resources

(b) A single counter ticket booking centre employs one booking clerk. A passenger on arrival immediately goes to the booking counter for being served if the counter is free. If, on the other hand, the counter is engaged, the passenger will have to wait. The passengers are served on first come first served basis. The time of arrival and the time of service varies from one minute to six minutes. The distribution of arrival and service time is as under :

Arrival/Service Time (Minutes)	Arrival (Probability)	Service (Probability)
1	0.05	0.10
2	0.20	0.20
3	0.35	0.40
4	0.25	0.20
5	0.10	0.10
6	0.05	--

Required :

(i) Simulate the arrival and service of 10 passengers starting from 9 A.M. by using the following random numbers in pairs respectively for arrival and service. Random numbers(60 09)(6 12) (08 18) (36 65)(38 25)(07 11) (08 79) (59 61) (53 77) (03 10.)

(ii) Determine the total duration of
 (1) Idle time of booking clerk and
 (2) Waiting time of passengers.

8 Marks

Answer:- Simulation table 1 (Arrival)

Time (in minutes)	Arrival	Cummulative	Probability
1	0.05	0.05	00-04 03 (10)
2	0.20	0.25	05-24 16(2), 68(3), 07(6), 08(7)
3	0.20	0.25	05-24 36(4), 38(5), 59(8), 53(9)
4	0.25	0.85	60-84 60(1)
5	0.10	0.95	85-94
6	0.05	1.00	95-99

Simulation table 2 (service)

Time	Service	Cummulative	Probability
1	0.10	0.10	00-09 09 (1)
2	0.20	0.30	10-29 12(2), 18(3), 25(5), 11(6), 10(10)
3	0.40	0.70	30-69 65(4), 61(8)
4	0.20	0.90	70-89 79(7), 77(9)
5	0.10	1.00	90-99

(ii) Statement showing computation of waiting of passenger and Idle time of booking clerk

Time unit	Event	Customer served (time required)	Customer Waiting	Time of waiting	Idle time of Booking clerk.
9:00 AM	Arrival	C1 C ₁ (1)	--	--	--
9:01 AM	Dept	C ₁ --	--	--	1
9:02 AM	Arrival	C2 C ₂ (2)	--	--	--
9:04 AM	Dept	C2 --	--	--	--
	Arrival	C3 C ₃ (2)	--	--	--
9:06 AM	Dept	C3 --	--	--	1
9 : 07 AM	Arrival	C4 C ₄ (3)	--	--	--
9 : 10 AM	Dept	C4 --	--	--	--
	Arrival	C5 C ₅ (2)	--	--	--
9 : 12 AM	Dept	C5 --	--	--	--
	Arrival	C6 C ₆ (2)	--	--	--
9 : 14 AM	Dept	C6 --	--	--	--
	Arrival	C7 C ₇ (4)	--	--	--
9 : 17 AM	Arrival	C8 --	C8	--	--
9 : 18 AM	Dept	C7 C ₈ (3)	--	(9:18 – 9:17) = 1	--
9 : 21 AM	Dept	C ₈ --	--	--	--
	Arrival	C9 C ₉ (4)	--	--	--
9 : 22 AM	Arrival	C ₁₀ --	C10	(9:25-9:22)	--
9 : 25 AM	Dept	C9 C ₁₀ (1)	--	3	--
9 : 26 AM	Dept	C10 --	--	--	--
Stop					

Idle time booking clerk = 2 minutes.

Waiting time of passengers = 4 minutes

(c) A city health centre provides health and other related services to the citizens who are covered under insurance plan. The health centre receives a payment from the insurance company each time any patient attends the centre for consultation as under :

Consultations involving	Payment from Insurance company (Rs.)
No treatment	60
Minor treatment	250
Major treatment	500

In addition, the adult patients will have to make a co-payment which is equivalent to the amount, of payment for the respective category of treatment made by the insurance company, However, children and senior citizens are not required to make any such co-payment.

The health centre will remain open for 6 day in a week for 52, weeks in a year. Each physician treated 20 patients per day although the, maximum number of patients that could have been treated by a physician on any working day is 24 patients.

The health centre received a fixed income of Rs. 2,25,280 per annum for promotion of health products ..from the manufacturers.

The annual expenditure of the health centre is estimated as under :

Materials and consumable (100% variable) Rs., 22, 32, 000

Staff salaries per annum per employee (fixed) :

Physician	Rs. 4,50,000
Assistants	Rs. 1,50,000
Administrative staff	Rs. 90,000
Establishment and other operating costs (fixed)	Rs. 16,00,000

The non-financial information is as under :

(i) Staff :

Number of physicians employed	6
Assistants	7
Administrative staff	2
(ii) Patient Mix :	
Adults	50%

Children	40%.
Senior Citizens	10%
(iii) Mix of patient appointments (%)	
Consultation requiring no treatment	70%
Minor treatment	20%
Major treatment	10%

Required:

- (i) Calculate the Net income of the city health centre for the next year;
(ii) Determine the percentage of maximum capacity required to be utilized next year in order to break even. **8 Marks**

Answer:- (i) Working notes

- (1) Calculate maximum no. of patient comes into Hospital during the years.
= 6 days x 52 weeks x 24 Patient x 6 physician
= 44928 Patient.

(2) Patient mix

Adults	50%	22464	Patients
Children	40%	17971	"
Senior citizen	10%	<u>4493</u>	"
		44928	

(3) mix of Patient appointments (%)

<u>Treatment</u>	<u>%</u>	<u>Adults</u>	<u>Children</u>	<u>Senior Citizen</u>
No	70%	15725	12580	3145
Minor	20%	4493	3594	899
Major	10%	2246	1797	449

Income statement of city health center

<u>Revenue</u>	(Payment from Insurance Company)	
<u>Adults</u>		
No treatment	15725 x 60	
Minor "	4493 x 250	
Major "	<u>2246 x 500</u>	31,89,750
<u>Children</u>		
No treatment	12580 x 60	
minor "	3594 x 250	
Major "	<u>1797 x 500</u>	25,51,800
<u>Senior Citizen</u>		
No treatment	3145 x 60	
minor "	899 x 250	
major "	<u>499 x 500</u>	6,37,950
<u>Payment from adults patient</u>		
No treatment	15725 x 60	
Minor "	4493 x 250	
Major "	<u>2246 x 500</u>	31,89,750
Fixed income for Promotion of Health center		2,25,280
	Total (A)	<u>97,94,530</u>
<u>Expenses.</u>		
i) Material & consumable (100% variable)		= 22,32,000
ii) Staff salary (fixed)		
a) Physician [450000 x 6]		= 27,00,000
b) Assistants [150000 x 7]		= 10,50,000
c) Administrative staff [90000 x 2]		= 1,80,000
iii) Establishments and other operating cost (Fixed)		<u>= 16,00,000</u>
	Total (B)	= 77,62,000
Profit (A – B) = 9794530 – 7762000		= 2032530

$$\text{Break Even} = \frac{(77,62,000 - 22,32,000)}{55,30,000} = 71,62,285.$$

$$\text{Contribution ratio} = \frac{77.21\%}{97,94,530 - 22,32,000} \times 100 = 77.21 \%$$

$$\% \text{ Maximum of capacity required in order to Breakeven} = \frac{71,62,285}{97,94,530} \times 100 = 73.125 \%$$