

Roll No.

Total No. of Questions – 7

Total No. of Printed Pages – 15

Time Allowed – 3 Hours

Maximum Marks – 100

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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 has not opted for Hindi Medium, his/her answers in Hindi will not be valued.

Question No. 1 is compulsory.

Answer any five questions from the remaining six questions.

In case, any candidate answers extra question(s)/sub-question(s) over and above the required number, then only the requisite number of questions first answered in the answer-book shall be valued and subsequent extra questions answered shall be ignored.

Working notes should form part of the answer.

Wherever necessary, candidates may make appropriate assumptions and clearly state them.

No statistical or other table will be provided with this question paper.

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1. (a) X Limited is a manufacturer of cardboard boxes. An analysis of its operating income between 2014 and 2015 shows the following : 5

	Income Statement (amount in 2014)	Revenue & cost effect of growth component in 2015	Revenue & cost effect of price recovery component in 2015	Cost effect of productivity component in 2015	Income Statement (amount in 2015)
Revenue (₹)	40,00,000	2,00,000 (F)	4,20,000 (F)	–	46,20,000
Cost (₹)	29,20,000	60,000 (A)	2,56,000 (A)	58,000 (F)	31,78,000
Operating income (₹)	10,80,000	1,40,000 (F)	1,64,000 (F)	58,000 (F)	14,42,000

X Limited sold 4,00,000 boxes and 4,20,000 boxes in 2014 and 2015 respectively. During 2015, the market for cardboard boxes grew 3% in terms of number of units and all other changes are due to company's differentiation strategy and productivity.

Required :

Compute how much of the change in operating income from 2014 to 2015 is due to the industry market size factor, productivity and product differentiation and also reconcile the profit of both years due to these factors.

- (b) Some statements are given below. Identify name of the cost with examples and state whether it is relevant/non-relevant in decision making. 5
- (i) Costs are historical costs which have already been incurred and cannot change by any decision made in future.

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- (ii) It is measure of benefits foregone by rejecting the second best alternative of resources in favour of the best.
- (iii) It is portioning of cost which involves payments to outsiders i.e, it gives rise to cash expenditure as opposed to such costs as depreciation.
- (iv) Total cost is changed (increase or decrease) due to change in the level of activity, technology or production process or method of production.
- (v) Cost used in evaluation of a product to reflect the use of resources but that have no observable cost.

- (c) G Ltd., produces and sells 95,000 units of 'X' in a year at its 80% production capacity. The selling price of product is ₹ 8 per unit. The variable cost is 75% of sales price per unit. The fixed cost is ₹ 3,50,000. The company is continuously incurring losses and management plans to shut-down the plant. The fixed cost is expected to be reduced to ₹ 1,30,000. Additional costs of plant shut-down are expected at ₹ 15,000. 5

Should the plant be shut-down ? Find the shut-down point in units and also in percentage of capacity level of production.

- (d) A company which has developed a new machine has observed that the time taken to manufacture the first machine is 600 hours 5

Required :

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.

2. (a) ✓ Speedo Limited is a specialist car manufacturer that produces various models of cars. The organization is due to celebrate its 100th anniversary next year. To mark the occasion, Speedo Limited intends to produce a sports car ; the Model Royal. As this will be a special edition, production will be limited to 1,000 numbers of Model Royal Cars. 10

Speedo Limited is considering using a target costing approach and has conducted market research to determine the features that consumers require in a sports car. Based on this market research and knowledge of competitor's products, company has decided to price the Model Royal at ₹ 9.75 Lacs. Company requires an operating profit margin of 25% of the selling price of the car. Details for the forthcoming year are as follows :

Forecast of direct costs for a Model Royal Car –

Labour	₹ 2,50,000 ✓
Material	₹ 4,75,000 ✓

Forecast of annual overhead costs –

	₹ in lacs	Cost driver
Production line cost	<u>2310</u>	See note 1
Transportation costs	<u>900</u>	See note 2

Note 1 :

The production line that would be used for Model Royal has a capacity of 60,000 machine hours per year. The production line time required for Model Royal is 6 machine hours per car. This production line will also be used to make other cars and will be working at full capacity.

Note 2 :

Some models of cars are delivered to showrooms using car transporters. 60% of the transportation costs are related to the number of deliveries made. 40% of the transportation costs are related to the distance travelled.

The car transporters have forecast to make a total of 640 deliveries in the year, and carry 10 cars each time. The car transporter will always carry its maximum capacity of 10 cars.

The total annual distance travelled by car transporters is expected to be 2,25,000 kms. 50,000 kms of this is for the delivery of Model Royal cars only. All 1,000 Model Royal cars that will be produced will be delivered in the year using the car transporters.

Required :

- (i) Calculate the forecast total cost of producing and delivering a Model Royal car using Activity Based Costing principles to assign the overhead costs.
 - (ii) Calculate the cost gap that currently exists between the forecast total cost and the target total cost of a Model Royal car.
- (b) A manufacturing company has 100 kg of A, 180 kg of B and 120 kg of C ingredients available per month. Company can use these materials to make three basic products namely 5 – 10 – 5, 5 – 5 – 10, and 20 – 5 – 10, where the numbers in each case represent the percentage of weight of A, B and C respectively in each of the products.

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The cost of these raw materials are as follows :

Ingredient	Cost per kg (₹)
A	64
B	16
C	40
Inert ingredients	16

Selling price of these products are ₹ 32.60, ₹ 34.80 and ₹ 36 per kg respectively. There is capacity restriction of the company product 5 – 10 – 5, so that company cannot produce more than 30 kg per month.

Only formulate this problem as L.P. model to determine the productions (in kg) of each product which will maximise its monthly profit.

3. (a) Zed company manufactures two types of flooring rolls. Budgeted and actual data for 2015 are –

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	Static Budget			Actual Result		
	Industrial	Domestic	Total	Industrial	Domestic	Total
Unit Sales in Rolls ('000)	200	600	800	252	588	840
Contribution Margin (₹ in lacs)	100.00	240.00	340.00	119.70	246.96	366.66

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In late 2014, a marketing research estimated industrial volume for industrial and domestic flooring at 80 Lacs Rolls. Actual industry volume for 2015 was 70 Lacs Rolls.

Compute :

(i) Sales Mix Variance and Sales Quantity Variance by type of flooring rolls and in total.

(ii) Market Share Variance and Market Size Variance.

(b) The following table shows for each activity needed to complete the road construction project, the normal time, the shortest time in which the activity can be completed and cost per day for reducing the time of each activity. The contract includes a penalty clause of ₹ 80 per day over 19 days. The overhead cost is ₹ 150 per day. The cost of completing the eight activities in normal time is ₹ 6,000. 8

Activity	Normal time in days	Shortest time in days	Cost of reduction per day (₹)
1 – 2	7	5	90
1 – 3	9	5	100
1 – 4	7	4	40
2 – 4	4	4	–
2 – 5	6	4	50
3 – 6	13	9	210
4 – 6	8	5	60
5 – 6	6	6	–

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Required :

- (i) Draw the network diagram for the project and identify the critical path and show normal duration and minimum duration of different paths.
- (ii) Calculate the total cost associated to normal duration of the project.
- (iii) Crash the relevant activities systematically and determine the lowest cost and the associated time.

4. (a) A company manufactures four products. The annual demand for products, selling prices and variable production costs are as follows : 8

Products	P	Q	R	S
Demand (Units)	1,20,000	1,86,000	1,71,000	99,000
	₹	₹	₹	₹
Selling price/unit	23.88	28.68	55.08	47.88
Direct Material/unit	10.08	13.20	30.48	24.96
Direct Labour/unit	4.08	4.08	6.72	6.36
Variable overheads/unit	1.44	1.44	2.40	2.16

Other data :

- (i) The variable overheads are absorbed on a machine hour basis at a rate of ₹ 1.20 per machine hour.
- (ii) Fixed overheads total ₹ 46,84,000 per annum.

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(iii) Production capacity available 8,15,000 machine hours per annum.

(iv) Products P, Q and R can be bought-in at ₹ 21.36 per unit, ₹ 24 per unit and ₹ 48 per unit respectively.

You are required to calculate the best product mix for the year and the resulting optimal profit.

- (b) ✓ A book-store wishes to carry systems analysis and design in stock. 8
Demand is probabilistic and replenishment of stock takes 2 days (i.e, if an order is placed on March 1, it will be delivered at the end of the day on March 3). M-4.

The probabilities of demand are given below :

Demand of books (Daily)	0	1	2	3	4
Probability	0.05	0.10	0.30	0.45	0.10

Each time an order is placed, the store incurs an ordering cost of ₹ 100 per order. The store also incurs a carrying cost of ₹ 5 per book per day. The inventory carrying cost is calculated on the basis of stock at the end of each day. The manager of the book-store wishes to compare two options for his inventory decision ;

- Order 5 books, when the inventory at the beginning of the day plus orders outstanding is less than 8 books.
- Order 8 books, when the inventory at the beginning of the day plus orders outstanding is less than 8 books.

Currently (beginning of the first day) the store has stock of 8 books plus 6 books ordered 2 days ago are expected to arrive next day. Further it can be assumed that the demand occurring during the day can be met out of stock received at the end of the day.

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Required :

Using Monte-Carlo simulation for 10 days, recommend which option the manager should choose ?

The two digit random numbers are given below :

89, 34, 78, 63, 61, 81, 39, 16, 13, 73

- (a) The budget of a hotel for the year 2016 shows following room occupancy : 10

Quarter	January – March	April – June	July – September	October – December
Average occupancy %	<u>45</u>	<u>60</u>	<u>90</u>	<u>55</u>

Revenue for the year is estimated to be ₹ 60,00,000 and arises from three profit centres namely Accommodation *45%, Restaurant 35% and Bar 20%.

* The accommodation revenue is earned from several different categories of guests each of which pays a different rate per room.

The three profit centres have following percentage of margin :

	Accommodation (%)		Restaurant (%)		Bar (%)	
Revenue		100		100		100
Wages	20		30		15	
Cost of sale	—		35		50	
Direct cost	10	30	15	80	5	70
Gross Margin		<u>70</u>		<u>20</u>		<u>30</u>

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Fixed cost for the year is estimated to be ₹ 9,15,000.

As a means of improving the budgeted profitability by 20%, following two suggestions have been made :

- (1) To offer special two night holidays at a reduced price of ₹ 250/- per night. It is expected that those accepting the offer would spend an amount equal to 40% of the accommodation charges in the restaurant and 40% of the accommodation charges in the bar.
- (2) To increase prices Management is confident that there will be no drop in volume of sales if restaurant prices are increased by 7.50% and bar prices by 10%. Accommodation prices would also need to be increased.

You are required to :

- (i) Calculate the budgeted profit.
- (ii) How many two night holidays would need to be sold each week in three quarters, totalling 39 weeks, when occupancy is less, to achieve the desired profitability as per suggestion (1) ?
- (iii) By what percentage the prices of accommodation would need to be increased as per suggestion (2) to achieve the desired profitability ?

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- (b) ABC Ltd. produces three products A, B and C. The following information is available for a period : 6

Product	A	B	C
Contribution per unit (Sales – Direct Materials) (₹)	30	25	15

Machine hours required per unit of production :

	Machine hours required per unit			Through put Accounting ratio
Product	A	B	C	
Machine 1	10	2	4	133.33%
Machine 2	15	3	6	200.00%
Machine 3	5	1	2	66.67%

Estimated sales demand for A, B and C are 500 units each and machine capacity is limited to 6,000 hours for each machine.

Required :

Analyse the above information and apply theory of constraints process to remove the constraints. How many units of each product will be made ?

6. (a) From the information given below, prepare a cash budget of the company for the first half of 2016, assuming that cost would remain unchanged. 8
- (i) Sales are both on credit and for cash the latter being one-third of the former.

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- (ii) Realisation from debtors are 25% in the month of sale, 60% in the following month and the balance in the month after that.
- (iii) Company's policy of selling price is 25% over cost.
- (iv) Budgeted sales of each month are purchased and paid for in the preceding month.
- (v) Rent payable is ₹ 2,000 per month.
- (vi) Sales forecast for the different months are :
 2015 – October ₹ 1,60,000; November ₹ 1,80,000; December ₹ 2,00,000.
 2016 – January ₹ 2,20,000; February ₹ 1,40,000; March ₹ 1,60,000; April ₹ 1,50,000; May ₹ 2,00,000; June ₹ 1,80,000 and July ₹ 1,20,000
- (vii) The company has outstanding debentures of ₹ 2 Lakhs on 1st January carrying interest at 15% per annum payable on the last date of each quarter on calendar year basis. 20% debentures are due for redemption on 30 June 2016.
- (viii) The company has to pay advance tax of ₹ 54,000 in March.
- (ix) Anticipated office costs for the six months are :
 January ₹ 25,000, February ₹ 20,000, March ₹ 40,000, April ₹ 35,000, May ₹ 30,000 and June 45,000.
- (x) Opening cash balance is ₹ 10,000 on January 1, 2016.

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- (b) The following table shows all the necessary information on the available supply from each warehouse, the requirement of each market and the unit transportation cost in rupees from each warehouse to each market. 8

Warehouses	Markets				Supply in units
	I	II	III	IV	
A	5	2	4	3	22
B	4	8	1	6	15
C	4	6	7	5	8
Requirement in units	7	12	17	9	45/45

The shipping clerk has worked out the following schedule from experience :

12 units from A to II, 1 unit from A to III,
 9 units from A to IV, 15 units from B to III,
 7 units from C to I and 1 unit from C to III.

Required :

- Check if the clerk has made the optimum schedule.
- Find the optimum schedule and minimum total shipping cost.
- Carrier of route C to II offers to transport entire supply of warehouse C at a reduced price. By how much the rate be reduced by the carrier before the clerk should consider giving him business ?

7. Answer any **four** out of the following five questions :

- | | |
|--|---|
| (a) A company manufactures two products X and Y. Product X requires 5 hours to produce while Y requires 10 hours. In a month of 25 effective working days of 8 hours a day, 1,000 units of X and 600 units of Y were produced. The company employs 50 workers in the production department to produce X and Y. The budgeted hours are 1,02,000 for the year. | 4 |
| Calculate capacity ratio, activity ratio and efficiency ratio. Also establish their inter-relationship. | |
| (b) State the limitations of uniform costing. | 4 |
| (c) Briefly explain the principles associated with synchronous manufacturing. | 4 |
| (d) Enumerate the uses of Pareto Analysis. | 4 |
| (e) Distinguish clearly between the skimming pricing policy and penetration pricing policy. | 4 |