

Roll No.

Total No. of Questions – 7

Total No. of Printed Pages – 16

Time Allowed – 3 Hours

Maximum Marks – 100

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Answers to questions are to be given only in English except in 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.

Questions No. 1 is compulsory.

Answer any **five** questions from the remaining **six** questions.

Working notes should form part of the respective answers.

No Statistical or other table will be provided with this questions paper.

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1. (a) X Ltd. is a prominent Eye Testing machines manufacturing Company. 5
It has several types of eye testing machines in its portfolio, each of which are yielding progressive returns. The company has developed and launched its innovative machine the 'Eye Care' in the market. The data relating to its cost structure are given below :

	₹ per unit
Raw Materials	42,000
Imported Parts	8,000
Direct labour	6,000
Other Variable Costs	9,000
Fixed overheads	25,000

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Market research has indicated that at a selling price of ₹ 1,00,000 no order will be received, but the demand for 'Eye Care' will be increased by four units with every ₹ 10,000 reduction in the unit selling price below ₹ 1,00,000.

Determine the unit selling price of 'EYE Care' that will maximize the profit of X Ltd.

- (b) Using the same material P-72, Sigma Limited manufactures two products - SX and ZX. It is ascertained that during the year 2021-22, the supply of material P-72 will be limited to 1,50,000 kg. The following information relates to products SX and ZX :

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Particulars	SX	ZX
Annual Demand	12,000 units	15,000 units
Variable production cost per unit	₹ 120	₹ 150
Material (P-72) required for each unit of output	4 kg	10 kg

A subcontractor has quoted prices to supply SX @ ₹ 180 per unit and ZX @ ₹ 260 per unit.

Required :

- (I) Calculate how many units of SX and ZX should be manufactured by Sigma Limited and how many units should be purchased from the subcontractor in order to maximise profits.
- (II) From financial perspective, what do you need to ensure in order to justify your answer in (I) above ?

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- (c) PQR Limited has two departments that produce two separate product lines. The company has been implementing Total Quality Management (TQM) over the past year. Revenue and costs of quality for that year are given below.

Particulars	Department K (₹)	Department P (₹)	Total (₹)
Sales	92,00,000	1,10,00,000	2,02,00,000
Costs of quality :			
Prevention costs	1,86,000	1,24,500	3,10,500
Appraisal costs	1,36,000	68,000	2,04,000
Internal failure costs	94,000	1,97,500	2,91,500
External failure costs	44,000	1,60,000	2,04,000
Total costs of quality	4,60,000	5,50,000	10,10,000

Required :

Identify the department which is taking a more serious approach to implement TQM, based on the department wise **computation and analysis** of the following:

- Total costs of quality as a percentage of sales.
- Ratio of costs of conformance to total costs of quality.
- Ratio of costs of non-conformance to total costs of quality.
- Costs of non-conformance as a percentage of sales.

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- (d) A co-operative farm is engaged in dairy business. It is considering using a combination of cow feeds available from local suppliers. It would like to feed the cows at minimum cost while also making sure each cow receives an adequate supply of calories and vitamins. The cost, calorie content, and vitamin content of each feed are given in the table below.

Contents	Feed Type I	Feed Type II
Calories (per kilogram)	800	1,000
Vitamins (per kilogram)	150 units	80 units
Cost (per kilogram)	₹ 15	₹ 30

Each cow requires at least 18,000 calories per day and at least 7,000 units of vitamins. A further constraint is that not more than one-third of the diet (by weight) can consist of Feed Type I, since it contains an ingredient which is toxic if consumed in too large quantity.

Required :

- Formulate a linear programming model for this problem.
- In order to solve the problem using simplex method how many slack and surplus variables need to be introduced. Mention the constraints where these variables are to be introduced.
- Explain the meaning of slack variables and shadow price.

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2. (a) CTX Ltd. is a manufacturer of a product sold under the brand name 'Caltel' at ₹ 400 each. It has a production capacity of 40,000 units per month. As projected by the company, it expects to sell 25,000 units per month in the next quarter and submits the following costs and revenues for the next month.

Particulars	₹	₹
Sales (25,000 units @ ₹ 400 per unit)		1,00,00,000
Less : Direct material	20,00,000	
Less : Direct labour	35,00,000	
Less : Variable manufacturing overheads	4,50,000	
Less : Fixed manufacturing overheads	20,00,000	
Less : Fixed selling and distribution overheads	7,50,000	
Total costs		87,00,000
Profit		13,00,000

CTX Ltd. is not expecting an increase in demand for the product of the company and it estimates that demand in the foreseeable future will remain at 25,000 units per month. Direct labour and fixed overheads cannot be reduced in the short run.

A potential customer Decagon Ltd. has offered to enter into a contractual agreement to purchase 15,000 units per month for the next three years at an agreed price of ₹ 260 per unit. A special logo is to be printed on the product which will cost ₹ 8 per unit. No selling and distribution cost would be incurred for the order.

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However, the following would emerge, if the offer is not accepted and a decision is taken by the company to reduce capacity permanently by 15,000 units per month :

- Direct labour to the extent of 37.5 % will be made redundant and there would be no redundancy costs.
- Savings in fixed manufacturing overheads would be ₹ 8,00,000 per month.
- Savings in fixed selling and distribution overheads would be ₹ 3,10,000 per month.

Required :

- Advise whether it would be beneficial for CTX Ltd. to accept the offer of Decagon Ltd.
- Explain the factors involved in decisions relating to expansion and contraction of business.

- (b) Jupiter Limited is planning to launch a new product in the market. The team involved in feasibility study has provided the following data for the first year.

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The variable cost per unit, total fixed cost, selling price per unit and the probabilities associated with these random variables are as follows :

Variable cost		Fixed cost		Selling price per unit and sales volume		
Variable cost per unit (₹)	Probability	Total fixed cost (₹)	Probability	Selling price per unit (₹)	Sales Volume (units)	Probability
14.60	0.10	1,00,000	0.10	22.00	30,000	0.15
14.80	0.20	1,20,000	0.15	23.00	29,000	0.25
15.00	0.30	1,50,000	0.25	24.00	27,000	0.30
15.20	0.20	2,00,000	0.30	24.50	26,000	0.20
15.50	0.20	2,40,000	0.20	26.00	22,500	0.10

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Random Numbers to be used are as follows :

	Random Numbers							
For selling price per unit	97	95	12	11	90	49	57	15
For variable cost per unit	86	81	02	92	75	91	24	58
For fixed cost	39	22	13	02	80	67	14	99

Sales volume corresponds to each selling price and thus sales volume not to be considered as a separate random variable.

Required :

Using simulation process, repeat the trial 8 times and calculate the expected profit from the new product to be launched.

3. (a) PCB Limited manufactures a component GB 321X which is used in the engine of four stroke 125CC Bharat Stage-6 compliant motorcycle. For the month of April 2021, the budgeted sales were 1,200 units of the component. The budgeted selling price was ₹ 3,600 per component. During April 2021, the actual records showed that 1,650 units of the component were produced and sold for ₹ 57,75,000.

Standard cost card per unit of the component and actual cost data for April 2021 are as follows :

Standard cost card per unit of component		Actual for 1650 units	
Cost item	₹	Quantities	₹
Direct Materials (12 kg @ ₹ 150 per kg)	1,800	13,200 kgs	21,12,000
Direct labour (1.5 hrs @ ₹ 240 per hour)	360	1,980 hours	4,95,000
Variable overheads (1.5 hrs @ ₹ 60 per hour)	90	1,980 hours	1,48,500
Total	2,250		27,55,500

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Required :

(i) Prepare a statement reconciling the budgeted contribution and actual contribution for the month of April 2021 showing the amounts and nature (favourable or adverse) of the following variances :

- Material price and usage variance
- Labour rate and efficiency variance
- Variable overhead efficiency and expenditure variance
- Sales price variance and sales margin volume variance

(ii) Identify the variances that have mostly contributed to increase in actual contribution from the budgeted contribution and explain the factors responsible for such change.

(iii) In the light of the above, advise whether there is any need for revision of the standard cost card in the forthcoming budget period.

(b) PKG Limited has three warehouses which stores a given product. These warehouses supply the product to four dealers. The supply and demand in units and the corresponding unit transportation cost are given. The following solution is prepared by Operational manager of the company.

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Warehouses	Dealers				Supply
	D1	D2	D3	D4	
W1	27 30	23 70	31 50	69	150
W2	10	45	40	32 40	40
W3	30 60	54	35	57 20	80
Demand	90	70	50	60	270

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Required :

- (i) Is this solution degenerate ?
- (ii) Is this solution optimum ?
- (iii) Calculate the minimum transportation cost.
- (iv) Is this solution unique ?

4. (a) APS Associates, an advertising firm, performs on going services for three Customers - A, B and C. The revenues and costs for the past year are as under :

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APS ASSOCIATES Customer Profitability Analysis				
Particulars	A ₹	B ₹	C ₹	Total
Revenue (fees charged)	4,50,000	2,70,000	3,50,000	10,70,000
Operating Costs :				
Cost of services (variable)	3,70,000	2,20,000	3,30,000	9,20,000
Salaries, rent and general administration (fixed)	44,000	26,000	38,000	1,08,000
Total operating costs	4,14,000	2,46,000	3,68,000	10,28,000
Operating profit	36,000	24,000	(18,000)	42,000

APS Associates is considering dropping customer C's account. Total fixed costs would not be affected by the decision to discontinue customer C.

Required :

- (i) Using differential analysis advise whether APS Associates should discontinue customer C's account.
- (ii) Suppose, after dropping customer C, the firm can utilise the capacity to generate a contribution margin of ₹ 35,000 per year from a new customer 'P' involving a direct fixed cost of ₹ 13,000 per year.
Purely from a financial perspective advise whether the firm should accept the new customer P's account.
- (iii) Advise the non-financial factors that should also be considered in (ii) above before coming to a final decision.
- (iv) State any four benefits of customer profitability analysis.

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- (b) ABC Ltd. manufactures an auto component X in two operations machining and finishing. Machining operations are carried out in Department P and finishing Operations are carried out in Department Q, the details of which are given below :

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	Department P	Department Q
Annual Capacity	2,40,000 units	2,00,000 units
Annual Production	2,00,000 units	2,00,000 units
Fixed operating costs other than direct materials	₹ 12,00,000	₹ 6,00,000
Fixed operating costs per unit produced	₹ 6 per unit	₹ 3 per unit

The selling price of Component X is ₹ 150 per unit with a direct material cost of ₹ 120 incurred at the start of operations in Department P and there are no other variable costs to the company. ABC Ltd. can sell whatever output it produces.

You are required to answer the following independent situations on the basis of throughput accounting :

- ABC Ltd. is planning to make use of some modern tools in the Department Q. If these tools are used, the final output would increase by 5,000 units per annum. These tools costs ₹ 75,000 per annum to ABC Ltd. Should ABC Ltd. acquire these modern tools ?
- The production manager of Department P has come up with a proposal of faster set ups that would increase the annual capacity of the Department P by 18,000 units per annum with a cost of ₹ 40,000 a year. Should this suggestion be implemented ?
- An outside contractor has offered to do finishing operations for 20,000 units of Department Q at a unit cost of ₹ 9 which is three times the fixed operating unit cost of Department Q. Should ABC Ltd accept the proposal ?
- ABC Ltd. produces 4000 defective units at the machine operations in Department P and another 5000 units at the finishing operations in Department Q. What is the cost to ABC Ltd. of the defective units produced in both the Departments. Explain your answer briefly.

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5. (a) Sun Chemicals Ltd. operates a Division R that produces chemical compound 'R' usable in production of detergent soaps. Total installed capacity of Division R is 1,00,000 tonnes and company is operating at full capacity. Revenue and costs associated with compound R per tonne is as under :

		₹ (per tonne)
Selling Price		20,000
Less Variable Cost	14,000	
Fixed costs (based on the Installed capacity)	5,000	19,000
Net Income		1,000

Sun Chemicals Ltd. has just acquired a small company RAC extractions Ltd. that manufactures branded soaps and decided to treat it as an independent profit centre and as a separate Division 'RS'. The new division RS is currently purchasing its requirement of 12,000 tonnes of Compound R per year in an open market at ₹ 20,000 per tonne less 15% quantity discount. Once acceptable inter divisional transfer price is worked out for both the divisions, it is likely to ask RS Division to source its annual requirement from Division R.

Required :

For (i) and (ii) below assume that Division R could sell all of its production of Compound R at the price of ₹ 20,000 per tonne.

- Only from the view point of financial considerations of each division, keeping the individual division's interests in the forefront, will there be any mutual agreeable transfer price ? Support your answer with brief reasoning.
- Assuming that Division R meets the open market procurement price of RS, what will be the effect on profit of Division R & Division RS and the Company as a whole.

For (iii) to (vi) below assume that the Division R could sell only 80,000 tonnes each year to outside customers at ₹ 20,000 per tonne :

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- (iii) Are the managers of the Division R and Division RS likely to agree to a transfer price for 12,000 tonnes of compound R ? Why or why not ?
- (iv) Suppose the Division RS's outside suppliers reduced the price of compound R to ₹ 16,000, can the Division R accept this as transfer price. What would be effect on overall profit of the company in this case ?
- (v) If the Division R refuses to supply the compound R to Division RS at the price stated in point (iv) above should Division RS be required to purchase the compound R at the higher price from Division R only, for the overall interest of the company.
- (vi) Disregarding the divisional independence, if Division RS is directed to purchase 12,000 tonnes of Compound R at ₹ 20,000 per tonne, what will be the effect on the profit of the Company as a whole ? Consider the open market price suggested in point (iv) above.
- (b) In the 3rd quarter of 2018-19 Modern Engineering Limited (MEL) had developed a new product that has a short life cycle. The product has a life cycle of 18,000 units. It was estimated that the first 15,000 units will be sold @ ₹ 800 each. There after, during 'decline' stage of its life cycle, the selling price will have to be reduced. The product is produced in batches.

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Cost and other details applicable throughout the product's life cycle are as follows :

No. of units per batch	100 units
Labour cost	₹ 150 per hour
Other variable costs (Including material cost)	₹ 25,000 per batch
Total fixed cost for the product	₹ 5,80,000
Labour hours taken to produce the first batch	400 hours

The product enjoyed 90 per cent learning curve until 128th batch had been produced. Production of batches beyond 128th batch will have no learning effect and requires same amount of labour time as required for the 128th batch.

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Till March 31, 2021, MEL had produced and sold 15,000 units at ₹ 800 each. It is ascertained that total labour hours taken for production of 127 batches and 128 batches are 24,327 hours and 24,489 hours respectively.

Required :

Calculate the selling price per unit for 3,000 units to be sold in decline stage so as to earn a total life cycle profit of ₹ 36,00,000 from the product.

6. (a) Shyam Food Products (SFP) Ltd. manufactures protein shakes under the brand name 'Health Plus' and 'Body Plus'. It has a fully automated production system and the product cost does not include direct labour cost. The company is a market leader in terms of market share and price of the products. It has its own client base ready to pay the price but would not compromise with quality. SFP Ltd. has implemented a stringent quality control system and it carries out the following four activities in relation to its products :

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- Inspection of incoming raw materials received in batches.
- Processing of products in batches.
- Quality control inspection of finished products - first during the production process for each batch processed and again at the time of despatch for each batch of products despatched to customers to ensure product quality control.
- Despatch of finished products to customers in batches.

Recently, an FMCG Conglomerate stepped into this business and have started aggressive advertisement campaigning and are about to launch their products within a few months. SFP Ltd. is a cash rich company. It apprehends that the competitors may adopt a penetrating pricing policy and offer lower prices for the same product quality and pose a growing threat to the company.

The Chief Executive Officer (CEO) and the Management Accountant both believe that the company would no longer be in a position to dictate the price of the products. Rather, it would be a market driven price and in order to keep the profit intact, the company will have to adopt target costing approach. SFP Ltd. took an initiative to know the accurate cost of the products using Activity Based Costing (ABC) approach.

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The following information relates to the batch size, costs involved for the activities carried out and other relevant information for the products of the company for the quarter ending on 31st March, 2021 :

Particulars	Health Plus	Body Plus	Cost (₹)
Raw materials consumed	40,000 kg @ ₹ 144 per kg	50,000 kg @ ₹ 180 per kg	1,47,60,000
Output discarded in quality control test at the end of production process	10%	20%	—
Batch size :			
Inspection of raw materials	2,000 kgs	2,500 kgs	1,70,000
Processing	400 kgs	1,000 kgs	1,87,500
Dispatch	400 kgs	500 kgs	2,55,000
Product quality control inspection	—	—	6,00,000

Required :

- Calculate the cost driver rate for each of the four activities.
- Calculate cost per kilogram of 'Health Plus' and 'Body Plus' using activity based costing.
- Advise how the company can remain competitive and keep its market share intact.

- (b) PQR Ltd. manufactures two products P and Q using two basic raw materials AX-25 and BZ-50. The current pattern of sales of P and Q is in the ratio of 5 : 6 respectively. The relevant data is as under :

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	P	Q
Expected selling price per unit	₹ 750	₹ 500
Material required (per unit/kg)		
AX- 25	1.5 kg	1.2 kg
BZ-50	0.6 kg	0.5 kg
Labour @ ₹ 80 per hour	₹ 96	₹ 72
Variable overheads per unit	₹ 64	₹ 46

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Fixed overheads are ₹ 27,12,500 per month and the company desires a profit of 8% on sales.

The price of material AX- 25 and BZ-50 is ₹ 160 per unit and ₹ 100 per unit respectively. Opening inventory of material and finished goods as on 01.06.2021 is as under :

AX-25	BZ-50	P	Q
8,000 kg	3,750 kg	3,000 units	4,000 units

The company is introducing a new system of inventory control which should reduce stock levels. The company forecasted closing stock of materials and finished goods at 70% and 75% of the opening stocks respectively. Normal wastage of material during the production is 4% in case of material AX-25.

You are required to prepare the following budgets for June 2021:

- (i) Sales budget in quantity and value.
- (ii) Production budget in quantity.
- (iii) Material usage budget in quantity and value.
- (iv) Material purchase budget in quantity.

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

4×4

= 16

- (a) State with brief reasons whether the following statements are valid or invalid in the context of pricing decisions:
 - (i) Under perfect competition, a firm is a price setter.
 - (ii) Price of a product set below the perceived value but above the cost of sales give incentives to the seller only.
 - (iii) Charging lower rates for front seats than the back seats in cinema theatre is an example of price discrimination based on place.
 - (iv) When demand of the product is elastic to price, skimming pricing strategy is adopted.

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- (b) State with brief reasons the validity of the following statement in connection with PERT and CPM :
- (i) Two activities have common predecessor and successor activities. So, they can have common initial and final nodes.
 - (ii) The difference between the earliest and latest start time for the activity is termed as independent float.
 - (iii) The optimum duration of a project is the minimum time in which it can be completed.
 - (iv) When dummy activities are inserted in a network diagram unnecessarily, this type of error is called dangling.
- (c) (i) "Assignment problem is special case of transportation problem, it can also be solved by transportation methods" explain the statement briefly.
- (ii) In an assignment problem to assign jobs to men to minimise the time taken, suppose that one man does not know how to do a particular job, how will you eliminate this allocation from the solution ?
- (d) Discuss the limitations of inter firm comparison.
- (e) Some statements are given below. Identify the type of cost and state whether it is relevant/non- relevant in decision making :
- (i) A company has paid ₹ 8 lakhs to a marketing research company to find out expected demand of the newly developed product of the company.
 - (ii) Company invested ₹ 30 lakhs in a project. Company could have earned ₹ 2.40 lakh as interest by keeping amount as Fixed deposit with bank.
 - (iii) Company has paid ₹ 2 lakh as rent for a factory which is temporarily closed for four months.
 - (iv) Company has paid commission of ₹ 4.50 lakh @ 2% on sales to the salesmen for achieving sales beyond the target sale of ₹ 25 lakh per month per salesman.

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