Time Allowed: 3 Hours   **Full Marks: 100**

The figures in the margin on the right side indicate full marks.

SECTION – A : STRATEGIC COST MANAGEMENT FOR DECISION MAKING

Answer to Question No. 1 & 6 in Section A, are compulsory.
Further, answer any 3 from Question nos. 2, 3, 4 & 5.

1. **(a) Choose the most appropriate answer to the following questions with justification. 1 mark will be awarded for correct answer and 1 mark for justification.:**   **[8×2= 16]**

   i. Which of the following is not a term normally used in value analysis?
      a. Resale value
      b. Use value
      c. Esteem value
      d. Cost value

   ii. PRAISE stands for :
      a. Appreciating someone
      b. Product, Recognition, Adoption, Invention, Solution & Evaporation
      c. Problem Identification, Ranking, Analysis, Innovation, Solution & Evaluation
      d. None of the above

   iii. Which of the following is not the quality parameter for service organizations?
      a. Consistency
      b. Friendliness
      c. Durability
      d. Promptness

   iv. The break-even point of a manufacturing company is ₹1,60,000. Fixed cost is ₹48,000. Variable cost is ₹12 per unit. The PV ratio will be:
      a. 20%
      b. 40%
      c. 30%
      d. 25%

   v. T Ltd. produces and sells a product. The company expects the following revenues and costs in 2022: Revenues (400 sets sold @ ₹ 600 per product) = ₹ 2,40,000
      Variable costs = ₹ 1,60,000
      Fixed costs = ₹ 50,000

What amount of sales must T Ltd. have to earn a target net income of ₹63,000 if they have a tax rate of 30%?
a. ₹ 4,20,000
b. ₹ 4,29,000
c. ₹ 3,00,000
d. ₹ 4,89,000

vi. If project A has a net present value (NPV) of ₹ 30,00,000 and project B has an NPV of ₹ 50,00,000, what is the opportunity cost if project B is selected?
a. ₹ 23,00,000
b. ₹ 30,00,000
c. ₹ 20,00,000
d. ₹ 50,00,000

vii. Target costing is the answer to :
a. Market driven prices
b. Sellers' market
c. No Profit situation
d. None of the above

viii. Glasso, a manufacturer of large windows, is experiencing a bottleneck in its plant. Setup time at one of its workstations has been identified as the culprit. A manager has proposed a plan to reduce setup time at a cost of ₹ 7,20,000. The change will result in 800 additional windows. The selling price per window is ₹ 18,000, direct labour costs are ₹ 3000 per window, and the cost of direct materials is ₹ 7,000 per window. Assume all units produced can be sold. The change will result in an increase in the throughput contribution of _____.
a. ₹ 64,00,000
b. ₹ 88,00,000
c. ₹ 56,80,000
d. ₹ 1,44,00,000

2.(a) What are the generic links of Porter's Value Chain?   **[8]**
  (b) Differentiate Cost Control with Cost Reduction.   **[4]**

3.(a) Narrate the steps for implementing the Total Quality Management.   **[8]**
  (b) What do you understand by 6C's?   **[4]**

4. (a) The income statement of Ashok Gears Ltd. is summarized as below:

Net Revenue ……………………………………………… ₹ 80,00,000

Less: Expenses (including ₹40,00,000 of Fixed Cost) …………. ₹ 88,00,000

Net Loss…………………………………………….. …………… ₹ 8,00,000

The manager believes that an increase of ₹20,00,000 as fixed expenditure in advertising outlays will increase the sales substantially. His plan was approved by the Board.

You are required to calculate:

(i) At what sales volume will the Company have break even?

(ii) What sales volume will result in a Net Profit of ₹ 4,00,000?   **[4]**

(b)   AB Limited has two divisions Alpha & Beta. Alpha produces components, two units of which are required for one unit of final product produced by Beta. Alpha has a capacity to produce 20,000 units and entire quantity is supplied to Beta @ ₹ 200/unit. Variable cost component at Alpha is ₹ 190 & fixed cost ₹ 20 per unit. For final product of Beta, per unit variable cost excluding component is ₹ 700, fixed cost ₹ 200 and selling price is ₹ 1500. Alpha has placed a proposal for increasing the transfer price to ₹ 220 i.e.. the market price. Facility at Alpha can be rented out @ ₹ 3.00 Lakhs p.a. Manager at Alpha wants to opt for this alternative. Beta can buy this component from outside market @ ₹ 210. If capacity of Alpha is augmented to 40,000 units with an additional investment of ₹ 15 lakhs, it can sell 20,000 units to external market and balance to Beta @ ₹ 210 per unit. Fixed cost for Alpha will be up by ₹ 1.00 lakh. Evaluate and give your opinion on:

1. Facility of Alpha is rented out and Beta buys from market @ ₹ 210 per unit.
2. Alfa sells to outside market @ ₹ 220 and Beta buys @ 210 per unit from market
3. Capacity enhancement at a cost of capital of 12% p.a.   **[8]**

5.(a)   Your company fixes the inter-divisional transfer prices for its products on the basis of cost, plus a return on investment in the division. The Budget for Division A for 2021-22 appears as under:

Particulars	₹
Fixed Asset	5,00,000
Current Asset	3,00,000
Debtors	2,00,000
Annual Fixed cost of the division	8,00,000
Variable cost per unit of product	₹ 10 per unit
Budgeted Volume	4,00,000 units per year
Desired ROI	28%

Determine the transfer price for Division A.   **[6]**

(b) A company has estimated the following demand level of its product:

Sales Volume (units)	10000	12000	14000	16000	18000
Probability	0.10	0.15	0.25	0.30	0.20

It has assumed that the sales price of ₹ 6 per unit, marginal cost of ₹ 3.50 per unit, and fixed costs of ₹ 34,000. What is the probability that?
(A) The company will break-even in the period?
(B) The company will make a profit of at least ₹ 10,000?   **[6]**

6.   Modern Co produces 3 products, A, B and C, details of which are shown below:

Particulars	A	B	C
Selling price per unit (₹)	120	110	130
Direct material cost per unit (₹)	60	70	85
Variable overhead (₹)	30	20	15
Maximum demand (units)	30,000	25,000	40,000
Time required on the bottleneck resource (hours per unit)	5	4	3

There are 3,20,000 bottleneck hours available each month.

Required:

Calculate the optimum product mix based on the throughput concept.   **[8]**

SECTION – B : QUANTITATIVE TECHNIQUES IN DECISION MAKING

Answer to Question No. 7 & 11 in Section B, are compulsory.
Further, answer any 2 from Question nos. 8, 9 & 10.

7. Choose the most appropriate answer to the following questions giving justification.   [2+2= 4]
   i. The Objective Function of a LPP is $Z = 3x_1 + 2x_2$. If $x_1 = 10$ and $x_2 = 5$ then the value of Z is –
       a.   35
       b.   40
       c.   45
       d.   50

   ii.   The solution to a Transportation Problem with 'm' sources ad 'n' destinations is feasible if the number of cell allocations are –
       a.   m + n
       b.   mn
       c.   m – n -1
       d.   m + n – 1

8.(a)   A travelling salesman has to visit five cities. He wishes to start from a particular city, visit each city once and then return to his starting point. The travelling cost (in ₹ 00) between any two cities is given in the table below:

From city	To City				
	A	**B**	**B**	**D**	**E**
A	M	5	8	4	5
B	5	M	7	4	5
C	8	7	M	8	6
D	4	4	8	M	8
E	5	5	6	8	M

Find the cost minimising sequence of visit.   **[7]**

(b) The Management of a company is negotiating with its Union for revision of hourly wages of its employees. The Management deployed a Consulting Firm who has prepared a payoff matrix for the purpose which indicates the additional hourly cost (in ₹) to the company. It is shown below: you being a part of the Consulting Firm have to assist the Management in selecting the best strategy. What is the value of the game? How is it going to affect the company's cost?

Management's Strategies	Strategies of the Union			
	U_1	U_2	U_3	U_4
M_1	2.50	2.70	3.50	-0.20
M_2	2.00	1.60	0.80	0.80
M_3	1.40	1.20	1.50	1.30
M_4	3.00	1.40	1.90	0

[7]

9.(a) The past data of demand per week (in '00 kgs.) of a confectionery item is given below –

Demand/Week	0	5	10	15	20	25
Frequency	2	11	8	21	5	3

Using the sequence of random numbers – 35, 52, 13, 90, 23, 73, 34, 57, 35, 83, 94, 56, 67, 66 generate the demand for the next 10 weeks. Also find out the average demand per week.

[8]

(b) What are the different types of Data Analysis Tool? Discuss each briefly.   **[6]**

10.(a) M/S B.P.Leathers, a shoe manufacturer has modern outlook and they depend heavily on Business Forecasting methodology to plan their business activities like manufacturing, marketing, finance etc. At the beginning of the year 2022 they have forecasted data of demand of their shoes for the beginning of the month of March as 1000 pairs. But the actual demand turned out to be 900 pairs. Using a Smoothing Coefficient of 0.1 forecast the demand at the beginning of the 2nd week of March 2022.

Also forecast the demands using Exponential Smoothing technique at the beginning of each week till mid-April 2022 when the actual demands are as follows –

At the beginning of the 2nd week of March – 1010 pairs, At the beginning of the 3rd week of March – 1032 pairs, At the beginning of the 4th week of March – 976 pairs, At the beginning of the 1st week of April – 934 pairs, At the beginning of 2nd week of April – 1008 pairs & At the end of the 2nd week of April – 1020 pairs. **[10]**

(b) Distinguish between PERT and CPM. **[4]**

11. Sri Lanka, the third largest tea producing country has a production share of 9% of the international market and one of the world`s leading exporters with a share of 19% of the global demand. Thus tea industry is crucial to enhance their economic competitiveness in the world market. The nature of the highly competitive global market has made scientific and reasonable production management increasingly important for tea companies to differentiate themselves from competitors. In order to enhance their competitive position, Sri Lankan tea manufacturers are giving serious thought to use optimization techniques like Linear Programming to find their best product mix to achieve maximization of profit. Dulwan Tea Company, established in 1974 is one of the leading tea exporters of the country. They use their own leaves which grow in their tea plantations. More than 2500 varieties of flavored and non-flavored tea products are produced and globally exported by the company. This brand is available in more than 90 countries in the world including UK, Poland, Canada, South Africa, Australia and New Zealand. Therefore, how to optimize the production process yielding maximum profit is a critical and challenging task in front of the decision makers of Dulwan. After lot of deliberations among themselves, the management of Dulwan has decided to hire a Cost and Management consultant.

Accordingly, they hired Mr. Kuppuswamy, a resident of Jafna, Sri Lanka and a well-known consultant of the island. In his first visit to the company the management explained to him the requirements and Mr. Kuppuswamy technically phrased the objective of the work as follows.

~ To formulate a mathematical model that would suggest a viable product mix to ensure maximum profit of the company as well as evaluating performance of the proposed product mix.
~ To highlight the peculiarities of using linear programming technique at a single operating procedure and prove that despite the obstacles, the application of the technique in determining the product mix enables Dulwan Tea Company to be more profitable than the otherwise.
Thereafter a team is formed from the existing employees of the company and under the guidance of Mr. Kuppuswamy they started working to formulate the problem as a Linear Programming model. Since the company is dealing with huge varieties of tea product, everybody could realize that solving such LPP manually is impossible. So it is decided to

purchase a suitable software for the purpose and Mr. Kuppuswamy is requested to get at least three quotes from renowned global software companies. When the process is on, all of a sudden new opportunities open and the company decided to bid for supplying few of its very premium quality tea to the European market. But the management was not very sure as to which quality of tea they should try to sell so that the objective of profit maximization is fulfilled. Once again Mr. Kuppuswamy was approached and this time he decided to find the best product mix by solving the problem manually (as variety of very premium quality tea was not much and also the decision regarding which software to purchase not finalized).

During solution of the problem manually, at one stage the following Simplex Table is obtained

C_B	Product mix	Quantity	X_1	X_2	X_3	S_1	S_2	S_3	A_1
2	X_1	4	1	2	1/2	0	0	1/4	0
0	S_2	12	0	0	-1	0	1	-1/2	0
0	S_1	12	0	6	0	1	0	1	-1
	C_j		2	4	1	0	0	0	-M
	Z_j	8	2	4	1	0	0	1/2	0
	$C_j - Z_j$		0	0	0	0	0	-1/2	-M

Answer the following questions, with proper explanation, related to the Simplex Table above.

i) How many varieties of very Premium quality tea are considered in the problem?

ii) Is the solution given in the Table above Optimal?

iii) What is the Objective Function?

iv) Is there any alternate solution to the problem?

v) Is the solution feasible?

vi) What is the optimum product mix and the maximum profit.

vii) If any alternate solution is possible then find it. **[8]**