

Total No. of Questions : 12]

SEAT No. :

P4520

[Total No. of Pages : 4

[4959]-41**B.E. (Theory) (Mechanical Engineering)****QUANTITATIVE AND DECISION MAKING TECHNIQUES (C)****(Elective - II) (2008 Pattern)***Time : 3 Hours]**[Max. Marks : 100**Instructions to the candidates:*

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.
- 2) Two separate answers books are used for Section - I and Section - II.
- 3) Figures to right indicate full marks.
- 4) Use of non programmable calculator is permitted.
- 5) Assume suitable data, if necessary.

SECTION - I**Q1) a) Explain [6]**

- i) Minimax and Maximum Principle
- ii) Two Person Zero Sum Game

b) Solve following Game problem by Graphical Method. [10]

B's Strategies

		B1	B2	B3	B4
A's Strategies	A1	8	5	-7	9
	A2	-6	6	4	-2

OR

Q2) a) Explain decision making environments and decision making criteria. [6]**b) Find the Game Value of following problem. [10]**

B's Strategies

		B1	B2	B3	B4
A's Strategies	A1	-5	16	13	15
	A2	20	-5	60	-70
	A3	-5	9	12	10
	A4	20	2	50	-80

P.T.O.

Q3) Solve Given LPP by Simplex Method.

[18]

$$\text{Maximise } Z = 2x_1 + 3x_2 + 4x_3$$

Subjected to

$$3x_1 + x_2 + 4x_3 \leq 600$$

$$2x_1 + 4x_2 + 2x_3 \geq 480$$

$$2x_1 + 3x_2 + 3x_3 = 540$$

$$x_1, x_2, x_3 \geq 0$$

OR

Q4) a) Explain Any one of the following with respect to Linear Programming. [6]

i) Types of solution by graphical method with respect to type of problem.

ii) Sensitivity Analysis

b) Solve Given LPP by Simplex Method.

[12]

$$\text{Minimize } Z = 12x_1 + 20x_2$$

Subjected to

$$6x_1 + 8x_2 \geq 100$$

$$7x_1 + 12x_2 \geq 120$$

$$x_1, x_2 \geq 0$$

Q5) a) Explain Trans - Shipment problems.

[6]

b) Solve following Problem by VAM to minimize transportation cost. Cell entries are transportation cost per unit.

[10]

DEMAND

		D1	D2	D3	D4	D5	Available
SOURCE	S1	68	35	4	74	15	18
	S2	57	88	91	3	8	17
	S3	91	60	75	45	60	19
	S4	52	53	24	7	82	13
	S5	51	18	82	13	7	15
	Required	16	18	20	14	14	

OR

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- Q6)** a) Explain Steps to solve Assignment Problem by Hungarian Method. [8]
 b) Solve following Maximization Assignment Problem. [8]

	A	B	C	D
I	42	35	28	21
II	30	25	20	15
III	30	25	20	15
IV	24	20	16	12

SECTION - II

- Q7)** a) Explain with suitable example Monte- Carlo Simulation. [6]
 b) A hardware store produces and sells hardware items. Information on the items is given below. [10]

Expected Annual Sales = 8000 units

Ordering Cost = Rs. 180 per order

Holding Cost = 10% of the average inventory value

The item can be purchased according following discounted rates with respect to lot size

Lot Size	Unit Price
1-999	Rs. 22.00
1000-1499	Rs. 20.00
1500-1999	Rs. 19.00
2000 & above	Rs. 18.50

Calculate EOQ and Total Cost.

OR

- Q8)** a) Explain Elements of Queuing System. [6]
 b) Customer arrive at a bank counter manned by a single cashier according to Poisson distribution with mean arrival rate 6 customer/hour. The cashier attends the customer on first come first serve basis at an average rate of 10 customers/hour with the service time exponential distribution. [10]
 Find
- i) The probability of the number of arrivals (0 to 5) during 15 minute interval and 30 minute interval.
 - ii) The probability that the queuing system is idle.
 - iii) The time a customer should expect to spend in the queue.

- Q9) a)** A manufacturing company produces a single product whose selling price is Rs. 16/unit and the variable cost is Rs. 12/unit. If annual fixed cost of the firm are estimated as Rs. 1,20,000. Find the break even point in units, in rupees and as a percentage of capacity if the firm has an estimated capacity of 50,000 units of the product. What is margin of safety? [8]
- b) Explain Payback Period Method. [4]
- c) Write difference between Payback Period Method and IRR Method. [4]

OR

- Q10) a)** Discuss various replacement analysis models. [8]
- b) A manufacturer have machine A having price 2500/- It's maintainece cost is Rs. 400/- for first five years and then increase by Rs. 100 further per year. Scrap value of machine is negligible. Money value is 10% per year. When the machine should be replaced. [8]

Q11) A project has following data with duration in days

	1-2	1-3	2-4	3-4	3-5	4-5
Optimistic Time in Days	2	9	5	2	6	8
Most likely Time in Days	5	12	14	5	6	17
Pessimistic Time in Days	14	15	17	8	12	20

- a) Draw the network, find expected duration and critical path. [6]
- b) Find out floats for activity 1-3 [3]
- c) What is the probability that project will get complete in 30 days. [3]

Normal Distribution total area under curve values are as below

Z	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
$\Psi(Z)$	0.8159	0.8413	0.8643	0.8849	0.9032	0.9192	0.9332	0.9452

- d) Differentiate between PERT and CPM. [6]

OR

Q12) Write Short note on following. [18]

- a) Types of Floats
- b) Dynamic Programming
- c) Goal Programming

