Total No. of Questions : 12]

SEAT No. :

P4520

[Total No. of Pages : 4

[4959]-41

B.E. (Thoery) (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

A's Strategies	B1	B2	B3	B4
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

A's Strategies	B1	B2	B3	B4
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]**

Maximise $Z = 2x1 + 3x2 + 4x3$

Subjected to

$3x1 + x2 + 4x3 \leq 600$

$2x1 + 4x2 + 2x3 \geq 480$

$2x1 + 3x2 + 3x3 = 540$

$x1, x2, x3 \geq 0$

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]**

Minimize $Z = 12x1 + 20x2$

Subjected to

$6x1 + 8x2 \geq 100$

$7x1 + 12x2 \geq 120$

$x1, x2 \geq 0$

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]**

DEMEND

		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

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 maintaince 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

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