Total No. of Questions : 12]

SEAT No. :

P1528

[Total No. of Pages : 5

[4759]-40

B.E. (Mechanical)

QUANTITATIVE & DECISION MAKING TECHNIQUE

(2008 Course) (Semester-I) (402045 C) (Elective-II)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***All the questions are compulsory.***
2) ***Two separate answer 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) Define and explain scope of Operation Research. **[6]**

b) Find the Game Value of following problem. **[10]**

		Player B			
		B1	B2	B3	B4
Player A	A1	–5	16	13	15
	A2	20	–5	60	–70
	A3	–5	9	12	10
	A4	20	2	50	–80

OR

Q2) a) Explain: **[6]**

i) Minimax and Maximin Principle.

ii) Dominance Rule.

b) Explain steps in Decision making. **[4]**

c) Solve following Game problem with Dominance Rule. **[6]**

		Player B		
		B1	B2	B3
Player A	A1	12	–8	–2
	A2	6	7	3
	A3	–10	–6	2

P.T.O.

Q3) a) Explain Hungarian method of solving assignment problem. **[6]**

b) Five different machines can do any of five required components with different machining time resulting from each assignment as shown in table below. Find out minimum machining time possible through optimum assignment. **[10]**

Component \ Machine	1	2	3	4	5
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

OR

Q4) a) Explain Least cost method of allocation for transportation problem. **[6]**

b) A company has factories at F1, F2 and F3 that supply products to warehouses at W1, W2 and W3. The weekly production of factories is 200, 160 and 90 units respectively and the weekly demand of warehouses is 180, 120 and 150 units respectively. The unit shipping costs in rupees is below. **[10]**

	W1	W2	W3
F1	16	20	12
F2	14	8	18
F3	26	24	16

Solve and optimize the solution by suitable method.

Q5) a) Define following terms of Linear Programming. **[6]**

i) Basic Solution.

ii) Feasible Solution.

iii) Artificial Variables.

b) Solve LPP by suitable method **[12]**

$$Z = 40x_1 + 35x_2$$

subjected to $2x_1 + 3x_2 \leq 60$

$4x_1 + 3x_2 \leq 96$

$x_1, x_2 \geq 0$

OR

Q6) Solve following problem by big M method. **[18]**

$$Z = 600x_1 + 500x_2$$

subjected to $2x_1 + x_2 \geq 80$

$x_1 + 2x_2 \geq 60$

$x_1, x_2 \geq 0$

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

OR

Q8) a) Discuss any one Inventory control Models. **[4]**

b) A tailor specializes in ladies dresses. The number of customer approaches the tailor appear to be Poisson distributed with a mean of 6 customers per hour. The tailor attends the customers on a first come first served basis and the customers wait if the need be. The tailor can attend the customers at an average rate of 10 customers per hour with the service time exponentially distributed. Find- **[12]**

i) The probability of the number of arrivals from 0 to 5 in 15 minute interval and 30 minute interval.

ii) The utilization parameter.

iii) The probability that the queuing system is idle.

iv) The average time that the tailor is free on a 10 hour working day.

v) The probability associated with the number of customers from 0 to 5 are in the queue.

Q9) a) Explain Payback period method of Investment analysis. **[8]**

b) With the following data. **[8]**

Fixed Cost = Rs. 40,000/-

Variable Cost = Rs. 2/unit

Selling Price = Rs. 10/unit

Calculate

i) Breakeven point in unit and Rs.

ii) Profit when sales is Rs. = 1,00,000/-

iii) Sales when it is desirable to earn profit of Rs. 30,000/-

OR

Q10)a) Discuss various replacement analysis models. **[8]**

b) A manufacturer have machine A having price 2500/- It's maintenance 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) Describe Fulkerson's rule used in network analysis and discuss cost aspects and crashing of network. **[6]**

b) Information on the activities required for a project is as follows. Find critical pach, TF, FF, IF. **[12]**

Activity	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
NT	2	7	8	3	6	10	4	6	2	5	6

OR

Q12)a) Write difference between PERT and CPM. **[6]**

b) A small project is composed of scrap activities whose time estimates are listed below. **[12]**

Activities		To	Tm	Tp
I	J			
1	2	3	6	15
1	6	2	5	14
2	3	6	12	30
2	4	2	5	8
3	5	5	11	17
4	6	3	6	15
6	7	3	9	27
5	8	1	4	7
7	8	4	19	28

i) Draw network diagram

ii) Calculate the length and variance of the critical path

iii) What is the approximate probability that the job on critical path will be completed in 41 days?

●●●●●