Total No. of Questions : 12]

SEAT No. :

P1700

[Total No. of Pages : 5

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B.E. (Mechanical)

c - QUANTITATIVE & DECISION MAKING TECHNIQUE

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

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to each sections should be written in separate answer sheet.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of non programmable calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Define Operations Research with its Advantages and Limitations. **[6]**

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

	B1	B2	B3	B4
A1	–7	7	–4	8
A2	6	–4	–2	–6

OR

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

i) Pure and Mixed Strategies.

ii) Dominance Rule.

b) Solve following 4 × 4 Game Problem. **[10]**

	B1	B2	B3	B4
A1	5	–4	–4	6
A2	–3	–2	–3	–6
A3	6	8	–4	–1
A4	7	3	–9	–3

P.T.O.

Q3) Solve following LPP by Simplex Method. **[18]**

Maximize $Z = 4000x_1 + 2000x_2 + 5000x_3$

Subject to $12x_1 + 7x_2 + 9x_3 \leq 1260$

$22x_1 + 18x_2 + 16x_3 \leq 19008$

$2x_1 + 4x_2 + 3x_3 \leq 396$

OR

Q4) Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 Paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 Paise per gram. The daily minimum requirements of vitamin A and vitamin B are 100 and 120 units respectively. Find the minimum cost of product mix by Big M Method. **[18]**

Q5) a) Solve following transportation problem by VAM method and find optimum solution by MODI method. Where S1, S2, S3, S4 are supply centers and D1, D2, D3 are demand centers. **[12]**

	D1	D2	D3	Supply
S1	7	10	5	90
S2	12	9	4	50
S3	7	3	11	80
S4	9	5	7	60
Demand	120	100	110	

b) Explain LCM **[4]**

OR

Q6) a) Explain concept of Trans-shipment problem with suitable example. **[6]**

b) Solve following Minimization Assignment Problem with Hungarian Method. **[10]**

	I	II	III	IV	V	VI
A	9	22	58	11	19	27
B	43	78	72	50	63	48
C	41	28	91	37	45	33
D	74	42	27	49	39	32
E	36	11	57	22	25	18
F	3	56	53	31	17	28

SECTION - II

Q7) a) Write a note on Monte - Carlo Simulation. **[4]**

b) Annual Demand of Baby-dolls is 2000. Its ordering cost is Rs. 150 per order. Holding Cost is Rs. 2.4 per unit per annum and shortage cost is Rs. 1.6 per unit per annum. Assume total working days are 250 / year and Lead Time is 15 days. Calculate Economic Order Quantity. Optimal level of Shortages, Maximum Inventory Level, Total Variable Cost (Ordering + Holding) and Re-order Level. **[12]**

OR

Q8) a) Define any three from following: **[6]**

i) Queue Length

ii) Traffic Intensity

iii) Service Channels

iv) Service in Priority

b) A Xerox machine is managed by a single operator who on an average takes 10 minutes for each customer. The arrival of customer follows Poisson's distribution with an average rate of four per hour. The service times are exponentially distributed. Calculate **[10]**

i) Expected Number of customers in system

ii) Fraction of time spent by each customer in the system

iii) Fraction of time during which shop is empty

iv) What is the probability that 2 customers will be in shop

v) What is the probability that 5 customers will be in system

Q9) a) The following failure rates have been observed for a certain type of transistor in a digital computer. **[12]**

Week	1	2	3	4	5	6	7	8
Probability of failure	0.03	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed transistor is Rs. 1.25. The decision is made to replace all these transistors simultaneously at fixed intervals and the individual transistors as they fail in service. If cost of group replacement is Rs. 0.3 per transistor what is the best interval between group replacements. Assume Number of transistors 1000 at start.

b) Differentiate between payback period method and IRR method. **[4]**

OR

Q10)a) Explain break even analysis and margin of safety with neat sketch. **[6]**

b) Following Figures are related to nut manufacturing company. **[10]**

Variable Cost per unit = 8 Rs.

Sell Price per unit = 12 Rs.

Total Units Sold = 1,20,000

Fixed Cost = Rs. 25,000

Calculate ; P/V Ratio, B.E.P. Units, B.E.P. in sales, Margin of Safety, Total Profit.

Q11)Write short notes on any three: **[18]**

a) Differentiate PERT and CPM

b) Types of Floats

c) Fulkerson's Rule

d) Goal Programming

OR

Q12)The time estimates in weeks for activities of a PERT network are given below: **[18]**

Activity	Optimistic Time	Most Likely Time	Pessimistic Time
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

For above Z = 1.33 for P = 0.9082; Z = 0.67 for P = 0.7486 and Z = 1 for P = 0.8413

a) Draw Network Diagram.

b) Determine Expected Project Length.

c) Calculate standard deviation and variance of project length.

d) What is the probability that project will be completed

   i) At least 4 weeks earlier than expected time.

   ii) No more than 4 weeks than expected time.

e) What should be scheduled time completion time for the probability of completion time to be 90% expected time.