Total No. of Questions : 10]

SEAT No. :

P4546

[Total No. of Pages : 4

[4959] - 1169

B.E. (Computer)

OPERATION RESEARCH FOR ALGORITHMS IN SCIENTIFIC APPLICATIONS (Elective - IV(b))

(2012 Pattern) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :-

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) State and Explain stages of Development of Operations Research. **[5]**

b) Solve following LP Problem graphically.

Maximize $Z = 3x_1 + 5x_2$ subject to restrictions

$x_1 + 2x_2 \leq 2000$, $x_1 + x_2 \leq 1500$, $x_2 \leq 600$ and $x_1, x_2 \geq 0$ **[5]**

OR

Q2) a) Formulate the following problem as linear programming problem. A company produces two types of Hats. Each hat of first type requires twice as much labour time as the second type. If all hats are of second type only, the company can produce a total of 500 hats a day. The market limits daily sales of first and second type to 150 and 200 hats. Assume that profits per hat are Rs. 8 for first type and Rs. 5 for second type. **[5]**

b) State and Explain North-West Corner rule to obtain initial basic feasible solution of a transportation problem. **[5]**

Q3) a) Solve following LP Problem using Simplex Method

Maximize $Z = x_1 + 2x_2 + x_3$ subject to the constraints

$2x_1 + x_2 - x_3 \leq 2$, $-2x_1 + x_2 - 5x_3 \geq -6$, $4x_1 + x_2 + x_3 \leq 6$ and $x_1, x_2, x_3 \geq 0$ **[5]**

b) Explain step by step procedure of Hungarian method to solve Assignment problem. **[5]**

P.T.O.

OR

Q4) a) What are the characterisitcs of Standard form of Linear Programming Problem? **[5]**

b) Obtain an initial basic feasible solution, using the north-west corner rule for the following transportation problem. **[5]**

	Demand 1	Demand 2	Demand 3	Demand 4	Availability
Source 1	6	8	8	5	30
Source 2	5	11	9	7	40
Source 3	8	9	7	13	50
Demand	35	28	32	25	120

Q5) a) Explain relevance of Queuing system for computer programming. Explain the terms pure Birth and Pure Death Models. What is Kendell notation? **[8]**

b) Visitors' parking at a college is limited to five spaces only. Cars making use of this space arrive according to Poisson distribution at the rate of six cars per hour. Parking time is exponentially distributed with a mean of 30 minutes. Visitors who cannot find an empty space on arrival may temporarily wait inside the lot until a parked car leaves. That temporary space can hold only three cars. Other cars that cannot park or find a temporary waiting must go elsewhere. Determine the following. **[10]**

i) The probability, $p_{n,}$ of n cars in the system.

ii) The Effective arrival rate for cars that actually use the lot.

iii) The average number of cars in the lot.

iv) The average time a car waits for a parking space inside the lot.

v) The average number of occupied parking spaces.

vi) The average utilization of the parking lot.

OR

Q6) a) Define following terms with respect to game theory **[6]**

i) Pure strategy

ii) Mixed strategy

iii) Payoff matrix

b) Find the range of values of 'P' and 'Q' with the entry (2,2) as a saddle point for given matrix representation of a game. **[6]**

	Player B		
Player A	2	4	5
	10	7	Q
	4	P	6

c) Consider the following pay-off table **[6]**

Acts	Events			
	E1	E2	E3	E4
A1	40	200	–200	100
A2	200	0	200	0
A3	0	100	0	150
A4	–50	400	100	0

Probabilities of events are P (E1) = 0.2, P (E2) = 0.15, P (E3) = 0.4, P (E4) = 0.25. Calculate expected pay-off and the expected loss of each action.

Q7) a) Draw the network diagram and determine the critical path for the following project activities specifications. **[10]**

Activity	Time Estimate (Weeks)
1 - 2	5
1 - 3	6
1 - 4	3
2 - 5	5
3 - 6	7
3 - 7	10
4 - 7	4
5 - 8	2
6 - 8	5
7 - 9	6
8 - 9	4

b) What are major assumptions for Programme Evaluation and Review Technique (PERT)? How those are useful for measure of certainty? **[6]**

OR

Q8) a) Explain how time of an activity is estimated in PERT. Explain the measure of certainty in PERT. **[8]**

b) Explain the terms with reference to CPM **[8]**

i) Event ii) Predecessor event iii) Successor event

iv) Activity v) Dummy activity vi) Network

Q9) a) Explain mathematical model of Bellman's Principal. **[8]**

b) Write a note on Applications of Dynamic Programming. **[8]**

OR

Q10)a) Explain following concepts with respect to Dynamic Programming **[8]**

i) Principle of Optimality ii) State iii) Stage

b) Describe applications of Operations Research in Bio-technology field. **[8]**