Total No. of Questions : 12]

SEAT No. :

P2008

[Total No. of Pages : 4

[5254]-179

B.E. (Computer)

OPERATIONS RESEARCH

(2008 Pattern) (Elective - IV) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answer to these questions should be written in separate books.***
3) ***Use of non programmable calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to right indicate full marks.***
6) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) Discuss the role of operational research models in decision making. **[8]**

b) Discuss the simplex method where it indicates existence of multiple optimal unbounded and infeasible solutions in linear programming problem. **[8]**

OR

Q2) a) Solve the linear programming problem using simplex method **[10]**

Maximize $Z = 2x_1 - 4x_2 + 5x_3 - 6x_4$

Subject to constraints

$x_1 + 4x_2 - 2x_3 + 8\,x_4 \leq 2$

$-x_1 + 2x_2 + 2x_3 + 4x_4 \leq 1$ and

$x_1, x_2, x_3, x_4 \geq 0$

b) State and explain in brief linear programming applications. **[6]**

Q3) a) What is decision making under uncertainty? Explain Laplace, Minimax, Savage and Hurwicz criteria. **[8]**

b) Explain **[8]**

i) Stochastic process

ii) Markov process

iii) Transition probability

iv) Markov chain

P.T.O.

OR

Q4) a) The probability of demand for hiring cars on any day in a given city is as follows. **[8]**

No. of cars demanded	0	1	2	3	4
Probability	0.1	0.2	0.3	0.2	0.2

Cars have a fixed cost of Rs.90/- each day to keep the daily hire charges (variable costs of running) Rs.200/- If the car hire company owns 4 cars. What is daily expectation? If company is about to go into business and currently has no car, how many cars should it buy?

b) Solve the game whose pay off matrix is given below. **[8]**

Player B

Player A	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	3	4	2	4
A_3	4	2	4	0
A_4	0	4	0	8

Q5) a) What do you mean by queue discipline? Describe how customers are selected for service with respect to static and dynamic queue discipline? **[9]**

b) For M/M/1 queue determine **[9]**

i) Expected No. of customers in system

ii) Expected No. of customers in queue

iii) Expected waiting time in system

iv) Expected waiting time in queue

OR

Q6) a) Describe the characteristics of service mechanism (process) that are concerned with the manner in which customers are serviced with respect to queueing system. **[9]**

b) Four counters are being opened on the border of a country for checking of passports & necessary papers of the tourists. The tourists choose a counter at random. If the arrivals at the border is poisson at the rate λ and the service time is exponential with parameter $\lambda/2$. What is steady state average queue at each counter? **[9]**

SECTION - II

Q7) a) For following project draw network diagram and find project completion time. Find total float for each activity. **[10]**

Activity	Preceding Activities	Activity duration days
A	––	4
B	––	7
C	––	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

b) Explain steps involved in Johnson's algorithm for 'n' Jobs 2 machines **[8]**

OR

Q8) a) Find optimal sequence for following sequencing problem. **[10]**

Jobs	Machines				
	M_1	M_2	M_3	M_4	M_5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

Also find total elapsed time

b) Explain various application areas of PERT & CPM techniques. **[8]**

Q9) a) With help of suitable diagram discuss how to determine extreme points of an unconstrained type of continuous function? **[8]**

b) What do you mean by separable and non linear convex programming? How will you solve the separable non-linear programming problem? **[8]**

OR

Q10)a) Explain general & canonical form of non-linear programming problem. **[8]**

b) Define separable functions. Give one example of separable function & non separable function. Explain separable programming problem. **[8]**

Q11)a) Explain backward & forward recursive approach to solve dynamic programming problem. **[8]**

b) How the linear programming problem can be formulated as dynamic programming problems? Explain **[8]**

OR

Q12)a) Write a note on applications of Dynamic programming in various areas. **[8]**

b) Define following terms with respect to dynamic programming **[8]**

i) Stage

ii) State

iii) State variables

iv) Decision variables

v) Optimal return

vi) State transformation function