Total No. of Questions : 12]

SEAT No. :

P3444

[Total No. of Pages : 5

[4959]-220
B.E. (Computer)
b-OPERATIONS RESEARCH
(2008 Course) (Semester - II) (Elective - IV) (410451)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Derive constraint equation for the following problem. **[9]**

A paint company produces interior and exterior paints from two materials, M1 and M2. Following table gives basic data of the problem.

	Tons of Raw material per ton of		Maximum daily availability (tons)
	Exterior paint	Interior Paint	
Raw Material M1	6	4	24
Raw Material M2	1	2	6
Profit per ton ($1000)	5	4	

A Market survey indicates that, the daily demand for interior paint can not exceed that of exterior paint by more than 1 ton & for interior paint 2 tons.

P.T.O.

b) Solve the following LP problem using simplex method. **[9]**

Maximize $z = x_1+2x_2+x_3$

Subject to constraints

$2x_1 + x_2 - x_3 \leq 2$

$-2x_1 + x_2 - 5x_3 \geq -6$

$4x_1 + x_2 + x_3 \leq 6 \quad , \ x_1, x_2, x_3 \geq 0$

OR

Q2) a) Solving following problem graphically

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

$x_1+2x_2 \leq 2000$

$x_1+x_2 \leq 1500 \quad , \ x_2 \leq 600$ and $x_1, x_2 \geq 0$ **[9]**

b) State and explain applications of linear programming from different Industries point of view. **[9]**

Q3) a) Define probability. Explain with suitable examples **[8]**

i) Addition law of probability

ii) Conditional law of probability

b) Consider the following pay - off matrix of game **[8]**

		Player 1		
		I	II	III
Player 2	I	1	7	2
	II	6	2	7
	III	5	1	6

Reduce matrix to 2×2 matrix & obtain the value of game.

OR

Q4) a) Give the proof of Baye's theorem. **[8]**

b) Define following w.r.t. Game theory. **[8]**

i) Characteristics

ii) Maxima - minima

iii) Saddle point

iv) Value of a game

Q5) a) Give a summary of various types of queueing models. **[8]**

b) A software Tester finds that the time spent on debugging and fixing the error has an exponential distribution with mean 30 min per module. The arrival of modules is Poisson with an average of 10 modules per day of 8 hours. What is expected time per day?

How many modules are there on average? **[8]**

OR

Q6) a) What is queueing system? Explain queueing systems transient state & steady state. **[8]**

b) State and prove the arrival distribution theorem. **[8]**

SECTION - II

Q7) a) Describe following Terminologies with respect to job sequencing. **[9]**

i) Processing order

ii) Idle time on machine

iii) Total Elapsed time

iv) No passing rule

b) Describe following Terminologies with respect to PERT chart. **[9]**

i) Total float

ii) Free float

iii) Independent float

iv) Dummy arrows in a network

OR

Q8) a) Explain the algorithm of finding critical path. **[9]**

b) Solve following Job sequencing problem using Johnson's method to determine a sequence of 5 Jobs that will minimize the elasped time T. Processing time as follows **[9]**

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Q9) a) Explain general and canonical form of Non-Linear programming problem. **[8]**

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

OR

Q10)a) Explain how to obtain normality & orthogonality conditions. **[8]**

b) Explain Lagrangian method with respect to NLP. **[8]**

Q11)a) Explain Mathematical model of Bellman's principal. **[8]**

b) Write a Note on Applications of dynamic programming. **[8]**

OR

Q12)a) Describe recursive nature of computations in dynamic programming. **[8]**

b) Explain following concepts with respect to dynamic programming. **[8]**

i) Principle of optimality

ii) State

iii) Stage

x x x