www.sppuonline.com

Total No. of Questions : 12] **SEAT No. :**

P1466 **[Total No. of Pages :6**

[4759] - 223
B.E. (Computer)
OPERATION RESEARCH
(2008 Pattern) (Elective - IV) (Semester - II) (410451)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Describe the components associated with basic structure of linear programming model. **[5]**

b) What are the major assumptions of linear programming model for reducing the complex real world problems into a simplified form? **[5]**

c) Use Simplex method to solve following linear programming problem. **[8]**

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

Subject to constraints

$2x_1 + 3x_2 \leq 8$

$2x_2 + 5x_3 \leq 10$

$3x_1 + 2x_2 + 4x_3 \leq 15$

and $x_1, x_2, x_3 \geq 0$.

OR

Q2) a) Describe the steps of simplex algorithm for obtaining an optimal solution to linear programming problem. **[8]**

P.T.O.

www.sppuonline.com

b) Use graphical method to solve following linear programming problem. **[10]**

Maximize $Z = 2x_1 + x_2$

Subject to constraints

$x_1 + x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$ and $x_1, x_2 \geq 0$.

Q3) a) Discuss the difference between decision making under certainty, under uncertainty and under risk. **[8]**

b) Consider the game with pay-off matrix. Determine optimal strategies for players A and B. Determine value of a game. Is the game is fair or strictly determinable? **[8]**

	Player B		
Player A	B_1	B_2	B_3
A_1	–1	2	–2
A_2	6	4	–6

OR

Q4) a) The following matrix gives the payoff (Rs) of different strategies (alternatives) S_1, S_2 and S_3 against conditions (events) N_1, N_2, N_3 and N_4. **[8]**

Calculate the decision taken under following approaches.

i) Pessimistic

ii) Optimistic

iii) Equal probability

iv) Regret

www.sppuonline.com

Strategy State of Nature

	N_1	N_2	N_3	N_4
S_1	4000	–100	6000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	–2000	1,000

b) What is Role of probability distribution function? What are different types of continuous probability distribution function? **[8]**

Q5) a) Draw and explain structure of queueing system. **[8]**

b) Let on an average 4 customers arrive after every 2 minutes in a system. Calculate **[8]**

i) Probability of no more than 2 minutes gap between successive arrivals.

ii) Average time between successive arrivals.

iii) Probability of interarrival time between successive arrivals.

OR

Q6) a) What do you mean by Queue discipline? Explain static and dynamic queue discipline to serve customers of the queue. **[8]**

b) A Group of Engineers has two terminals to aid in their calculations. The average computing job requires 20 minutes of terminal time, and each engineer requires some computation about once every 0.5 hour. That is, mean time between calls for service is 0.5 hours. Assume that these are distributed according to an exponential distribution. **[8]**

If there are six engineers in the group, find

i) Expected number of Engineers waiting to use one of the terminals.

ii) The total lost time per day.

www.sppuonline.com

www.sppuonline.com

SECTION - II

Q7) a) There are seven jobs, each of which has to go through the machines A and B in the order AB. Processing times in hours are as follows. **[9]**

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine:

i) Sequence of Jobs that will minimize total elapsed time T

ii) Total elapsed time T

iii) Idle time for machine A and B

b) Explain following terms in PERT/CPM. **[9]**

i) Earliest time

ii) Latest time

iii) Total activity time

iv) Event slack

v) Critical path

OR

Q8) a) What are the elements that characterize a sequencing problem? Explain principal assumptions made while dealing with sequencing problems.**[9]**

b) An architect has been awarded a contract to prepare plans for an urban renewal project. The job consist of the following activities and their estimated times. **[9]**

www.sppuonline.com

Activity	Description	Immediate Predecessors	Time (days)
A	Prepare preliminary sketches	-	2
B	Outline specifications	-	1
C	Prepare drawings	A	3
D	Write specifications	A,B	2
E	Run off prints	C,D	1
F	Have specifications	B,D	3
G	Assemble bid packages	E,F	1

i) Draw network diagram of activities for the project.

ii) Indicate the critical path, and calculate total float and free float for each activity.

Q9) a) Solve the following non-linear programming problem using separable programming algorithm. **[8]**

Max $Z = 3x_1 + 2x_2$

Subject to constraints

$g(x) = 4x_1^2 + x_2^2 \leq 16,\ x_1, x_2 \geq 0$

b) What do you mean by separable programming and separable convex programming?Separate functions $f(x) = 9x_1^2 + 5x_2^2 - 5x_1 + 2x_2$ into two functions. **[8]**

OR

www.sppuonline.com

www.sppuonline.com

Q10)a) State and explain procedure of solving Non-linear programming probelm. **[8]**

b) Write a note on Geometric programming. **[8]**

Q11)a) Draw and explain functional Relationship among components of Dynamic programming. **[8]**

b) A man is engaged in buying and selling identical items. He operates from a warehose of capacity of 500 items. Each month he can sell any quantity that he chooses upto the stock at the begining of the month. Each month, he can also buy as much as he wishes for delivery at the end of the month, so long as his stock does not exceed 500 items. For next four months he has following error-free forecasts of cost & sales prices.

month n	1	2	3	4
Cost	27	24	26	28
Sales price	28	25	25	27

www.sppuonline.com

if he currently has stock of 200 items, what quantities he sell & buy in the next four months? Find the solution using dynamic programming.**[8]**

www.sppuonline.com

OR

Q12)a) What is the dynamic recursive Relation? Explain the recursive nature of computation in dynamic programming. **[8]**

b) Use dynamic programming to find the value of **[8]**

Max $Z = y_1 * y_2 * y_3$

Subject to constraints

$y_1 + y_2 + y_3 = 5$ and $y_1, y_2, y_3 \geq 0$.

☼ ☼ ☼

www.sppuonline.com