Sub Code:NMCA315

Paper Id: 910180 Roll No:

MCA

(SEM-III) THEORY EXAMINATION 2019-20

COMPUTER BASED OPTIMIZATION TECHNIQUES

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. What is linear programming ?
b. What are slack, surplus and artificial variables?
c. What is meant by unbalanced transportation problem?
d. Explain the procedure of North-West Corner Rule.
e. What are the useful aspects of Duality in LLP?
f. What is meant by a mathematical model of a real situation?
g. What is assignment problems? Give two applications.
h. Describe the characteristics of Dynamic Programming.
i. What is the relationship among State, Stage and Policy ?
j. What are the elements of Queuing theory?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. What is Operations Research? Explain briefly the different phases of Operations Research and general method for solving Operations Research models.
b. What are Inventory models? Give the classification of different inventory models and describe them briefly.
c. What are the main steps in the basic procedure of modified distribution method?
d. Solve the following programming problem by graphical method:

Minimize $Z = 2x + 4y$

Subject to $x + y \leq 14$

$2x + 2y \geq 30$

$2x + y \leq 18$

Where as $x, y \geq 0$

e. State and prove the Markovian Property of Inter Arrival times.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the economic order quantity model. What are its assumptions? What are the practical limitations in using this formula.

(b) A factory has a large number of bulbs, all of which must be in working condition. The mortality of bulbs is given in the following table :

Week	1	2	3	4	5	6
Proportion of bulbs Failing	0.10	0.15	0.25	0.35	0.12	0.03

If a bulb fail in service, it costs Rs. 3.50 to be replaced; but if all the bulbs are replaced at a time it costs Rs.1.20 each, find the optimum group replacement policy.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Briefly define the disadvantages of revised simplex method over the original simplex method?

(b) Solve the following LPP :

Max. $Z = 20X_1 + 10X_2$
s.to. $X_1 + X_2 = 150$
$X_1 \leq 40$
$X_2 \geq 20$
where as $X_1, X_2 \geq 0$

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain degeneracy in a transportation problem. How degeneracy is overcome?

(b) A car hire company has one car at each of the five depots a, b, c, d & e. A customer in each of the five towns A, B, C, D & E requires a car. The distance (in miles) between he depots (origin) and the towns (destinations) where the customers are given the following distance matrix.

	A	b	C	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How should the cars be assigned to the customers so as to minimize the distance travelled.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss Wolfe's method for solving a Quadratic Programming Problem.

(b) Use dynamic programming to solve the following LPP
Max. $Z = 2X_1 + 5X_2$
s.to. $2X_1 + X_2 \leq 43$
$2X_2 \leq 46$
where $X_1, X_2 \geq 0$

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the essential features of Queuing System.

(b) What is Queuing Theory? What information can be obtained by analyzing a queuing system?