Sub Code: RCA304

Paper Id: 214304 Roll No: | | | | | | | | | | | | | |

MCA

(SEM III) THEORY EXAMINATION 2019-20

COMPUTER BASED OPTIMIZATION TECHNIQUES

Time: 3 Hours *Total Marks: 70*

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

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Write the algorithm of graphical solution for LP models.
b.	Define Following terms used in LPP. (i) Basic feasible solution (ii) Optimum feasible solution
c.	Formulate transportation problem as an L.P.P.
d.	Define Poisson distribution.
e.	List the five applications of inventory model.
f.	Define characteristics of Non-linear programming.
g.	Define transient and steady state.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	What is an inventory system? Explain clearly the different costs that are involved in inventory problems with suitable examples.
b.	Solve the following LPP by dual simplex method: Minimize $z = 2x_1 + x_2$ subject to the constraints: $3x_1 + x_2 \geq 3$, $4x_1 + 3x_2 \geq 6$, $x_1 + 2x_2 \geq 3$ and x_1 , $x_2 \geq 0$
c.	A steel company has three open earth furnaces and five rolling mills. Transportation cost (rupees per quintal) for shipping steel from furnaces to rolling mills are shown in the following table:

Mills

		M_1	M_2	M_3	M_4	M5	Capacity
Furnaces	F_1	4	2	3	2	6	8
	F_2	5	4	5	2	1	12
	F_3	6	5	4	7	3	14
	Requirement	4	4	6	8	8	

Find out the optimal shipping schedule?

d.	Use the Wolfe's method to solve the quadratic programming problem: Maximize $z = 2x_1 + x_2 - x_1^2$; subject to the constraints $2x_1 + 3x_2 \leq 6$, $2x_1 + x_2 \leq 4$ *and* $x_1, x_2 \geq 0$
e.	Explain Exponential distribution and Erlang distribution.

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SECTION C

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

(a)	What are various assumptions of EOQ formula .What are limitations of EOQ?
(b)	A pipeline is due for repairs. It will cost Rs. 10,000 and lasts for 3 years. Alternatively, a new pipeline can be laid down at a cost of Rs. 30,000 and lasts for 10 years. Assuming cost of capital to be 10% and ignoring salvage value, which alternative should be chosen?

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

(a)	Use Big M method to Minimize $z = x_1 - 3x_2 + 2x_3$ subject to the constraints: $3x_1 - x_2 + 2x_3 \leq 7, -2x_1 + 4x_2 \leq 12, -4x_1 + 3x_2 + 8x_3 \leq 10$ and $x_1, x_2, x_3 \geq 0$.
(b)	Prove that dual of dual is given primal itself.

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

(a)	Solve the problem by Gomory's algorithm: maximize $z = 3x_1 + 4x_2$, subject to $x_1 + x_2 \leq 4,\ 0.6x_1 + x_2 \leq 3,\ x_1, x_2 \geq 0$ and x_1, x_2 are integers.
(b)	Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and given in the following table:

Job

Man	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

Minimize the tot al cost.

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

(a)	Use dynamic programming to solve the L.P.P.: Maximize $z = 3x_1 + 5x_2$ subject to constraints: $x_1 \leq 4;\ x_2 \leq 6; 3x_1 + 2x_2 \leq 18;\ x_1, x_2 \geq 0$
(b)	Derive Kuhn-Tucker necessary conditions for an optimum solution to a quadratic programming problem.

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

(a)	State the assumptions under which an arrival process is Poisson process. Using these assumptions, derive the distribution.
(b)	A TV repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs set in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?