

Subject Code: MC1324/R13

M C A - II Semester Regular/Supplementary Examinations, Aug - 2015
OPTIMIZATION TECHNIQUES

Time: 3 hours

Max Marks: 60

Answer any **FIVE** of the following
All questions carry equal marks.

1. (a) Explain the typical applications of operation research in industry.
(b) Use penalty method to solve the following Linear Programming Problem.

$$\begin{aligned} \text{Minimize } Z &= 5x + 3y \\ \text{Subjected to } 2x + 4y &\leq 12 \\ 2x + 2y &= 10 \\ 5x + 2y &\geq 10 \\ x, y &\geq 0 \end{aligned}$$

- 2 (a) Discuss the various phases in solving an operations research problem.
(b) Max $Z = x_1 + 2x_2 + x_3$

$$\begin{aligned} \text{Subject to } 2x_1 + x_2 - x_3 &\geq -2 \\ -2x_1 + x_2 - 5x_3 &\leq 6 \\ 4x_1 + x_2 + x_3 &\leq 6 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

3. Find the sequence that minimizes the total elapsed time required to complete the following tasks.

Tasks	A	B	C	D	E	F	G
Time on machine 1	3	8	7	4	9	8	7
Time on machine 2	4	3	2	5	1	4	3
Time on machine 3	6	7	5	11	5	6	12

4. A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and then return to his starting point. Cost of going from one city to another is shown below. You are required to find the least cost route.

To City

	A	B	C	D	E
From City A	---	4	10	14	2
From City B	12	--	6	10	4
From City C	16	14	--	8	14
From City D	24	8	12	--	10
From City E	2	6	4	16	--

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5. The cost of a machine is Rs.6100 and its scrap value is only Rs. 100. The maintenance costs are found from experience to be:

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rs.	100	250	400	600	900	1250	1600	2000

When should machine be replaced?

6 (a) Describe the basic characteristics of an inventory system.

(b) The annual demand of a product is 10000 units. Each unit costs Rs.100 for orders placed in quantities below 200 units but for orders of 200 or above the price is Rs.95. The annual inventory holding cost is 10% of the value of the time and the ordering cost is Rs.500 per order. Find the economic lot size?

7. A project consists of series of tasks labeled A,B,.....H,I with the following constraints: A < D, E; B, D < F; C < G; B < H; F, G < I. W < X, Y means X, and Y can't start until W is completed. You are required to construct a network using this notation. Also find the minimum time of completion of the project when the time of completion of each task is given as follows.

Task	A	B	C	D	E	F	G	H	I
Time(days)	23	8	20	16	24	18	19	4	10

8. (a) Write any four differences between PERT and CPM.

(b) Minimize $Z=Y_1^2+Y_2^2+Y_3^2$

Subject to $Y_1+Y_2+Y_3 \geq 15,$

$Y_1, Y_2, Y_3 \geq 0$
