

Code No: NR-31-MCA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA-III Semester Regular Examinations, February 2010
OPERATIONS RESEARCH

Time: 3hours

Max.Marks:60

Answer any Five questions
All questions carry equal marks

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- 1.a) Discuss various advantages and limitations of linear programming.
b) The contents of various products per unit in nutrient contents is

Nutrients	Content A	In product B	Minimum amount Required
M ₁	36	6	108
M ₂	3	12	36
M ₃	20	10	100

If product A costs Rs. 20/- and B Rs. 40/- How much each of two products should be bought so that total cost is minimized

- 2.a) Explain Duality theory in LP programming
b) Find the dual of $Z = 50x_1 - 80x_2 - 140x_3$. (minimization)

Subject to $x_1 - x_2 - 3x_3 \geq 4$

$x_1 - 2x_2 - 2x_3 \geq 3$

$x_1, x_2, x_3 \geq 0$.

Find its solution by solving dual problem

3. Find assignment of trucks from cities in surplus to cities in deficit so that distance covered by vehicles is minimum

	I	II	III	IV	V	VI
A	12	10	15	22	18	8
B	10	18	25	15	16	12
C	11	10	3	8	5	9
D	6	14	10	13	13	12
E	8	12	11	7	13	10

- 4.a) Illustrate game theory with saddle and without saddle
b) Determine optimal strategies for A.

B

$$A \begin{bmatrix} 3 & 1 \\ 2 & 7 \\ 1 & 11 \end{bmatrix}$$

- 5.a) Derive the formula for EOQ, Optimum Inventory level, Total cycle time mentioning assumptions with shortage penalty costs.
- b) The demand for product is 25 units per month and items are with drawn uniformly. Set up cost is Rs 15 and inventory holding cost is Rs 0.3 per unit per month.
- i) Determine how often to make a production run without shortage.
- ii) Determine how often to produce if shortage cost is Rs 1.50 per month.
- 6.a) Explain concept of system reliability.
- b) Cost of replacing individual resistor is Rs 1 per resistor and if all resistors are replaced at same time, cost would be reduced to 35 paise. Percentage surviving at end of month t is

Month	0	1	2	3	4	5	6
% Surviving	100	97	90	70	30	15	0

What is optimum replacement plan if there are 10000 resistors.

7. Give following data with order of processing ACB and sequence suggested is 5 – 3 – 6 – 2 – 1 – 4. Determine total elapsed time and determine whether sequence is optimal.

Job	1	2	3	4	5	6
M/C A	12	10	9	14	7	9
M/C B	7	6	6	5	4	4
M/C C	6	5	6	4	2	4

- 8.a) Distinguish CPM and PERT mentioning their applications.
- b) Find critical path and completion time for network given below. Find activity and project variance completion time.

Activity	Preceding Activity	Optimistic	Pressimistic	Normal
A	-	5	9	7
B	A	6	8	7
C	B	1	3	2
D	C	3	9	6
E	D	4	12	8
F	B	4	6	5
G	B	5	9	7
H	G	6	10	8
I	E, H	2	6	4