JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, February/March - 2016
OPERATIONS RESEARCH
(Computer Science and Engineering)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks

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1.a) Explain the graphical procedure for solving linear programming problem of two decision variables.

b) Minimize $z = 2y_1 + 3y_2$ subject to the constraints

$$y_1 + y_2 \geq 5$$
$$y_1 + 2y_2 \geq 6$$
$$y_1 \geq 0, \quad y_2 \geq 0$$

Using big-M method.   [7+8]

2.a) Explain the mathematical formulation of the transportation problem.

b) Determine an initial basic feasible solution for the following transportation problem using North-West corner rule, where O_i and D_j represent i^{th} origin and j^{th} destination respectively.   [7+8]

	D_1	D_2	D_3	D_4	Supply
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Demand	6	10	15	4	35

3.a) Explain the mathematical formulation of Assignment problem.

b) A car hire company has one car at each of five depots a, b, c, d and e. A customer requires a car in each four, namely A, B, C, D, E. Distance (in kms) between depots (origin) and towns (destinations) are given as below.

	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 customers so as to minimize the distance travelled?   [7+8]

4. There are 4 jobs each of which has to go through the machines M_1, M_2, M_3, M_4, M_5 and M_6 in the order M_1, M_2, M_3, M_4, M_5 and M_6. Processing times are as given below:

		M_1	M_2	M_3	M_4	M_5	M_6
	A	20	10	9	4	12	27
Job(j)	B	19	8	11	8	10	21
	C	13	7	10	7	9	17
	D	22	6	5	6	10	14

Determine a sequence of these four jobs which minimize the total collapsed time T. Also find T.   [15]

5.a) A truck can carry a total of 10 tons of product. These types of product are available for shipment. Their weights and values are tabulated. Assuming that at least one of each type must be shipped. Determine the loading which will maximize the total value.

Type	Value (Rs)	Weight (tons)
A	20	1
B	50	2
C	60	2

b) Minimize $z = 3x + 4$
Subject to $x \leq 3$,
$$3x + 4y \leq 11.$$
[7+8]

6.a) Explain maxi-min and mini-max principle used in game theory with examples.
b) Solve the game using dominance. [8+7]

1	3	4	7
9	5	3	8
10	4	5	6

7. The cost of a machine is Rs 5000. The running cost and the salvage value of the machine are given below. Find when the machine should be replaced. [15]

Year	1	2	3	4	5	6	7	8
Maintenance cost (R_n)	1500	1600	1800	2100	2500	2900	3400	4000
Resale price (S_n)	3500	2500	1700	1200	800	500	500	500

8. A stockist has to supply 400 units of a product every Monday to his customers. He gets the product at Rs.50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs.75 per order. The cost of carrying inventory is 7.5% per year of the cost of the product.
Find.
a) The economic lot size.
b) The total optimal cost (including the capital cost).
c) The total weekly profit if the item is sold for Rs.55 per unit. [5+5+5]

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