R13

Code No: 117FZ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November/December - 2016

OPERATIONS RESEARCH

(Common to ME, MCT, MSNT)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) What is operations research? [2]
b) Give various definitions of operations research? [3]
c) What is meant by optimal solution? [2]
d) Explain the steps in transportation algorithm. [3]
e) What are the assumptions made in the sequencing problem? [2]
f) What is priority sequencing and what are the priority sequencing rules? [3]
g) Explain the rules to determine a saddle point [2]
h) Explain the terms i) Pure strategy ii) Mixed strategy. [3]
i) What is simulation? [2]
j) Describe the various elements of the queue. [3]

PART-B

(50 Marks)

2. Solve the following LPP
Maximize $Z= 15X_1 + 6X_2 + 9X_3 + 2X_4$
Subject to constraints $2X_1 + X_2 + 5X_3 + 6X_4 \leq 20$,
$3X_1 + X_2 + 3X_3 + 25X_4 \leq 20$,
$7X_1 + X_4 \leq 70$
X_1, X_2, X_3 and $X_4 \geq 0$ [10]

OR

3. Use simplex method to
Minimize $Z= x_2 - 3x_3 + 2x_5$
subject to constraints: $3x_2 - x_3 + 2x_5 \leq 7$,
$-2x_2 + 4x_3 \leq 12$
$-4x_2 + 3x_3 + 8x_5 \leq 10$;
$x_2 \geq 0, x_3 \geq 0, x_5 \geq 0$ [10]

4. What is the unbalanced Assignment problem? How is it solved by the Hungarian method? [10]

OR

5. Find the Total cost using North-west corner method. Also find the optimal assignment. [10]

	W1	**W2**	**W3**	**W4**	**capacity**
F1	95	105	80	15	12
F2	115	180	40	30	7
F3	195	180	95	70	5
Requirement	5	4	4	11	

6. Find the sequence that minimizes the total time required in performing the following jobs on three machines in the order A-B-C as shown in the below table. Also find the total elapsed time. [10]

Machine/Job	**1**	**2**	**3**	**4**	**5**	**6**
A	8	3	7	2	5	1
B	3	4	5	2	1	6
C	8	7	6	9	10	9

OR

7. The maintenance cost and resale value per year of a machine whose purchase price is Rs. 7000 is given below:

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rs.	900	1200	1600	2100	2800	3700	4700	5900
Resale value in Rs.	4000	2000	1200	600	500	400	400	400

When should the machine be replaced? [10]

8. Obtain the optimal strategies for both persons and the value of the game for zero-sum two-person game whose payoff matrix is given below:

3	2	4	0
2	4	4	2
4	2	4	0
0	4	0	8

[10]

OR

9. A stockiest 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. [5+5]

10. Jobs arrival at a workstation in a manufacturing plant is in a Poisson fashion at an average rate of five per hour. The time to machine one job is an exponential distribution with a mean time of 20 minutes. What is the expected time a job has to wait at the workstation? What will be the average number of jobs waiting at the workstation at any time? What is the probability that there will be more than four jobs? [10]

OR

11.a) State the Bellman's Principle of Optimality.

b) What are the applications of dynamic programming? [5+5]

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