

Code No: 812AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, January - 2018
OPERATIONS RESEARCH
Time: 3hrs
Max.Marks:60
Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have a, b, c as sub questions.

PART - A
5 × 4 Marks = 20

- 1.a) Explain briefly the major phases of operations research. [4]
- b) Distinguish between the transportation model and the assignment model. [4]
- c) Explain the various types of replacement situations. [4]
- d) Explain the bellman's principle of optimality. [4]
- e) What is queue? Explain basic elements of queues. [4]

PART - B
5 × 8 Marks = 40

2. Solve the following LPP using the simplex method.

$$\text{Max } Z = x_1 - x_2 + 3x_3$$

$$\text{Subject to } x_1 + x_2 + x_3 \leq 10$$

$$2x_1 - x_3 \leq 3$$

$$2x_1 - 2x_2 + 3x_3 \leq 0$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

[8]

OR

3. Use simplex method to
Minimize $Z = 2x_1 + 9x_2 + x_3$ subject to constraints:

$$x_1 + 4x_2 + 2x_3 \geq 5$$

$$3x_1 + x_2 + 2x_3 \geq 4$$

$$x_1 > 0, x_2 > 0, x_3 > 0$$

[8]

4. Solve the following travelling salesman problem and find the shortest possible path.

[8]

	A	B	C	D	E
A	∞	3	6	2	3
B	3	∞	5	2	3
C	6	5	∞	6	4
D	2	2	6	∞	6
E	3	2	4	6	∞

OR

5. Find the basic feasible solution with cost using Vogel's approximation method. Find the optimal solution. [8]

	D1	D2	D3	D4	supply
O1	1	2	-2	3	70
O2	2	4	0	1	38
O3	1	2	-2	5	32
Demand	40	28	30	32	

6. The cost of the machine is Rs 6100/- and its scrap value is Rs 100/-. The maintenance cost found from experience are as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost(Rs)	100	250	400	600	900	1200	1600	2000

When should the machine be replaced?

[8]

OR

7. A machine operator has to perform two operations turning and threading on a number of different jobs. The time required to perform these operations for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to complete all the jobs. [8]

Machine/Job	1	2	3	4	5	6
A	3	12	5	2	9	11
B	8	10	9	6	3	1

8. Solve the following problem using forward dynamic programming.

$$\text{Min } Z = x_1^2 + x_2^2 + x_3^2$$

$$\text{Subject to } x_1 + x_2 + x_3 \geq 15$$

$$\text{And } x_1, x_2, x_3 \geq 0$$

[8]

OR

9. 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: [8]

Player A	Player B			
	3	2	4	0
	2	4	4	2
	4	2	4	0
	0	4	0	8

10. A particular item has demand of 5000 units/year. The cost of procurement is Rs200 and the holding cost per unit is Rs 2.40/year. The replacement is instantaneous and no shortages are allowed. Determine: a) The economic lot size, b) The time between orders, c) The number of orders per year. d) The total cost per year if the cost of one unit is Rs 2. [8]

OR

11. 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? [8]

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