

Code No: 09A50502

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech III Year I Semester Examinations, June/July - 2014

OPERATIONS RESEARCH

(Computer Science and Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1. Solve by
- Simplex method
- :

$$\text{Maximise } Z = 6x_1 + 4x_2$$

$$\text{Subject to: } 2x_1 + 3x_2 \leq 30$$

$$3x_1 + 2x_2 \leq 24$$

$$x_1 + x_2 = 3, \quad \text{and } x_1, x_2 \geq 0.$$

2. Determine the minimum elapsed time to complete processing of the two jobs on 5 machines, the processing order of machines being different for the two jobs. The processing order of machines and the processing times (in hours) are given below:

Job I	A - 6	C - 7	B - 5	D - 4	E - 5
Job II	A - 4	B - 3	C - 5	E - 2	D - 4

3. The following table gives the distances between pairs of cities to be visited by a travelling salesman. Find the optimal route for the salesman.

	A	B	C	D	E
A	--	10	17	12	15
B	14	--	15	6	7
C	18	12	--	21	15
D	11	16	13	--	12
E	20	17	11	6	--

4. The following mortality rates have been observed for a certain type of light bulb in an installation with 1000 bulbs:

End of the week:	1	2	3	4	5	6
Probability of failure to date:	0.09	0.25	0.49	0.85	0.97	1.00

It costs Rs.3 to replace a failed bulb individually, but if all the bulbs are replaced as a group, the unit replacement cost comes down to Rs.0.70. Find the optimal replacement policy. At what group replacement price per bulb, would a policy of strictly individual replacement become preferable?

5. Solve the game for optimal strategies of A and B, and find the value of the game, for which the pay - off matrix of A is given below:

		B			
		I	II	III	IV
A	I	5	-10	9	0
	II	6	7	8	1
	III	8	7	15	1
	IV	3	4	-1	4

6. The Table 2 given below shows a feasible solution to a transportation problem given in Table 1. Is this solution optimal? If not, find an optimal solution using this feasible solution.

Table 1

		<i>Destinations</i>					<i>Available</i>
		A	B	C	D	E	
<i>Sources</i>	I	2	3	3	4	6	100
	II	4	7	6	5	7	60
	III	5	6	3	4	3	50
	IV	4	7	8	4	8	80
	30	60	70	90	40	← <i>Demand</i>	

Table 2

10	30	40		20
20			40	
		30		20
	30		50	

7. A company has a demand of 12000 units / year for an item, and it can produce 2000 such items per month. The cost of one set up is Rs.400, and the holding cost per unit per month is Rs.0.15. The shortage cost of one unit is Rs.20 per year. Find the optimal lot size and the total cost per year, assuming the cost of 1 unit as Rs.4.
8. A student has to take examination in three different courses A, B, and C. He has three days available for study. He feels that it would be better to devote a whole day to study of the same course, so that he may study a course for one day, two days, or three days, or not at all. His estimates of grades he may get according to the days of study he puts in are as follows:

<i>Study Days</i>	<i>Course</i>		
	A	B	C
0	1	2	1
1	2	2	2
2	2	4	4
3	4	5	4

Determine the optimal allocation of time of study for each course so as to maximize the total grades.
