R13

Code No: 117FZ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November/December - 2017

OPERATIONS RESEARCH

(Common to ME, CSE, IT, MCT, AME, MIE, MSNT, AGE)

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) What is a model? List the various classification schemes of Operations Research models. [3]

c) How the assignment problem can be viewed as a linear programming problem? [2]

d) Formulate the travelling – Salesman problem as an assignment problem. [3]

e) Define the problem of sequencing. [2]

f) What are the situations which make the replacement of items necessary? [3]

g) What are the characteristics of game theory? [2]

h) What is inventory management? Write the major decisions concerning inventory? [3]

i) What are major limitations of simulation? [2]

j) What do you understand by a queue? Give some important applications of queuing theory? [3]

PART-B **(50 Marks)**

2. What do you mean by LPP? What are its limitations? Use penalty (or Big-M) method to maximize $z = 3x_1 - x_2$
Subject to the constraints
$2x_1 + x_2 \geq 2$; $x_1 + 3x_2 \leq 3$; $x_2 \leq 4$
$x_1, x_2 \geq 0$ [10]

OR

3. What is a simplex? Describe simplex method of solving linear programming problem. [10]

4. Find the optimal solution for the assignment problem with the following cost matrix.

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

[10]

OR

5. There are three sources or origins which store a given product. These sources supply these products to four dealers. The capacities of the sources (S_i) and the demands at dealers (D_J) are as given below.

$S_1 = 150$, $S_2 = 40$, $S_3 = 80$

$D_1 = 90$, $D_2 = 70$, $D_3 = 50$, $D_4 = 60$.

The cost of transporting the product from various sources to various dealers is shown in the table below:

	D_1	D_2	D_3	D_4
S_1	27	23	31	69
S_2	10	45	40	32
S_3	30	54	35	57

Find out the optimum solution for transporting the products at a minimum cost. [10]

6. Find the sequence that minimizes the total elapsed time required to complete the following jobs.

Processing times in hours

No. of jobs	:	1	2	3	4	5	6	
Machine A	:	4	8	3	6	7	5	
Machine B	:	6	3	7	2	8	4	[10]

OR

7. A truck owner finds from his past records that the maintenance cost per year of a truck whose purchase price is Rs.8000, are given below:

Year	:	1	2	3	4	5	6	7	8
Maintenance cost (Rs):		1000	1300	1700	2200	2900	3800	4800	6000
Resale Price	:	4000	2000	1200	600	500	400	400	400

Determine at what time it is profitable to replace the truck? [10]

8. The payoff matrix of a game is given. Find the solution of the game to the player A and B.

		B				
		I	II	III	IV	V
A	I	-2	0	0	5	3
	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	IV	5	3	-4	2	-6

[10]

OR

9. Find the optimal order quantity for a product for which the price breaks are as follows:

Quantity	Unit cost (Rs.)
$0 \leq q_1 < 500$	10.00
$500 \leq q_2 \leq 750$	9.25
$750 \leq q_3$	8.75

The monthly demand for a product is 200 units, the cost of storage is 2% of the unit cost and the cost of ordering is Rs. 350. [10]

10. A supermarket has two girls ringing up sales at the counters. If the service time for each customer is exponential with mean 4 minutes, and if people arrive in a Poisson fashion at the counter at the rate of 10 per hour, then calculate:
a) The probability of having to wait for service;
b) The expected percentage of idle time for each girl;
c) If a customer has to wait, find the expected length of his waiting time. [10]

OR

11.a) State the Bellman's principle of optimality in dynamic programming and give a mathematical formulation of a dynamic programming problem?
b) Define simulation. Why is simulation used? Give one application area where this technique is used in practice? [6+4]

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