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Printed Pages: 04 Subject Code: NOE073

Paper Id: 199703 Roll No:

BTECH

(SEM VII) THEORY EXAMINATION 2018-19

OPERATIONS RESEARCH

Time: 3 Hours *Total Marks: 100*

Notes: *Assume any Missing Data.*

SECTION - A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. What is the role of operations research in decision making?
b. "Dual of a dual is it's primal." Explain.
c. Degeneracy in a transportation problem.
d. What are assignment problems? Give two examples.
e. What is float? What are the different types of float?
f. What is looping and dangling in network diagram?
g. What is two person zero-sum games?
h. Characteristics of M/M/1 queue model.
i. Discuss the various costs involved in an inventory model
j. Write a lucid note on replacement problem.

SECTION - B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Three machine shops A, B, C produces three types of products X, Y, Z respectively. Each product involves operation of each of the machine shops. The time required for each operation on various products is given as follows:

Products	Machine Shops A	B	C	Profit per unit
X	10	7	2	$12
Y	2	3	4	$3
Z	1	2	1	$1
Available Hours	100	77	80	

The available hours at the machine shops A, B, C are 100, 77, and 80 only. The profit per unit of products X, Y, and Z is $12, $3, and $1 respectively.

b. Find the optimal solution of the following transportation problem in which cell entries represent unit costs.

		Market I	II	III	Supply
Ware House	A	4	14	8	10
	B	6	6	2	16
	C	10	8	14	14
	D	2	12	4	28
Requirement		14	18	36	68

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c. The following table shows the various jobs of a network along with their time estimates:

Activity	Estimated Duration work		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
2-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15
6-7	2	4	8

Draw a network diagram and determine the critical path. What is the minimum time for completion of projects?

d. What do you understand by queuing model? Why do arrivals and services follow the Poisson and Exponential distribution respectively?

e. The demand for an inventory item each costing Re5, is 20000 units per year. The ordering cost is Rs.10. The inventory carrying cost is 30% based on the average inventory per year. Stock out cost is Rs.5 per unit of shortage incurred. Find out various parameters.

SECTION - C

3. **Attempt any one part of the following:** **10 x 1 = 10**

a. Solve the following LPP

Maximize $Z = 5X_1 + 10X_2 + 8X_3$

Subject to the following constraints :

$3X_1 + 5X_2 + 2X_3 \leq 60$

$4X_1 + 4X_2 + 4X_3 \leq 72$

$2X_1 + 4X_2 + 5X_3 \leq 100$

b. What is sensitivity analysis? Discuss its significance from managerial viewpoint.

Write the dual of the following primal problem:

Maximize $Z = -5x_1 + 2x_2$

Subject to : $X_1 + X_2 \geq 2$

$2X_1 + 3X_2 \leq 5$

$X_1, X_2 \geq 0$

4. **Attempt any one part of the following:** **10 x 1 = 10**

a. A wholesale company has three warehouses from which retail customers. The company deals in a single product, the supply of which at each warehouse are

Warehouse No.	Supply units	Customer No.	Demand units
I	20	A	15
II	28	B	19
III	17	C	13
		D	18

Conveniently, total supply at the warehouses is equal to customers. The following table gives the transportation cost per unit shipment from each warehouse to each customer :

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