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B.TECH
(SEM VII) THEORY EXAMINATION 2021-22
OPERATIONS RESEARCH

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20
- What are slack and surplus variables?
 - Explain basic feasible solution of LPP.
 - Define unbalanced assignment problem.
 - Discuss the objective of transportation problems.
 - What is PERT?
 - What are the rules for drawing the network diagram?
 - Define saddle point and optimal strategy.
 - What are various customer's behaviors?
 - Write down different types of costs on which EOQ depends.
 - Distinguish between deterministic and stochastic inventory models.

SECTION B

2. Attempt any three of the following: 10 x 3 = 30
- Classify and explain different models used in OR.
Solve the following problem by using graphical method:
Minimize $Z = 2X_1 + 3X_2$
Subjected to $X_1 + 2X_2 \geq 40$, $2X_1 + X_2 \geq 50$, $X_1, X_2 \geq 0$
 - Show that transportation is a special type of LPP. Use least cost method to find initial basic feasible solution of the given problem.

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

- What do you mean by network analysis? What is its significance? Also distinguish between the following:
 - CPM and PERT
 - Critical and Dummy activities
- For what type of business problem game theory is useful? Explain. Solve the following game graphically and find out the optimal strategies for both of the players.

		Player B			
		1	2	3	4
Player A	1	4	-2	3	-1
	2	-1	2	0	1
	3	-2	1	-2	0

- What are the types of inventory? Why they are maintained. Explain the various costs related to inventory. What are the economic parameters of inventory?



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SECTION C

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

(a) Solve using Simplex method the following problem:

$$\text{Maximize } Z = 3x + 2y$$

$$\text{subject to: } 2x + y \leq 18; 2x + 3y \leq 42; 3x + y \leq 24; x \geq 0, y \geq 0$$

(b) Explain the phenomenon of infeasibility in an LP problem. What are the indicators of such a phenomenon? Write the dual of the given primal problem:

$$\text{Maximize: } Z = a + 2b + 3c$$

$$\text{s.t. } 4a + 2b + c \leq 25; 2a + 3b - c \geq 20; a + 2b + 3c \leq 15; b + 2c = 10 \text{ and } a, b, c \geq 0$$

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

(a) Applying MODI method, determine the optimal solution of the following transportation problem.

	1	2	3	4	Capacity
1	100	120	90	60	700
2	70	30	70	70	600
3	60	60	90	110	

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