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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

- a. What are slack and surplus variables?
- b. Explain basic feasible solution of LPP.
- c. Define unbalanced assignment problem.
- d. Discuss the objective of transportation problems.
- e. What is PERT?
- f. What are the rules for drawing the network diagram?
- g. Define saddle point and optimal strategy.
- h. What are various customer's behaviors?
- i. Write down different types of costs on which EOQ depends.
- j. Distinguish between deterministic and stochastic inventory models.

## SECTION B

2. Attempt any three of the following:

10 x 3 = 30

- a. Classify and explain different models used in OR.  
Solve the following problem by using graphical method:  
Minimize  $Z = 2X_1 + 3X_2$   
Subjected to  $X_1 + 2X_2 \geq 40$ ,  $2X_1 + X_2 \geq 50$ ,  $X_1, X_2 \geq 0$
- b. 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	

- c. What do you mean by network analysis? What is its significance? Also distinguish between the following:
  - i. CPM and PERT
  - ii. Critical and Dummy activities
- d. 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

- e. 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:

Maximize  $Z = 3x + 2y$

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:

Maximize:  $Z = a + 2b + 3c$

s.t.  $4a + 2b + c \leq 25$ ;  $2a + 3b - c \geq 20$ ;  $a + 2b + 3c \leq 15$ ;  $b + 2c = 10$  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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