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

Time: 3 Hours

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

Roll No:

SECTION A

1. Attempt *all* questions in brief.

- 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:

- a. Classify and explain different models used in OR. Solve the following problem by using graphical method: Minimize Z = 2X1 + 3X2Subjected to $X1 + 2X2 \ge 40$, $2X1 + X2 \ge 50$, X1, $X2 \ge 0$
- 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 | | | | |
|---|----------|----------|----|----|----|----|
| Ť | | | 1 | 2 | 3 | 4 |
| | | 1 | 4 | -2 | 3 | -1 |
| | Player A | 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?

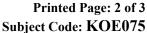
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10 x 3 = 30

Total Marks: 100



 $2 \ge 10 = 20$



 $10 \ge 1 = 10$



SECTION C

3. Attempt any one part of the following:

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Solve using Simplex method the following problem: (a)

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 + 3cs.t. $4a + 2b + c \le 25$; $2a + 3b - c \ge 20$; $a + 2b + 3c \le 15$; b + 2c = 10 and $a, b, c \ge 0$

4. Attempt any one part of the following:

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

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



$10 \ge 1 = 10$