D3AST1903 **(2 Pages)** **Name.....**
Reg.No.....

THIRD SEMESTER M. Sc. DEGREE EXAMINATION, NOVEMBER 2020
STATISTICS
FMST3E01 - OPERATIONS RESEARCH

Time: Three Hours **Maximum Weightage: 30**

Part A: Answer any *four* questions. Each carries *two* weightage.

1. Explain the concept of solution, feasible solution and basic feasible solution of a linear programming problem.
2. Define convex set and extreme point of a convex set. Show that optimum feasible solution of a linear programming problem if it exists will always be at an extreme point of the region of feasible solution.
3. Discuss Vogal's approximation method of finding an initial basic feasible solution to a transportation problem.
4. Explain dominance property associated with a rectangular game. Use dominance property to reduce the game.

	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	3	4	5	1
A_3	4	2	4	-1

5. Define minimax and maximin value of a game. Establish the relation between them.
6. Discuss the need of inventory control. Explain various costs associated with an inventory. What do you mean by EOQ formula?
7. Describe the concept of path, tree and minimal spanning tree associated with a network. Give an example for each.

(4 × 2 = 8 weightage)

Part B: Answer any *four* questions. Each carries *three* weightage.

8. Prove that extreme points of the region of feasible solution to an LPP correspond to a basic feasible solution and vice versa.
9. State dual of an LPP. State and prove fundamental theorem of duality.
10. Define mixed strategies and expected value of a game. Explain how an mX2 game can be solved graphically by an example.
11. What do you mean by sensitivity analysis associated with an LPP?
    Max Z = CX
    Subject to AX = b
    $X \geq 0$.

    Explain how variations in the cost vector C and requirement vector b can be handled.

(P.T.O.)

12. Explain how will you solve an integer programming problem by Gomery's cutting plane method.
13. Explain the concept of price break associated with an inventory model. Discuss the solution of EOQ problem with one price break.
14. Derive Kuhn-Tucker condition for solving a non-linear programming problem and discuss its sufficiency.

(4 × 3 = 12 weightage)

Part C: Answer any *two* questions. Each carries *five* weightage.

15. Explain how you can solve an LPP by two-phase simplex method. Use two-phase simplex method to solve

    Max Z = $6x_1+4x_2$

    subject to $2x_1+3x_2 \leq 30$

    $3x_1+2x_2 \leq 24$

    $x_1+x_2 \geq 3$

    $x_1 \geq 0\ x_2 \geq 0$

16. a) State and prove fundamental theorem of game.

    b) Solve the game by LPP:

		Player B		
Player A	1	-1	3
	3	5	-3
	7	3	-2

17. a) What do you mean by critical path and critical activities? What are the total and free floats of a non-critical activity?

    b) Given the following information

Activity:	0-1	1-2	1-3	2-4	3-4	3-6	4-7	5-7	6-7
Duration:	2	8	10	3	3	7	5	2	8

    (i) Draw the network diagram.

    (ii) Identify the critical path.

    (iii) Determine total and free float for non-critical activities.

18. a) Discuss Wolfe's method of solving a quadratic programming problem.

    b) Solve the QPP

    Maximize Z = $2x_1+ 3\ x_2-2{x_1}^2$

    subject to $x_1 + 4x_2 \leq 8$

    $x_1 + x_2 \leq 2$

    $x_1 \geq 0;\ x_2 \geq 0.$

(2 × 5 = 10 weightage)