D3AST2303 **(2 Pages)** **Name.....**
Reg.No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024
(Regular/Improvement/Supplementary)
STATISTICS
FMST3E01 - OPERATIONS RESEARCH

Time: 3 Hours **Maximum Weightage: 30**

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

1. Explain the major steps in the graphical solution of LPP.
2. Describe Big M method for solving LPP.
3. Define integer programming problem. Explain Gomory's cutting plane method.
4. Explain the rules of network construction.
5. Elaborate the general non-linear programming problem.
6. Define transportation problem. Explain degeneracy in transportation problem.
7. What are the costs associated with inventories?

(4 × 2 = 8 weightage)

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

8. Show that if an LPP has a feasible solution, then it also has a basic feasible solution.
9. What is sensitivity analysis? Discuss the effect of variation in the cost vector C.
10. Explain Hungarian algorithm for solving an assignment problem.
11. Describe the constrained derivatives (Jacobian) method.
12. Explain Kuhn–Tucker conditions. Write its uses.
13. Develop EOQ problem with instantaneous production and variable order cycle time.
14. Explain shortest route algorithms in network analysis.

(4 × 3 = 12 weightage)

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

15. (a) Prove that dual of the dual is primal. Establish the theorem with an example.

(b) Solve the following LPP by Two phase method.

Max $Z = x + 2y + 3z$ subject to the constraints

$x - y + z \geq 4$ $x + y + 2z \leq 8$ $x - z \geq 2$ $x, y, z \geq 0$

(P.T.O.)

16. (a) Describe the method of conversion of rectangular game in to an LPP.

(b) Solve the following transportation problem.

Industries

Mines	1	2	3	4	5	Availability
1	10	12	15	17	9	200
2	15	14	8	12	7	200
3	21	15	17	15	23	150
Requirement	100	200	100	100	50	

17. (a) Explain Quadratic programming problem.

(b) Solve the following LPP by both the Jacobian and the Lagrangean methods.
Minimize $f(X) = x^2 + y^2 + z^2$ subject to
$g(X) = x + y + 3z - 2 = 0$ $h(X) = 5x + 2y + z - 5 = 0$ $x, y, z \geq 0$

18. (a) What are the variations in deterministic inventory problems with no shortages? Explain the fundamental EOQ problem.

(b) A < D, E ; B, D < F; C < G; B < H; F,G < I

Find the critical path. Also find the minimum time of completion of the project when the time of completion of each task is given as follows.

Task	:	A	B	C	D	E	F	G	H	I
Time (Days)	:	23	8	20	16	24	18	19	4	10

(2 × 5 = 10 weightage)