2021

STATISTICS— GENERAL

Paper : DSE-A-2

(Operations Research)

Full Marks : 50

The questions are of equal value

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer ***any five*** questions: 2×5

(a) Define feasible solution.

(b) When do you need a surplus variable?

(c) Define hyperplane.

(d) When do you use Charne's M Method?

(e) Define duality in connection with LPP.

(f) When does an assignment problem become unbalanced?

(g) Give a real life example of an assignment problem.

(h) State the criteria to check for optimality of a transportation problem through the modified difference (MODI) method.

2. Answer ***any two*** questions: 5×2

(a) Discuss when you can graphically conclude that an LPP has an unbounded solution.

(b) Define basic feasible solution. Distinguish between degenerate and non-degenerate basic feasible solution.

(c) Show that the intersection of two convex sets is also a convex set.

3. Answer ***any three*** questions: 10×3

(a) Derive the minimum ratio exit criterion for LPP.

(b) Name different types of solutions of an LPP.

Reduce the following problem in its standard form with non-negative variables.

Maximize $3x_1 - 4x_2 + 7x_3$

Subject to $7x_1 + x_2 + 7x_3 \leq 50$

$x_1 + 9x_2 - 5x_3 \geq 40$

$5x_1 + 3x_2 = 20,$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3$ is unrestricted in sign.

(c) Discuss the assumptions of a linear programming problem.

(d) Express the transportation problem as a standard form of LPP. Show that the number of basic variables in a Transportation problem is at most $(m+n-1)$.

(e) Discuss the role of an artificial variable in solving the LPP.

Formulate the dual for the following primal LPP.

Minimize $z = 10x_1 + 6x_2 + 2x_3$

Subject to $-x_1 + x_2 + x_3 \geq 1$

$3x_1 + x_2 - x_3 \geq 2$

$5x_1 + 3x_2 = 20$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0.$ 5+5
