

2020

STATISTICS — HONOURS

Paper : DSE-B-2

(Operations Research)

Full Marks : 50

The figures in the margin indicate full marks.

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

[Notations and symbols are as usual]

1. Answer **any ten** questions : 1×10
- (a) Indicate any three areas where Operations Research (OR) methods could be applied.
 - (b) State the three types of model used in OR.
 - (c) Define a convex set.
 - (d) Define an extreme point of a convex set.
 - (e) Define a slack variable in a Linear Programming Problem (LPP).
 - (f) Define a surplus variable in the LPP.
 - (g) Indicate the criteria for optimum solution in a Simplex Tableau for maximization LPP.
 - (h) Indicate the criteria for unbounded solution in a Simplex Tableau.
 - (i) Indicate the criteria for infinite number of optimum solutions in a Simplex Tableau.
 - (j) Define duality in connection with the LPP.
 - (k) Is it possible to develop a South-East corner rule to generate the initial solution in a Transportation problem?
 - (l) State the criteria to check for optimality of a transportation problem through the modified difference (MODI) method.
 - (m) What do you mean by pay off matrix?
 - (n) What do you mean by a zero-sum game?
 - (o) Define a saddle point in a pay off matrix.
2. Answer **any four** questions : 5×4
- (a) Explain the role of an artificial variable in solving the LPP.
 - (b) Show that if the i^{th} primal constraint is an equation, then the i^{th} dual variable is unrestricted in sign.

Please Turn Over

- (c) Express the transportation problem as LPP. Find the rank of the coefficient matrix of an $m \times n$ transportation problem and interpret the result.
- (d) Describe the Vogel's method to find the initial basic feasible solution of a transportation problem.
- (e) Define an assignment problem. Is it possible to express such a problem as LPP?— Justify.
- (f) Explain with suitable examples how the theory of dominance may be used to reduce the order of a matrix game.

3. Answer *any two* questions.

10×2

- (a) Derive the minimum ratio exit criterion for LPP.
 - (b) Describe the dual simplex method to solve LPP.
 - (c) Distinguish between pure and mixed strategies in a two-person zero-sum game. Derive the mixed strategies in a 2×2 zero-sum game, without any saddle point in the pay-off matrix.
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