Reg. No. ☐☐☐☐☐☐☐☐☐☐

STS 552

Fourth Semester M.Sc. Degree Examination, September/October 2022
STATISTICS
Operations Research

Time : 3 Hours   Max. Marks : 70

Notes : *1) Question No.* **1** *is* **compulsory**.
              2) Answer **any four** *questions from the remaining* **seven**
                 questions.

1. Answer **any six** sub-divisions.   **(3×6=18)**

    a) Define the following terms :
       i) Basic solution
       ii) Degenerate basic feasible solution
       iii) Hyper-plane.

    b) Write a note on Big-M method of solving Linear Programming Problem (LPP).

    c) What are the steps involved in writing a primal LPP into its dual form ?

    d) Prove that if primal variable is unrestricted in sign then associated dual constraint is an equation.

    e) Explain the shortest distance problem.

    f) Explain the characteristics of dynamic programming problem.

    g) Distinguish between (Q, r) and (S, s) polices.

    h) Describe periodic review in inventory modeling.

2. a) Prove that the linear objective function of an LPP attains its optimal (minimum) value at an extreme point of the convex feasible region.

    b) Explain two phase method of solving LPP.   **(8+5)**

3. a) Illustrate the steps involved in formulating a LPP with an example.

    b) Explain graphical method of solving LPP with different cases.

    c) Describe the condition for selecting a non basic variable while solving a standard LPP.   **(5+4+4)**

4. a) State and prove the complementary slackness theorem.

   b) Prove that in a primal-dual pair of linear programming problem's, if $z(x)$ and $z(w)$ be the primal and dual objective functions respectively and $\bar{x}$ and $\bar{w}$ are the pair of primal and dual feasible solution with $z(\bar{x}) = z(\bar{w})$. Then $\bar{x}$ and $\bar{w}$ is an optimal solution pair of the primal and dual LP.

   c) Explain the applications of duality theory. **(5+4+4)**

5. a) State and prove weak duality theorem.

   b) Explain dual simplex method of solving a linear programming problem.

   c) Explain Gomory's method of generating a cut. **(5+4+4)**

6. a) Obtain the optimum values for ordered quantity and for shortages when the inventory system allows decay.

   b) Explain the motives for holding inventory. **(8+5)**

7. a) Explain a heuristic solution procedure of single period model under simple (Q, r) system.

   b) Derive the Wilson-Harris policy.

   c) Write a note on stochastic inventory models. Explain the different approaches to solve such system. **(5+4+4)**

8. a) Define the term "Sensitivity Analysis". Explain its different cases.

   b) Write a note on probabilistic dynamic programming technique.

   c) Describe the algorithm of solving an integer programming problem. **(5+4+4)**

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