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AU–516

M.A./M.Sc. (Semester—IV) (CBCS) Examination

STATISTICS

Mathematical Programming (OR—I)

Paper—XIII

Time : Three Hours] [Maximum Marks : 80

Note :— Solve either (A) or (B) from each question.

1. (A) (i) State and prove duality theorem.

(ii) Discuss the problem of degeneracy in transportation problem. Explain how one can overcome it. 8–8

OR

(B) (i) Define assignment problem. Explain Hungarian assignment method.

(ii) State and prove necessary and sufficient condition for the existence of a feasible solution to the transportation problem. 8–8

2. (A) (i) Give the importance of ILPP. How does the optimal solution of an ILPP compare with that of the LPP ?

(ii) Explain Gomory's cutting plane method for the solution of an all integer programming problem. 8–8

OR

(B) (i) Give the advantages of the branch and bound method.

(ii) What is the meaning of the lower bounds and upper bounds in the branch and bound method ? 8+8

3. (A) (i) Define general NLPP. Give the Lagrange's method for optimality.

(ii) What are convex and concave functions ? Give the tests for concavity and convexity. 8–8

OR

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(B) (i) Derive Kuhn Tucker conditions for the non-linear programming problem of maximizing f(x) subject to the constraints $h^i(x) \leq 0$ for i = 1, 2, ... m and $X \geq 0$ where $X \in R^n$. Also show that these KT conditions are sufficient iff f(X) is concave and all $h^i(X)$ are convex functions of X.

(ii) Define :

(a) Local optimum

(b) Global optimum. 12+4

4. (A) (i) Explain in brief two stage programming problem.

(ii) What is goal programming problem ? Explain goal programming model formulation with the help of an example. 8+8

OR

(B) (i) Discuss the purpose of goal programming and dynamic programming with examples.

(ii) State Bellman principle of optimality and describe recursive equation approach to solve the dynamic programming problem. 8+8

5. (A) (i) Show that a two person zero sum game problem can be reduced to a linear programming problem.

(ii) Explain the theory of dominance in the solution of rectangular games. Illustrate with example. 8+8

OR

(B) (i) How do you solve a game when (a) Saddle point exists and (b) Saddle point does not exist ?

(ii) Let (a_{ij}) be the pay off matrix for a two person zero sum game. If $\underline{V}$ denotes the maximin value and $\overline{V}$ the minimax value of game then show that $\overline{V} \geq \underline{V}$.

8+8

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