M. Sc. (Sem. III) (CBCS) Examination

December - 2019

Statistics : MS - 303

(Optimizing Techniques) (Theory)

Faculty Code : 003
Subject Code : 1173003

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1) Attempt all questions.

(2) Each question carries equal marks.

1 Answer the following : (any **seven**)   14

(1) What is the difference between feasible solution and optimal solution in LPP ?

(2) What is optimization problem ?

(3) Define the term unbounded solution in LPP.

(4) What is convex set? Explain by an example.

(5) List the properties of LP problems.

(6) How to justify the role of slack and surplus variables in LPP ?

(7) What is the role of unrestricted variable in LPP ? Give an example.

(8) What is degeneracy in LPP? And how to solve it ?

(9) State the standard form of LPP.

(10) What is duality in LPP ?

2 Answer the following : (any **two**)   14

(1) Explain in detail the types of LPP's.

(2) Explain in detail properties of LP - Models.

(3) Explain the steps for formulating LPP's.

3 Answer the following : **14**

   (1) Prove that Intersection of any two convex set is convex.

   (2) Formulate the following problem into LPP :

Firm manufacturer 3 products A, B and C. The profits are 3 Rs., 2 Rs. and 4 Rs. respectively. The firm has two machines M1 and M2 below is the required time in minutes for each machine on each product.

	Products		
	A	B	C
M1	4	3	5
M2	2	2	4

Machines M1 and M2 have 2000 and 2500 machine minutes respectively. The firm must manufacture 100A's, 200B's and 50C's but not more than 150A's. Set up an LPP to maximize profit.

OR

3 Answer the following : **14**

   (1) Prove that Union of any two convex sets need not be convex.

   (2) Formulate the following allocation problem into LPP :

A manufacturer produces two types of models M and N each M model requires 4 hours grinding and 2 hours for polishing whereas each N model requires 2 hours of grinding and 5 hours for polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works for 40 hrs a week and each polisher's works for 60 hrs a week. Profit on an M model is 3 Rs., and on an N model is 4 Rs. what ever is produced in a week sold in the market. How should the manufacturers allocate this production capacity to the two types of models ? So that he may make the maximum profit in a week ?

4 Answer the following : (any **two**) **14**

   (1) The set of all feasible solutions of LPP is a convex set.

   (2) The set of optimal solutions to the LPP is convex.

   (3) Prove that

      (i) Every empty set is convex

      (ii) Every singleton set is convex

5 Answer the following : (any **two**)   **14**

    (1) Write the Steps for solving LPP by simplex method.

    (2) Explain the simplex method for solving LPP through algorithm.

    (3) Solve the following LPP by two phase method

        Minimize $Z = x_1 + x_2$

        Subject to

$$2x_1 + x_2 \geq 4$$
$$x_1 + 7x_2 \geq 7$$
$$\text{and } x_1, x_2 \geq 0$$

    (4) Solve the following LPP by Simplex method :

        Minimize $Z = x_1 - 3x_2 + 3x_3$

        Subject to

$$3x_1 - x_2 + 2x_3 \leq 7$$
$$2x_1 + 4x_2 \geq -12$$
$$-4x_1 + 3x_2 + 8x_3 \leq 10$$
$$\text{and } x_1, x_2, x_3 \geq 0.$$

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