

# ACADEMIC PLANNER & UNITIZATION OF SYLLABUS

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**Department of Mathematics**  
**Bankura Christian College**

ACADEMIC YEAR 2023-24

**5<sup>th</sup> Semester (Program) ( July to December )**

## **Linear Programming**

**Course Objectives:** The course will enable the students to

i) analyze and solve linear programming models of real-life situations.

ii) provide graphical solutions of linear programming problems with two variables and illustrate the concept of convex set and extreme points.

iii) understand the theory of the simplex method

**Course Specific Outcomes:** The student acquires the knowledge of

i) relationships between the primal and dual problems, and to understand sensitivity analysis.

ii) learn about the applications to transportation, assignment and two-person zero-sum game problems.

### **Unit 1**

Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison.

### **Unit 2**

Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.

Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

### **Unit 3**

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

| <b>MONTH/YEAR</b> | <b>WEEK</b> | <b>PORTIONS</b>   |
|-------------------|-------------|---|
| August 2023       | 4           | Introduction to linear programming problem                              |
| <b>MONTH/YEAR</b> | <b>WEEK</b> | <b>PORTIONS</b>   |
| September 2023    | 1           | Theory of simplex method, graphical solution                            |
|                   | 2           | Convex sets, optimality and unboundedness, The simplex algorithm,       |
|                   | 3           | Simplex method in tableau format, Introduction to artificial variables, |
|                   | 4           | Revision / Tutorial/ Unit Test  |

| <b>MONTH/YEAR</b> | <b>WEEK</b> | <b>PORTIONS</b>  |
|-------------------|-------------|--|
| October 2023      | 1           | Two-phase method , Big-M method and their comparison.  |
|                   | 2           | Duality, formulation of the dual problem Primal-dual relationships, economic interpretation of the dual.           |
|                   | 3           | Transportation problem and its mathematical formulation  |
| <b>MONTH/YEAR</b> | <b>WEEK</b> | <b>PORTIONS</b>  |
| November 2023     | 2           | Northwest-corner method, least cost method Vogel approximation method for determination of starting basic solution |
|                   | 3           | Algorithm for solving transportation problem   |
|                   | 4           | Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.              |
| <b>MONTH/YEAR</b> | <b>WEEK</b> | <b>PORTIONS</b>  |
| December 2023     | 1           | Formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies           |
|                   | 2           | Graphical solution procedure, linear programming solution of games.<br>Revision/Tutorial/Unit Test                 |
|                   | 3           | Study Leave  |