**OPERATIONS RESEARCH**
**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the academic year 2016 -2017)**
**SEMESTER – VI**

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| Subject Code | 15CS653 | IA Marks | 20 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 80 |
| Total Number of Lecture Hours | 40 | Exam Hours | 03 |

**CREDITS – 03**

**Course objectives:** This course will enable students to

- Formulate optimization problem as a linear programming problem.
- Solve optimization problems using simplex method.
- Formulate and solve transportation and assignment problems.
- Apply game theory for decision making problems.

| **Module – 1** | **Teaching Hours** |
|---|---|
| **Introduction, Linear Programming:** Introduction: The origin, nature and impact of OR; Defining the problem and gathering data; Formulating a mathematical model; Deriving solutions from the model; Testing the model; Preparing to apply the model; Implementation .<br>**Introduction to Linear Programming Problem (LPP):** Prototype example, Assumptions of LPP, Formulation of LPP and Graphical method various examples. | **8 Hours** |
| **Module – 2** | |
| **Simplex Method – 1:** The essence of the simplex method; Setting up the simplex method; Types of variables, Algebra of the simplex method; the simplex method in tabular form; Tie breaking in the simplex method, Big M method, Two phase method. | **8 Hours** |
| **Module – 3** | |
| **Simplex Method – 2: Duality Theory -** The essence of duality theory, Primal dual relationship, conversion of primal to dual problem and vice versa. The dual simplex method. | **8 Hours** |
| **Module – 4** | |
| **Transportation and Assignment Problems:** The transportation problem, Initial Basic Feasible Solution (IBFS) by North West Corner Rule method, Matrix Minima Method, Vogel's Approximation Method. Optimal solution by Modified Distribution Method (MODI). The Assignment problem; A Hungarian algorithm for the assignment problem. Minimization and Maximization varieties in transportation and assignment problems. | **8 Hours** |
| **Module – 5** | |
| **Game Theory:** Game Theory: The formulation of two persons, zero sum games; saddle point, maximin and minimax principle, Solving simple games- a prototype example; Games with mixed strategies; Graphical solution procedure.<br>**Metaheuristics:** The nature of Metaheuristics, Tabu Search, Simulated Annealing, Genetic Algorithms. | **8 Hours** |

**Course outcomes:** The students should be able to:

- Select and apply optimization techniques for various problems.
- Model the given problem as transportation and assignment problem and solve.
- Apply game theory for decision support system.

| **Question paper pattern:** |
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| The question paper will have TEN questions.<br>There will be TWO questions from each module.<br>Each question will have questions covering all the topics under a module.<br>The students will have to answer FIVE full questions, selecting ONE full question from each module. |
| **Text Books:** |
| 1. D.S. Hira and P.K. Gupta, Operations Research, (Revised Edition), Published by S. Chand & Company Ltd, 2014 |
| **Reference Books:** |
| 1. S Kalavathy, Operation Research, Vikas Publishing House Pvt Limited, 01-Aug-2002<br>2. S D Sharma, Operation Research, Kedar Nath Ram Nath Publishers. |

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