**Title of Subject : Operations Research (SW-217)**

**Discipline :** Software Engineering (3rd Semester)

**Effective :** 18 Batch & onwards

**Pre-requisite :** Linear Algebra & Analytical Geometry

**Assessment :** Theory**:** 20% Sessional, 80% Written Semester Examination

## (20% Mid, 60% Final)

**Credit Hours :** 03 + 0 **Marks :** 100

 **Minimum Contact Hours:** 45

# Specific Objectives of course:

* To have an understanding of the identification and development of operational research models from the description of the real-world problems
* To apply knowledge and algorithms for solving various optimization problems.

**COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| **CLOs** | **Description** | **Taxonomy level** | **PLO** |
| 1 | Describe the fundamental concepts of operations research and linear programming | C2 | 1 |
| 2 | Illustrate sensitivity analysis for solving business problems and use duality concepts. | C3 | 2 |
| 3 | Apply the knowledge and skills obtained to investigate assignment and transportation problems. | C3 | 3 |
| 4 | Demonstrate knowledge and understanding of the underlying techniques of the project management. | C3 | 11 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Engineering Knowledge: | ☑ | 7 | Environment and Sustainability:  | ☐ |
| 2 | Problem Analysis: | ☑ | 8 | Ethics: | ☐ |
| 3 | Design/Development of Solutions: | ☑ | 9 | Individual and Team Work: | ☐ |
| 4 | Investigation: | ☐ | 10 | Communication: | ☐ |
| 5 | Modern Tool Usage: | ☐ | 11 | Project Management: | ☑ |
| 6 | The Engineer and Society: | ☐ | 12 | Lifelong Learning: | ☐ |

# Course outline:

* **Introduction**

Operations Research basic concept, applications

* **Linear Programming**

Protac Inc. Problem, Problem Formulation, Blending Problem, Grual Problem, Transportation, Security Scheduling, Financial Planning, Break Even Analysis

* **Linear Programming Geometric Representations and Graphical Method**

# Graphical Solution, Unbounded & Infeasible Problem, Changes in RHS, Active and Inactive Constraints

* **Analysis of Models: The Graphical Approach**

Sensitivity Analysis, Changes in objective function co-efficient, change in the right-hand side of constraints

* **The Dual Problem**

Dual Problem, Conversion of Primal to Dual problems, Significance of Dual Problems

* **Special Applications of Linear Programming**

Transportation Problem, Solving Transportation Problem, Solving Transportation Problem, NWCM Method, Vogel Approach Method, Stepping Stone Method, Modified Distribution, Other Considerations, Degeneracy in Transportation Problem, Assignment Problem, Hungarian Method, Other Assignment Considerations, and Media Selection.

* **Integer Programming**

Integer Programming, Application of O-I Variables, An IP Warehouse Location Problem

* **Project Management**

# Project Management, Critical Path Method, Slack and Critical Method, CPM and Time Cost Trade Offs, Project Cost Management, Controlling Project Cost, The Pert Cost Control Report

# Recommended Books:

1. G.D. Eppen “Introductory Management Science” Prentice Hall Publications, Latest Edition.
2. William Bernard Taylor “Introductory Management Science” Prentice Hall Publications, Latest Edition.
3. Hamdy A. Taha “Operations Research” BPB Publications.ei Han & Kamber M., Data Mining: Concepts & Techniques,Morgan Kaufman Publisher, Latest Edition.

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| **Approval:** |  |
| **Board of Studies:** | **Resolution No. 02** | **Dated: 29-08-2019** |
| **Board of Faculty:** | **Resolution No. 01** | **Dated: 07-10-2019** |
| **Academic Council:** | **Resolution No. 96.10** | **Dated: 07-10-2019** |