Operations Research

Course Title: Operations Research
Course No: ORS255
Nature of the Course: Theory
Semester: IV

Full Marks: 80 + 20
Pass Marks: 32 + 8
Credit Hrs: 3

Course Description:
The course covers fundamental concepts of operations research including introduction, optimization, queuing models theory of games, decision theory, and networking analysis.

Course Objective:
The main objective of this course is to develop knowledge and skill to the students on the Operations research tools and techniques such as optimization, queuing theory, theory of games, decision theory and networking analysis

Unit 1: Introduction (3 Hrs.)
History, Development of operations research, Objective of OR, Scope of OR, Nature and Definition of OR, Characteristics of OR, Scientific Method in OR, Models and Modeling in OR, Limitation of OR, Applications of OR

Unit 2: Optimization
2.1.Linear programming I: Formulation and Graphic Solution (3 Hrs.)
Introduction to Linear programming problem, Formulation of linear programming problem, general statement of linear programming problem, Assumptions underlying linear programming, solution to linear programming-graphic method ,some special cases in linear programming

2.2 Linear programming II: Simplex Method (6 Hrs.)
Simplex method, Solution to maximization problems, solution to minimization problems, Big-M method, some special cases in linear programming

2.3 Transportation problem (5 Hrs.)
VAM method for generating initial basic feasible solution, Testing Optimality condition by using MODI Method, Balanced and unbalanced transportation problem.

2.4 Assignment problem (3 Hrs.)
Introduction, Hungarian Assignment Method (HAM), some special cases: Unbalanced assignment problems, constrained assignment problem.

Unit 3: Queuing Models (6 Hrs.)
Introduction, economies of the queuing problem, queuing system and its essential elements, types of queuing model (focused on only Single channel system and multi-channel system), operating characteristics of single channel system (Poisson-exponential single server model-infinite population),Poisson-exponential, multiple server model-infinite population.

Unit 4: Theory of Games (6 Hrs.)
Introduction, Basic terminologies, Two persons zero-sum game, pure strategy and mixed strategy, dominance rule, algebraic method, arithmetic method and graphical method.

Unit 5: Decision Theory (5 Hrs.)
Introduction, decision making environment, Decision making criteria under risk: EMV criterion, EOL criterion, EVPI, Decision tree analysis, Marginal analysis, Decision making criteria under uncertainty.

Unit 6: Networking Analysis (8 Hrs.)
PERT/CPM networks, scheduling the activities: Earliest and Latest Times, Time-cost trade off analysis.

Text / Reference Books:
- Sharma, J.K. (2013). *Operations Research Theory and application*.(5thed). New Delhi:Laxmi Publications
- Operations Research: An Introduction, Handy A. Taha, 10/e, Pearson