Operations Research

(Open Elective)

B.Tech –III Year , I & II Semester

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Course Objectives: This course will enable the students to:

1. Study the Linear Programming and Dynamic Programming techniques used for business and Engineering applications.
2. Know about the inventory, Game theory and Replacement theory applications in real world.

UNIT I (10 Lectures)

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem-Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M methods, Special cases in LP-Degeneracy, unbounded, infeasibility & alternative optima

UNIT 2(8 Lectures)

Transportation Problem: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions-Northwest corner rule, Least cost method and Vogel's approximation method. Optimality test by MODI method & Stepping stone method.

UNIT 3(8 Lectures)

Assignment Model: Formulation, Hungarian method for optimal solution. Solving unbalanced Assignment problem.

Sequencing Models. Solution of sequencing Problem-Processing n jobs through 2 Machines-Processing n jobs through 3 Machines-Processing n jobs through m Machines. Processing 2 jobs through m-machines.

UNIT 4 (8 Lectures)

Dynamic Programming: Characteristics of Dynamic programming. Dynamic Programming approach for Coach/Shortest Path and cargo loading problems.

Inventory Models: Inventory costs. Models with deterministic demand- Model (a) Demand rate uniform and production rate infinite, Model (b) Demand rate uniform and production rate finite.

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UNIT 5(8 Lectures)

Games Theory: Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, and value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point-mixed strategy for 2*2 games.

Replacement Models: Replacement of items that deteriorate whose maintenance costs increase with time without change in the money value, Replacement of items that fail suddenly: Individual Replacement policy, Group Replacement policy.

Text Books

1. P.SankaraIyer, "Operations Research", Tata Mcgraw-Hill,2008.
2. A.M. Natarajan P . Balasubramani, A Tamilarasi, "Operations Research", Pearson Education, India,2012.
3. Hamdy A Taha, "Operations Research an Introduction", Pearson Education ,2010.

Reference Books

1. S.D. Sharma, "Operations Research Theory Methods and Applications" , Kedarnath Ramnath Publishers, 2015.
2. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & Co.,2014.
3. J K Sharma., " Operations Research Problems and Solutions, 3e", Macmillan India Ltd, 2008.

Course Outcomes

At the end of the course students are expected to :

1. Apply linear programming models to several Engineering and Business Applications.
2. Use several other techniques like Transportation, Assignment, and Sequencing Models in the real world applications.
3. Study selected Dynamic Programming models to be used in real world situations.
4. Apply simple mathematical models in Inventory into the real Engineering Applications.
5. Solve Game theory problems related to business applications.
6. Develop optimum Replacement policy.

Online websites / Materials: IOR Tutorials(Interactive Operations Research Tutorial)
Online Courses: onlinecourses.nptel.ac.in

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