NIRMA UNIVERSITY
Institute of Technology
Bachelor of Technology
Open Elective (except Dept. of Mechanical and Civil Eng.)

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Course Code	**2MAOE26**
Course Title	**Operations Research**

Course Outcomes (CO):

At the end of the course, students will be able to -

1. identify and express a decision problem in mathematical form and solve it using different optimization methods
2. recognize and formulate assignment problems and drive their optimal solution
3. employ the concept of transportation problems
4. apply the basic theories and techniques related to project management

Syllabus: Teaching Hours: 30

Unit I **5**

Linear Programming: Structure and Assumption of Linear Programming, Mathematical Form of General LPP, Formulation of an LPP, Slack, Surplus and Artificial Variables, Standard Form of LPP, Solution of LPP using Graphical Method, Simplex Method and Two-Phase Method

Unit II **4**

Non-Linear Programming: Introduction, Prerequisites: Maxima and Minima of Functions and Their Solutions, Quadratic Forms, Convex and Concave Functions, Non-linear Programming Problems, Graphical Solution Method, Wolfe's Modified Simplex Method

Unit III **8**

Transportation Problem: Mathematical Model of Transportation problem, Methods to find initial basic feasible solution, North-West corner method (NWCM), Least Cost Method (LCM), Voggel's approximation method, Method for finding optimal solution – MODI method, Special cases in Transportation Problem

Unit IV **7**

Assignment Problem: Introduction, Mathematical Model, Method to find an optimal solution- Hungarian Method, Variations in assignment problem-multiple optimal solutions, Maximization case in assignment problem, Unbalanced assignment problem, restrictions on assignment

Unit V **6**

Project Management: Introduction, Basic Difference between PERT and CPM, Phases of Project Management, PERT / CPM Network Components and Precedence Relationship, Critical Path Analysis-Forward Pass Method , Backward Pass Method , Float of an Activity and Event, Critical Path, Time estimation and Critical Path in Net-Work Analysis

Self-Study:

Self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from the self-study contents.

Suggested Readings^:

1. Taha H A. Operations Research, Prentice Hall, New Delhi
2. Kantiswarup, Gupta P. K. and Manmoha. Operations Research, S.Chand & Sons, New Delhi
3. Sharma S.D. Operations Research, Kedarnath Ramnath & Co.Meerut
4. Sharam J. K. Operations Research, Kedarnath Ramnath & Co.Meerut

L = Lecture, T = Tutorial, P = Practical, C = Credit
^ this is not an exhaustive list