



HIGHER ENGINEERING MATHEMATICS

PROF. P. N. AGRAWAL

Department of Mathematics
IIT Roorkee

TYPE OF COURSE : New | Core | PG/UG

COURSE DURATION : 12 weeks (29 Jul'19 - 18 Oct'19)

EXAM DATE : 17 Nov 2019

INTENDED AUDIENCE : UG and PG students of technical institutions/ universities/colleges.

COURSE OUTLINE :

This course is a basic course offered to UG/PG students of Engineering/Science background. It consists of four main topics : 1. Discrete Mathematics 2. Graph theory 3. Linear programming problems 4. Queuing theory.

ABOUT INSTRUCTOR :

Dr. P. N. Agrawal is a Professor in the Department of Mathematics, IIT Roorkee. His area's of research includes approximation Theory and Complex Analysis. He delivered 13 video lectures on Engineering Mathematics in NPTEL Phase I and recently completed Pedagogy project on Engineering Mathematics jointly with Dr. Uday Singh in the same Department. Further he has offered online certification course "Mathematical methods and its applications" namely "Integral equations and calculus of variations and its applications" and "Numerical Linear Algebra", "Advanced Engineering Mathematics". He has taught engineering mathematics to B.Tech and M.Tech students at IIT Roorkee for many years.

COURSE PLAN :

Week 1: Representation of statements, Duality, Tautologies and Contradictions, Quantifiers, Predicates and validity of arguments

Week 2: Propositional Logics, Languages and Grammar, Finite state machines and their transitional table diagrams, Lattices, Partially ordered sets-I

Week 3: Partially ordered sets-II, Duality and Lattices as algebraic system, Sublattice-I & II, Boolean Algebra

Week 4: Switching Algebra, Boolean Functions, Different representation of Boolean functions, table diagrams, Lattices, Partially ordered sets-I

Week 5: Circuit minimization and simplification-II, Karnaugh Map-I & II, Various types of Graph

Week 6: Eulerian and Hamilton Graphs, Travelling salesman problem, Vertex and edge connectivity, Matrix representation of graph, Incidence and adjacency matrices of graphs

Week 7: Planar graphs, Kuratowski's Theorem, Detection of planarity, Euler's formula, Duality of a Planar graph

Week 8 : Colouring of Graphs, Chromatic numbers, Four color theorem, Graphical method-I & II

Week 9 : Simplex method

Week 10: Two phase method-II, Dual Simplex method, Application of Dual Simplex method, Sensitivity Analysis-I

Week 11: Queuing System. Distribution of arrivals and service times, Analysis of M/M/1:FIFO, Application of M/M/1 FIFO, Analysis of M/M/S FIFO

Week 12: Application of M/M/S FIFO