

MA5156 APPLIED MATHEMATICS FOR ENGINEERS

DETAILED SYLLABUS

UNIT I MATRIX THEORY

The Cholesky decomposition - Generalized Eigenvectors - Canonical basis - QR factorization - Least squares method - Singular value decomposition.

UNIT II CALCULUS OF VARIATIONS

Concept of variation and its properties – Euler’s equation – Functional dependant on first and higher order derivatives – Functionals dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric problems - Direct methods: Ritz and Kantorovich methods.

UNIT III PROBABILITY AND RANDOM VARIABLES

Probability – Axioms of probability – Conditional probability – Baye’s theorem - Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a random variable.

UNIT IV LAPLACE TRANSFORM TECHNIQUES FOR PARTIAL DIFFERENTIAL EQUATIONS

Laplace transform - Definitions - Properties – Transform error function - Bessel’s function - Dirac delta function - Unit step functions – Convolution theorem – Inverse Laplace transform: Complex inversion formula – Solutions to partial differential equations: Heat equation - Wave equation.

UNIT V FOURIER TRANSFORM TECHNIQUES FOR PARTIAL DIFFERENTIAL EQUATIONS

Fourier transform: Definitions - Properties – Transform of elementary functions - Dirac delta function – Convolution theorem – Parseval’s identity – Solutions to partial differential equations: Heat equation - Wave equation - Laplace and Poisson’s equations.

For Syllabus, Question Papers, Notes & many More

REFERENCES:

1. Andrews L.C. and Shivamoggi, B. "Integral Transforms for Engineers", Prentice Hall of India Pvt. Ltd., New Delhi, 2003.
2. Bronson, R. "Matrix Operations", Schaum's outline series, 2nd Edition, McGraw Hill, 2011.
3. James, G., "Advanced Modern Engineering Mathematics ", 3rd Edition, Pearson Education, 2004.
4. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
5. O'Neil, P.V., "Advanced Engineering Mathematics ", Thomson Asia Pvt. Ltd., Singapore, 2003.
6. Sankara Rao, K., "Introduction to Partial Differential Equations", Prentice Hall of India Pvt. Ltd., New Delhi, 1997

OBJECTIVES:

This course is designed to enrich the knowledge in various advanced mathematical techniques such as matrix theory, calculus of variations, probability and random variables, Laplace transforms and Fourier transforms. The fundamental concepts in these areas will be more useful for the students to model the engineering problems and solving them by applying these methods.