MAX-101   MATHEMATICS – I

L T P C
3 1 0 4

Formation of ordinary differential equations, solution of first order differential equations by separation of variables, homogeneous equations, exact differential equations, equations reducible to exact form by integrating factors, equations of the first order and higher degree , Clairaut's equation.

Linear differential equations with constant coefficients, Cauchy's homogenous linear equations, Legendre's linear equation , simultaneous linear equations with constant coefficients.

Fourier series of periodic functions, even and odd functions, half range expansions and Fourier series of different wave forms, complex form of Fourier series and practical harmonic analysis.

Laplace transforms of various standard functions, properties of Laplace transforms and inverse Laplace transforms, Convolution theorem, Laplace transforms of unit step function, impulse function and periodic functions, application to solution of ordinary differential equations with constant coefficient and simultaneous differential equations.

Z-tranform and difference equations, elementary properties of Z-transform, Convolution theorem, formation of difference equations using Z-transform.

Fourier transforms, Fourier integral theorem, Fourier sine, cosine integral and transforms, Fourier transforms of derivatives of function, convolution theorem, Parseval's identity.

BOOKS RECOMMENDED:

1. E Kreyszig, "Advanced Engineering Mathematics", 8th Ed. John Wiley, Singapore (2001).
2. R K Jain and S R K Iyengar, "Advanced Engineering Mathematics,", 2nd Ed. Narosa Publishing House, New Delhi (2003).
3. B S Grewal, "Higher Engineering Mathematics", Thirty-fifth edition, Khanna Publishers, Delhi.

MAX-201   MATHEMATICS –II

L T P C
3 1 0 4

Linear dependence of vectors and rank of matrices, linear transformations and inverse of matrices, reduction to normal form, bilinear form and quadratic form, consistency and solution of linear algebraic system of equations, eigen values, eigen vectors and their applications to system of ordinary differential equations, Cayley Hamilton Theorem, orthogonal, unitary, hermitian and similar matrices.

Differential calculus of functions of several variables, partial differentiation, homogeneous functions and Euler's theorem, Taylor's and Maclaurin's series, Taylor's theorem for functions of two variables, maxima and minima of functions of several variables, Lagrange's method of multipliers.

Double and triple integrals, change of order of integration, change of variables, applications to evaluation of area, surface area and volume.

Scalar and vector fields; differentiation of vectors, velocity and acceleration, vector differential operators Del, Gradient, Divergence and Curl and their physical interpretations, formulae involving these operators, line, surface and volume integrals, solenoidal and irrotational vectors, Green's theorem, Gauss divergence theorem, Stoke's theorem and their applications.

Formulation and classification of partial differential equations, solution of first order linear equations, standard forms of non-linear equations, Charpit's method, linear equations with constant coefficients, non-homogeneous linear equations, Monge's method for non-homogeneous equations of second order; separation of variables method for solution of heat, wave and Laplace equation.

BOOKS RECOMMENDED:

1. E Kreyszig, "Advanced Engineering Mathematics". 8th Ed. John Willey, Singpore (2001)
2. R K Jain and S R K Iyengar, "Advanced Engineering Mathematics", 2nd Ed. Narosa Publishing house, New Delhi (2003).
3. I A N Sneddon, "Elements of Partial Differential Equations "Tata McGraw Hill, Delhi (1974).
4. B S Grewal, "Higher Engineering Mathematics", Thirty-fifth edition, Khanna Publishers, Delhi.

MAX-202   MATHEMATICS – III

L T P C
3 1 0 4

Limit and derivative of a complex function, analytic functions and Cauchy Riemann equations, line integral of elementary functions, Cauchy's integral theorem, Cauchy's integral formula and derivatives of analytic functions, Taylor and Laurent series, zeros and singularities, residues and residue theorem, evaluation of real improper integrals, conformal mappings, linear fractional transformations and mappings by elementary functions.

Series solution of differential equations, Bessel's differential equation and Bessel functions and their properties, differential equations reducible to Bessel's differential equation, Legendre's differential equation, Legendre's polynomials and their properties, Fourier-Legendre expansion of a function.

Fundamental concepts of calculus of variations, functional involving several independent functions, one end fixed and other end free problems, both end free problems, constrained extrema.

BOOKS RECOMMENDED:

1. B S Grewal, "Higher Engineering Mathematics", Thirty-fifth edition, Khanna Publishers, Delhi.
2. L E Elsgole, "Calculus of Variations", Addison-Wisley Publishing Company.
3. J B Conway, "Functions of One Complex Variables", Narosa Publishing House, 1980.

MAX-204   PROBABILITY AND STATISTICS

L T P C
3 1 0 4

Concept of statistics, collection and representation of data, frequency distribution, graphical representation of data, measure of central tendency and dispersion, coefficient of dispersion, moments, factorial moments, skewness and kurtosis.

Different approaches of probability, addition and multiplication theorem of probability, Boole's inequality, conditional probability, Baye's theorem and applications.

Discrete and continuous random variables, distribution function, probability mass function, probability density function, two dimensional random variables, mathematical expectation of discrete and continuous random variables, properties of expectation, conditional expectation, Moment generating functions.

Binomial, Poisson, Normal and exponential probability distributions, correlation analysis, regression analysis, curve fitting using least square method.

Sampling and sampling distributions: Chi-square, Student-t and F-test.

BOOKS RECOMMENDED:

1. G K Bhattacharya and R A Johnson, "Statistical Concepts and Methods", John Wiley, New Delhi, 2002.
2. R V Hogg and A T Elliot, "Probability and Statistical Inference", Pearson Education, 6th Edition.
3. R V Hogg and A T Craig, "Introduction to Mathematical Statistics", Sixth Edition, Pearson Education, Delhi, India.

MAX-206   NUMERICAL METHODS

                                                            L T P C
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Roots of algebraic and transcendental equations, Bisection method, Regula-Falsi method, Newton-Raphson method, Bairstow's method and Graeffe's root squaring method.

Solution of simultaneous algebric equations, matrix inversion and eigen-value problems, triangularisation method, Jacobi's and Gauss-Siedel iteration method, partition method for matrix inversion, power method for largest eigen-value and Jacobi's method for finding all eigen-values.

Finite differences, interpolation and numerical differentiation, forward, backward and central differences, Newton's forward, backward and divided difference interpolation formulas, Lagrange's interpolation formula, Stirling's and Bessel's central difference interpolation formulas, numerical differentiation using Newton's forward and backward difference formulas and numerical differentiation using Stirling's and Bessel's central difference interpolation formulas.

Numerical integration, Trapezoidal rule, Simpson's one-third rule and numerical double integration using Trapezoidal rule and Simpson's one-third rule.

Taylor's series method, Euler's and modified Euler's methods, Runge-Kutta fourth order methods for ordinary differential equations, simultaneous first order differential equations and second order differential equations.

Boundary value problems, finite difference methods for boundary value problems.

Partial differential equations, finite difference methods for elliptic, parabolic and hyperbolic equations.

BOOKS RECOMMENDED:

1. S S Sastry, Introductionary Methods of Numerical Analysis, 3rd edition, Prentice Hall of India Pvt.Ltd., New Delhi, India-1999.
2. S C Chapra and R P Canale, Numerical Methods for Engineers, 2nd edition, McGraw Hill Book Company, Singapore 1990.
3. Grewal B S, "Numerical Methods", Khanna Publishers, Delhi.