Veer Surendra Sai University of Technology, Burla, Odisha

Department of Mathematics

Courses of Studies

B. Tech All Branches

(Syllabus after 2012: I,III,V Semester)

Semester I

Pre requirement: Field structure of R, Bounded, Unbounded sets, supremum, infimum, Completeness of R, limit point of a set, open set and closed set.

Unit I: Limit, Continuity and differentiability of a function of one variable, Darboux theorem, Rolles theorem, Lagranges mean value theorem, Cauchy mean value theorem, Taylor theorem and applications.

Unit II: Linear Algebra: Matrices, vectors, determinants, linear system of equations, matrices and linear system of equations. Matrix eigenvalue problem, symmetric, skew-symmetric, Hermitian and orthogonal matrices.

Unit III: Ordinary differential equations: First order differential equations, separable equations, exact differential equations, Bernoulli's equations, applications to electric circuits. Linear differential equations of second and higher order, homogenous equation with constant coefficients, Euler Cauchy equation, solution by undetermined coefficients, solution by variation of parameters, modeling of electric circuits.$P_n(x)$

Unit IV: Series solution of ODE: Power series method, Theory of power series method, Legendre's equation, Legendre polynomials . Frobenius method, Bessel's equation, Bessel function of first kind $J_n(x)$. Bessel function of second kind $Y_n(x)$.

Books recommended:

(i) Mathematical Analysis by S.C. Malik, S. Arora, New Age Publication Chapter 5 (except 5.4)
(ii) Advance Engineering Mathematics by E. Kreygszig, Chapters 1.1 – 1.7, 2.1-2.12, 4.1-4.6, 6, 7

Books for reference:

(i) A courser of Mathemetical Analysis by Shanti Narayan, P.K. Mital, S.Chand Publisher
(ii) A text book of Engineering Mathematics by New Age International Ltd Publishers by D. Dutte.

Semester II

Unit I: vector differential calculus: gradient , divergence, curl: vector algebra in 2-space and 3-space, inner product, vector product, vector and scalar functions and fields. Derivatives. Gradient of a scalar field, directional derivative, divergence of a vector field, curl of a vector field.

Unit II : Vector integral calculus: Line integrals, Independence of path, Green's theorem in the plane, Surfaces for Surface integrals, Surface integrals, Triple integrals. Divergence theorem of Gauss. Further application of the Divergence theorem. Stokes's theorem.

Unit III: Laplace Transform: Laplace transform, Inverse transform, linearity, shifting, transform of derivatives and integrals, differential equations, Unit shift function, second shifting theorem, Dirac delta function, Differntiation and integration of transforms, convolution, integral equation, partial fraction, differential equations,

Unit IV: Fourier Analysis: Periodic functions, trigonometric series, Fourier series,

Function of any period p=2L, even and odd function. Half range expansions.

Books recommended:

1) E. Kreyszig Ch 8(8.1-8.4 , 8.9-8.11) Ch 9(9.1-9.9) Ch 10 (10.1-10.4) Ch 5(5.1-5.7)

Semester III

Unit I : Partial differential equation: Basic concept, modeling: vibration of string, wave equation, solution by separation of variable, use of Fourier series, D'Alembert solution of wave equation, heat equation,

Unit II: membrane of two dimensional wave equation, Laplacian in polar coordinates, Laplacian in cylindrical and sphereical coordinates(formula only), Solution by Laplace Transform

Unit III : Complex Analysis : complex numbers, complex plane, polar form of a complex number, power and roots, derivative of analytic function, Cauchy-Reiman equation, Laplace equation, Geometry of analytic function, Conformal mapping, exponential function, trigonometric function, hyperbolic function, logarithm, general power, linear fractional transformation,

Unit IV: Complex Integration: Line integral in the complex plane, Cauchy integral theorem, Cauchy integral formula, Derivative of analytic function, sequence, series, convergence test, power series, function given by power series, Taylor series, Maclaurin series, Laurent Series, Singularities and zero, Residue integration method, Evaluation of real integration.

Books recommended:

1) E. Kreyszig Ch 11(except 11.6) Ch 12,13,14,15

Reference Book: A course in ordinary and partial differential equation, J Sinha Roy, S Padhy

Semester IV

Unit I: Numerical Analysis: Floating points, Round-off, Error, Error propagation, solution of equation by iteration, Interpoltaion, numerical integration and differentiation,

Unit II: Solution by iteration(Gauss-Seidel, Eigen value and eigen vector by Power method),

Unit III: Solution of IVP by Euler's method, Heun's method and Runge-Kutta fourth order method. Basic concept of optimization, Linear programming, simplex method, degeneracy, and Big-M method.

Unit IV : Data analysis and Probability theory: Experient, outcomes, events, probability, random variables, probability distribution, mean and variance of distribution, Bonomial , Poisson, hypergeometric, and Normal distribution. Estimation of parameters, confidence interval, testing of hypothesis, regression analysis, fitting straight line, correlation analysis.

Random variables, probability distribution, mean and variance of distribution, Binomial, Poison , Hyper-geometry and Normal distribution.

Books recommended:

1) E. Kreyszig Ch 17(17.1-17.3, 17.5) Ch 18(18.3, 18.8),Ch 19(19.1),Ch 20,22,23

Semester V

B.Tech (CSE/IT, Discrete Mathematical Structures)

Unit I

Logic: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness.

Counting: The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving recurrence relations, generating functions, inclusion-exclusion principle, application of inclusion-exclusion.

Unit II

Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, equivalence of relations, partial orderings.

Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

Unit III

Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal subgroups, rings, integral domains and fields.

Unit IV

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, prepositional calculus.

Coding theory: Coding of binary information and error detection, decoding and error correction.

Text Books:

1) K.H. Rosen: Discrete Mathematics and its application, 5th edition, Tata McGraw Hill.
Chapter 1(1.1-1.5), Chapter 3(3.1-3.4,3.6), Chapter 4(4.1-4.3,4.5), Chapter 6(6.1,6.2,6.4-6.6) Chapter 7(7.1-7.6), Chapter 8(8.1-8.5,8.7,8.8)