COURSE OUTCOME
B.Sc/B.A I SEMESTER

1.1: Differential Calculus:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions, concepts and objectives of limit, continuity and differentiability.
CO-2	By the end of this unit the student will be able to learn Lebnitz's theorem, Rolle's theorem and Taylor's theorem with Lagrange's and Cauchy's form of remainder.
CO-3	By the end of this unit student will be able to expand the functions by Taylor's series and Maclaurin's series. Also students are able to learn partial differentiation and Indeterminate forms.
CO-4	By the end of this unit student will be able to solve problems of Maxima and Minima, tangent and normals, curvature, asymptotes and singular points. Also student will be in a position to trace a curve in Cartesian form and polar form.

B.Sc/B.A II SEMESTER

1.2: Differential Equations:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with basic definitions, concepts of ordinary differential equations. Student will be able to solve the differential equations of first order and first degree.
CO-2	By the end of this unit the student will be able to solve the differential equations of first order and higher degree. Also students will be able to learn Wronskian and its properties. And solving a differential equation by reducing its order.
CO-3	By the end of this unit student will be able to solve the linear differential equations with constant coefficients buy evaluating the complementary function and particular integral.
CO-4	By the end of this unit student shall be familiar with basic definitions, concepts of partial differential equations, formation of first order partial differential equations. Also student will be able to solve partial differential equations by using Lagrange's method and Charpit's method.

B.Sc/B.A III SEMESTER

1.3: Real Analysis:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with basic definitions, concepts of countable and uncountable sets, Completeness property of R, Archimedean property of R, Intervals, limit points and Balzano Weierstrass theorem.
CO-2	By the end of this unit student shall be familiar with basic definitions of sequences, Cauchy sequence and their convergence. Also student will be able to find the limit of sequence.
CO-3	By the end of this unit student will be able to test an infinite series for convergence and divergence by the various tests like comparison test, Ratio test, Raabes' test, Cauchy root test,Lebnitz's test etc.
CO-4	By the end of this unit student shall be familiar with basic definitions, concepts and examples of Riemann integral. Also student will be able to learn necessary and sufficient conditions for integrability.

1.4: Integral Calculus:

SL NO	PARTICULARS
Course Outcomes	By the end of this course student shall be familiar with basic definitions and concepts of integrals. Student will be able to evaluate the integral of rational and irrational function, definite integrals, reduction formulae, Beta function and Gamma function. Also student shall be familiar with basic definitions and concept of double and triple integrals and their application in area, volumes and surfaces of solid of revolution.

B.Sc/B.A IV SEMESTER

1.5: Algebra:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with basic definitions of Groups (Abelian and non abelian), group of integer under addition and multiplication modulo n, cyclic group and complex roots of unity.
CO-2	By the end of this unit student will be able to learn circle group and group of symmetries (an isosceles triangle, an equilateral triangle, a rectangle and a square), permutations and group of permutations.
CO-3	By the end of this unit student will be able to learn the homomorphism and isomorphism of groups, subgroups and necessary and sufficient conditions for a non empty set to be subgroup. Also in addition, student will be able to know order of an element, cosets, index of group, Lagrange's theorem, normal subgroups with examples and Quotient group.
CO-4	By the end of this unit student shall be familiar with definitions and concepts of rings, sub rings, ideals, integral domain and field with examples. Also student will be able to learn commutative and non commutative rings and ring of integers with addition modulo n.

B.Sc/B.A V SEMESTER

1.6: Linear Programming:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with basic definitions and concepts of linear programming problem and formations of LPP and their solution by graphical method. Student will also able to know convex sets, supporting and separating hyper planes.
CO-2	By the end of this unit student will be able to learn the theory of simplex method, simplex method in tableau format and solution of a linear programming problem by simplex method.
CO-3	By the end of this unit student will be able to solve linear programming problem by introducing artificial variables by Big M method and two phase methods.
CO-4	By the end of this unit student will be able to learn Duality and formulation of duality. Student will also be able to develop the primal-dual relationship and economic interpretation of the dual problem.

B.Sc/B.A VI SEMESTER

1.7: Linear Algebra:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of vector spaces, vector subspaces, quotient spaces and algebra of subspaces.
CO-2	By the end of this unit student will be able to learn linear combinations of vectors, linear span and linear independence of vectors, basis, dimensions and dimensions of subspaces.
CO-3	By the end of this unit student will be able to learn linear transformations, null spaces, range, rank, nullity of a linear transformation and algebra of linear transformations.
CO-4	By the end of this unit student shall be familiar with definitions of dual spaces and dual basis, double dual and characteristic polynomials, eigen values and eigen vectors. Student will also be able to learn isomorphism, invertibility and change of coordinate matrix.

1.8: Vactor Calculus:

SL NO	PARTICULARS
Course Outcomes	By the end of this course student shall be familiar with basic definitions and concepts of vectors and reciprocal vectors. Student will be able to differentiate and partial differentiate the vector functions. Student will be able to learn dot product and cross product of two vectors, gradient, curl and divergence and applications of Green's theorem, Stokes's theorem and Gauss divergence theorem.

M.Sc/M.A I SEMESTER

1.1: Discrete Structures:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with recurrence relations, linear homogeneous recurrence relations and solution of recurrence relations with some examples.
CO-2	By the end of this unit student will be able to learn partially ordered sets, lattices, sub-lattices, direct product, Ideal lattice, modular and distributive lattices.
CO-3	By the end of this unit student will be able to understand Boolean algebra, Ideals in Boolean algebra, Boolean rings, Boolean functions, Karnaugh maps and applications of Boolean algebra to switching theory.
CO-4	By the end of this unit student shall be familiar with definitions of graphs, sub-graphs, direct graph, relations and graphs, paths, circuits, Eulerian graph, Hamiltonian graphs and connected graphs.

1.2: Abstract Algebra-I:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with Simple groups, Conjugacy, Normalization, Centre of a group, Class equation of a group and its consequences, Theorems for finite groups, Cauchy's theorem, Sylow's theorem.
CO-2	By the end of this unit student will be able to learn Homomorphism, Endomorphism, Automorphism, Inner automorphism, Kernel of a homomorphism, Fundamental theorem on homomorphism of group, Group of automorphisms , Results on group homomorphism.
CO-3	By the end of this unit student will be able to Maximal subgroups, Compositionseries, Jordan-Holder theorem, Solvable groups, Commutator subgroups, Direct products
CO-4	By the end of this unit student shall be able to understand Ideals, Algebra of ideals, Principal ideal ring, Units and associates, Polynomials ring, Division and Euclidean algorithm for polynomials, Unique factorization theorem

1.4: Complex Analysis:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of analytic functions, power series of an analytic functions and their convergence, Taylor's and Laurent's series, singularities, residues and poles with problems.
CO-2	By the end of this unit student will be able to evaluate residues, Cauchy residue theorem and applications of residue theorem in evaluation of improper real integrals.
CO-3	By the end of this unit student will be able to learn conformal mapping with properties, Mobius transformation with examples.
CO-4	By the end of this unit student shall be able to understand maximum modulus theorem, Mittag-Leffler theorem, Rouche's theorem, Entire functions and analytic continuation.

1.5: Operation Research I:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of OR, Scope of OR, Different Models of OR, Opportunities and shortcomings of OR,
CO-2	By the end of this unit student will be able to Dual simplex method, Revised Simplex

	Method
CO-3	By the end of this unit student will be able to Assignment and Transportation problems
CO-4	By the end of this unit student will be able to Theory of games ,Integer LP.

M.Sc/M.A II SEMESTER

2.1: Abstract Algebra-II:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of Embedding of rings, Ring of residue classes, Fundamental theorem on homomorphism of ring , Prime ideals, Maximal ideal.
CO-2	By the end of this unit student will be able to Euclidean ring, Properties of Euclidean ring, Module, sub-module, Module homomorphism, Linear sum and direct sum of sub-module
CO-3	By the end of this unit student will be able to Extension fields, Simple field extension, Algebraic field extension, Minimal polynomial, Roots of polynomials, Multiple roots, Splitting field.
CO-4	By the end of this unit student will be able to Automorphism of field, Fixed field, Normal extension, Galois group: Examples and characterizations, Construction with straight edge and compass.

2.2: Fluid Dynamics:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of fluids, Lagrangian and Eulerian methods, local and individual time rate of change, equation of continuity and boundary surface.
CO-2	By the end of this unit student will be able to understand the motion of inviscid fluids, Euler's equation of motion, Bernoulli's equation, Lagrange's equation, Cauchy integral and Helm-Holtz equation.
CO-3	By the end of this unit student will be able to learn impulsive motion of a fluid, Energy equation of inviscid fluid, Irrotational motion, Flow and circulation, Kelvin's circulation theorem, Stoke's theorem, Green's theorem and mean value of velocity potential over a spherical surface.
CO-4	By the end of this unit student will be able to learn motion in two dimensions, Stream functions, Complex potential, Source, Sink, Doublet, Milne-Circle theorem and Blausius theorem.

2.3: Operation Research II:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of Inventory control, Functional role of inventory control, Classification of EOQ models with shortages and without shortages.
CO-2	By the end of this unit student will be able to Queuing theory, Characteristics of Queuing system, Probability distribution in queuing system, Single served queuing model, M|M|1 queuing models, Multiple server queuing models.

CO-3	By the end of this unit student will be able to Markov chain, Application of Markov analysis, State and transition probabilities, Steady state conditions, Sequencing problems, Processing n jobs through two and three machines.
CO-4	By the end of this unit student will be able to Dynamic programming, Dynamic programming under certainty, Non-linear programming methods, Quadratic programming, Kuhn- Tucker conditions.

M.Sc/M.A III SEMESTER

3.2: Differential Equations:

SL NO	PARTICULARS
CO-1	By the end of this unit student will be able to describe existence and uniqueness and solutions of ordinary differential equation and Picard's iteration method with examples.
CO-2	By the end of this unit student shall be familiar with definitions and concepts of power series, Ordinary and singular points. Also student will be able to find power series solution of ordinary differential equations (Legendre's differential equation and Bessel's Differential equation) and generating functions.
CO-3	By the end of this unit student will be able to classify the second order partial differential equation and reduce them to Canonical form. Also student will be able to understand the concept of separation of variable solution.
CO-4	By the end of this unit student will be able to find the solution of heat equation, wave equations and Laplace equations with the help of separation of variable solution. Also student will be able to find the solution of second order nonlinear partial differential equation.

3.4: Mathematical Statistics:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of Elements of probability, Sample space, Discrete probability, Baye's theorem, Random variables and distribution functions, Mathematical expectations and moments.
CO-2	By the end of this unit student will be able to Some standard discrete and continuous univariate distributions: Binomial, Poisson, Normal, Gamma and Beta distributions.
CO-3	By the end of this unit student will be able to Correlation, Rank correlation, Regression line, Multiple and partial correlation of three variables only, Data reduction techniques, Canonical correlation.
CO-4	By the end of this unit student will be able to Concepts of sampling, Stratified sampling and systematic sampling,Test of hypothesis: t,z ,chi square test.

3.5: Calculus of variations:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of Variation of functional,Continuity and differentiability of functional, Necessary condition for an extremum,Euler's equation,Variational problems in parametric form, Functional depending on higher order derivatives and variational problems with subsidiary condition.
CO-2	By the end of this unit student will be able to The isoperimetric problem, Invariance of Euler's equation under coordinate transformation, General variational of functional, Variable end point problems,Transversality condition transversal theorem, Weierstrass-Endmann corner condition.

CO-3	By the end of this unit student will be able to Sufficient condition for extremum: second variation, Legendre's and Jacobi's necessary condition, Canonical transformation, Noether's theorem, The principle of least action, Conservation law, Hamilton Jacobi's equations.
CO-4	By the end of this unit student will be able to Transformation of ODE and PDE into functionals and their solutions by Ritze, Galerkin, Collocation and Kantrovitch methods.

M.Sc/M.A IV SEMESTER

4.1: Measure and Integration:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of Lebesgue outer measure, Measure of open and closed sets, Borel sets, Measurablesets, Measure of cantor's ternary set, Non-measurable sets.
CO-2	By the end of this unit student will be able to Measurable functions, Algebra of measurable functions, Step functions, Characteristic function, Simple functions, Convergence in measure, Egoroff's theorem, Riesz theorem.
CO-3	By the end of this unit student will be able to Lebesgue Integral and their properties, General Lebesgue integrals, Lebesgue integrals for unbounded functions, Convergence theorems, Fatou Lemma.
CO-4	By the end of this unit student will be able toFunctions of bounded variations, Absolutely continuity, Variation function, Jordan-decomposition theorem, Indefinite integral and its characterizations, Differentiation of an integral, Lebesgue differentiation theorem.

4.2: Functional Analysis:

SL NO	PARTICULARS
CO-1	By the end of this unit student shall be familiar with definitions and concepts of normed linear space with properties, Banach space, Quotient space and norms with examples.
CO-2	By the end of this unit student will be able to understand bounded linear operators, Hahn-Banach theorem, Open mapping theorem and closed graph theorem.
CO-3	By the end of this unit student will be able to describe Inner product spaces with properties, Hilbert space, Orthogonal complement and Projection theorem, Riesz representation theorem and orthonormal sets.
CO-4	By the end of this unit student shall be describe the different operator on Hilbert space like self-adjoint operator, Normal operators, Unitary operators and orthogonal projection operators.

4.4: Fluid Mechanics:

SL NO	PARTICULARS
CO-1	By the end of this unit student will be able to understand the motion of cylindrical and elliptical cylinders in details with examples.
CO-2	By the end of this unit student will be able to understand the motion of sphere, motion of a sphere in an infinite mass of the liquid rest at infinity and pressure distribution.
CO-3	By the end of this unit student will be able to know the general theory of stress and rate of strains, Newton's law of viscosity, Principal stresses and principal directions, Transformation of the stress components and rate of strain components, Relation between stresses and rate of strain components, Translation, Rotation and rate of deformation.

CO-4	By the end of this unit student will be able to describe Navier-Stoke's equation of motion, Energy equation of inviscid fluid and energy dissipation due to viscosity.