NETAJISUBHASUNIVERSITY, JAMSHEDPUR

Course of Study (2019-2022)

Syllabus for Scheme for Undergraduate B. Sc/B.A (Mathematics Honours)

Note :-Each paper in each semester is 30 marks for Internal Exam and 70 marks for External Exam,

Total marks 100 for each paper (Overall marks 1800)

Year - I					
Semester –I (F.M.200)		Code No	Semester –II (F.M.200)		Code No
P – I F.M (100)	Differential Calculus Analytical geometry(2D)	101	P – III F.M (100)	Vector Analysis Differential Equation -I	203
P –II F.M (100)	Integral Calculus Matrices	102	P – IV F.M (100)	Set theory Analytical Geometry 3 -D	204

Year - II					
Semester – III (F.M.300)		Code No	Semester – IV (F.M.300)		Code No
P –V F.M (100)	Theory of Equation Trigonometry	305	P – VIII F.M (100)	Complex Analysis Number Theory	408
P – VI F.M (100)	Real Analysis I Group Theory	306	P – IX F.M (100)	Real Analysis II Ring Theory	409
P – VII F.M (100)	Numerical Analysis Discrete Mathematics	307	P – X F.M (100)	Difference Equation -II Laplace Transformation	410

Year - III					
Semester – V(F.M.400)		Code No	Semester – VI(F.M.400)		Code No
P - XI F.M (100)	Difference Equation -III Metric Space	511	P –XV F.M (100)	Tensor Fourier Transform	613
P –XII F.M (100)	Statics Dynamics	512	P - XVI F.M (100)	Introduction to C++ (theory + practical)	614
P –XIII F.M (100)	Probability Theory Statistics	513A	P – XVII F.M (100)	Operation Research with Linear Programming Problem	615
OR	Linear Algebra Linear Difference Equation	513B	P - XVIII F.M (100)	Project based on Elective paper	616
P – XIV F.M (100)	Fluid Mechanics Special Function	514A			
OR	Mathematical Modeling Topology	514B			
Real Analysis III					

Elective Papers are P – IX ,P – X

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Prof. Alok Banga (Member)
Prof.D.Shome (Head Academics)
Prof. Srimanta Santra (Member)

Type of Question and Time allocation for University Exam

Full Marks: 70 Time: 3 Hours

Instruction:

- Question 1 will be compulsory

(Objective Multiple choice 10 questions) 10 X 1 = 10

- Short answer type 5 questions (out of seven questions) 5 X 2 = 10
- Long answer type 5 questions (out of seven questions) 5 X 10 = 50

Type of Question and Time allocation for Internal Exam

Full Marks: 15 Time: 3 Hours

Instruction:

- Question 1 will be compulsory

(Objective Multiple choice 5 questions) 5 X 1 = 05

- Long answer type 2 questions (out of five questions) 2 X 5 = 10

OR

Continues Internal Assessment (CIA) – 30 MARKS

1. Mid – Term Test (Subjective/Objective Type) 15 Marks
2. Assignment /Project/Posters/Quiz/Seminar 10 Marks
3. Classroom attendance & active participation with Leadership quality, good manners and articulation in routine class instruction delivers. 05 Marks

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First Year:Semester –I

Paper I: Code no. : - 101

Unit – I Differential Calculus

Successive Differentiation, Leibnitz Theorem.
Expansion, Taylor's AND Maclaurin's –Series.
Partial Differentiation, Homogeneous Functions, Euler's Theorem.
Tangent and Normal's, Curvature, AsymptotesConcavity,
convexityand points of inflection Maxima and minima of a function of two variables.

Reference Books:

1. Differential calculus:Lalji Prasad
2. Differential calculus:A.R.Vasishtha
3. Differential Calculus - G B Thomas & R L Finney.
4. Differential Calculus - Das & Mukherjee.

Unit – II Analytical Geometry (2-D)

Analytical geometry of two dimensions:

Transformation of rectangular axes.

Coordinate for the general equation of second degree to represents Parabola, Ellipse and Hyperbola and its reduction to normal forms.

Equation of tangents and Normals (using calculus), chord of contact and pair of tangents.

Systems of conies.Polar equation of a conic.

Reference Books:

1. Analytical geometry: A.R.Vasishtha
2. Analytical geometry: Lalji Prasad
3. Analytical Geometry: B. K. Kar, Books & Allied Co., Kolkata
4. Analytical Geometry of two dimensions - Askwith

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First Year:Semester –I

Paper II: ` **Code no. : - 102**

Unit – I Integral Calculus

Method of Substitution, Integration by Parts, Integration of Rational and Irrational Algebraic Function, Integration by Partial fraction, Integration by Trigonometrically functions, Definite Integral, Improper Integrals, Reduction Formulae, Curve-Tracing, Area of curves (Quadrature), Length of Plane Curves (Rectification), Volume & surface area of solids of revolution.

Reference Books:
1. Integral Calculus: Lalji Prasad
2. Integral Calculus: A.R.Vasishtha

Unit – II Matrices

Matrices, elementary row operations, row-equivalence, and row space. Systems of linear equations as matrix equations, and the invariance of its solution set under row-equivalence. Row-reduced matrices, row-reduced echelon matrices, row-rank, and using these as tests for linear dependence.The dimension of the solution space of a system of independent homogeneous linear equations.

Linear transformations and matrix representation.Matrix addition and multipli-cation.Diagonal, permutation, triangular, and symmetric matrices.Rectangular matrices and column vectors.Non-singular transformations.Inverse of a Matrix.Rank-nullity theorem. Equivalence of row and column ranks. Elementary matrices and elementary operations.Equivalence and canonical form. Determinants. Eigen-values, eigenvectors, and the characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix. Solution of homogeneous and non homogeneous simultaneous equations.

Reference Books:
1.Matrices:A.R.Vasishtha

2. Matrices: Lalji Prasad

3. Matrices-Shanti Narayan.

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First Year:Semester –II

Paper III: **Code no. : - 203**

Unit – I Vector Analysis

Vector Algebra.Operations with vectors.Scalar and vector product of three vectors.Product of four vectors.Reciprocal vectors.Vector Calculus.Scalar-valued functions over the plane and the space. Vector function of a scalar variable: Curves and Paths. Vector fields.

Vector differentiation.Directional derivatives, the tangent plane, total differential, gradient, divergence, and curl. Vector integration: Path, line, surface, and volume integrals. Line integrals of linear differential forms, integration of total differentials, conservative fields, conditions for line integrals to depend only on the endpoints, the fundamental theorem on exact differentials.Serret-Frenet Formulas.

Theorems of Green, Gauss, Stokes, and problems based on these.

Reference Books: 1. VAECTOR Analysis: A.R.Vasishtha 2. VAECTOR Analysis: Lalji Prasad 3. Vector Calculus - Dasgupta. 4. Vector Calculus - Shanti Narayan

Unit – II Differential Equation-I

First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions.Differential equation of first order but not of first degree, clairaut's form, singular solutions. Differential equations with constant coefficients' .

Orthogonal trajectories and its simple application in geometrical and mechanical problems.Homogeneous linear ordinary differential equations.

Linear differential equations of second orderby method of change of independent variable.

Transformation of the equation by changing the dependent variable and the independent variable.

Method of variation of parameters.

Ordinary simultaneous differential equations.

Total differential equation in three independent variables.

Partial differential equations: Lagrange's linear partial method.

Reference Books: 1.Differential Equation: A.R.Vasishtha&A.K.Vasishtha 2. Differential Equation:Lalji Prasad 3. Differential Equation: Shanti Narayan 4.Differential Equations - M D Raisinghania'

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First Year:Semester –II

Paper IV: **Code no. : - 204**

Unit – I Set Theory

Sets, relations,Fuction and mappings.Cartesian Product of SetsBijective, injective, and surjective maps.Com-position and restriction of maps.Direct and inverse images and their properties. Finite, infinite, countable, uncountable sets, and cardinality. Equivalence relations and partitions.Ordering relations.

Refence Books: 1. Set Theory - Lalji Prasad.

Unit – II Analytical Geometry (3-D)

Analytical geometry of three dimensions.Direction cosines.

Straight line.Plane.Sphere.Cone.Cylinder.

Central conicoids, paraboloids, plane sections of conicoids.

Generating lines.Reduction of second degree equations to normal form; classification of quadrics.

Reference Books: 1. Analytical geometry: A.R.Vasishtha 2. Analytical geometry: Lalji Prasad

3. Analytical Geometry: B. K. Kar, Books & Allied Co., Kolkata

4. Coordinate Geometry - S L Loney.

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Second Year:Semester –III

PaperV : Code no. : - 305

Unit –I Theory of Equation and Trigonometry

Theory of Equations:
Polynomials in one variable and the division algorithm.Rela-tions between the roots and the coefficients.Transformation of equations. Descartes rule of signs. Solution of cubic and biquadratic (quartic) equations.

Relations of root and their symmetric functions with coefficients.
Transformation of equations, Descarte's rule of signs.
Cardon's solution of a cubic equation.
Descarte's solution of a bi-quadratic equation.
Discriminant and nature of roots.

Refence Books
1 Theory of Equation – Burnside & Penton/ Lalji Prasad

Unit –II Trigonometry:

De-Moivre's theorem and applications.Direct and inverse, circu-lar and hyperbolic, functions.Logarithm of a complex quantity.Expansion of trigonometric functions.

Refence Books: 1. Higher Trigonometry - Lalji Prasad,
2. Theory of equation :Lalji Prasad

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Second Year:Semester –III

Paper VI: **Code no. : - 306**

Unit – I REAL ANALYSIS - I

Axioms of least upper bound and greatest lower bound in R. The completeness property of R, Archimedean property, density of rational and irrational numbers in R. Neighbourhoods and limit point of a set, open and closed sets, isolated points, Bolzano - Weierstrass theorem for sets (Statement only).
Interior points and limit points, open, closed, and perfect sets. Compact sets.
Limits and continuity.Basic properties of continuous functions.Operations on sequences.Uniform continuity.Bounded functions. Continuous functions defined on a compact set: Their boundedness, attainment of bounds, and uniform continu-ity. Intermediate Value Theorem.Discontinuities. Monotonic functions.
Sequences, bounded sequence, convergent sequence, monotonic sequence, subsequence, cauchy sequence and cauchy's general principle of convergence.
lnfinite series, Convergence and divergence of infinite series of real numbers, Pringsheim's theorem, comparison test, cauchy's root test, D'Alembert's ratio test, Raabe's test, De-Morgan's and Bertrand's test, Gauss's ratio test, Cauchy's condensation test, lntegral test, Alternating Series, Leibnitz test, Absolute and conditional convergence.

Reference Books:

1. Elements of Real Analysis - Shanti Narayan & M D Raisinghania.
2. Higher Algebra - S Bernard & J M Child
3.Real Analysis : Lalji Prasad

Unit – II Group Theory

Binary Operation,Definition of a group, with examples and simple properties. Groups of transfor-mations. Subgroups, Semi Group. Generation of groups and cyclic groups.Various subgroups of GL2(R).Symmetric group, Alternative group,Cosets of a subgroup in a group,Coset decomposition.Lagrange's theorem and its consequences.Normal subgroups, Quotient group.Fermat's and Euler's theorems.Permutation groups.Even and odd permutations. The alternating groups A_n. Isomorphism and homomorphism. Normal subgroups.Quotient groups.First homomorphism theorem.Cayley's theorem.

Reference Books:

1. Introduction to Topology & Modern Analysis: G. F. Simmons
2. Topology: Munkres3.Advanced Topology: K. K. Jha
3. Theory of equation :Lalji Prasad

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Second Year:Semester –III

Paper VII: Code no. : - 307

Unit – I NUMARICALANALYSIS

Representations of numbers: Roundoff error, trunca-tion error, significant error, error in numerical computations.

Solution of transcendental and algebraic equations: Bisection, secant, RegulaFalsi, fixed-point, Newton-Raphson, Graffe's methods.

Interpolation: Difference schemes, interpolation formulas using differences. La-grange and Newton interpolation.Hermite interpolation.Divided differences.

Numerical differentiation: Methods based on interpolations. Methods based on finite differences.

Numerical integration: Trapezoidal, Simpson's, and Weddle's rules. Gauss Quad-rature Formulas.

Solution of linear equations: Direct methods - Gauss elimination, Gauss-Jordan elimination, LU decomposition. Iterative methods - Jacobi, Gauss-Siedel.

The algebraic eigenvalue problem: Jacobi's method, Given's method, House-holder's method, Power method.

Ordinary differential equations: Euler's method, Single-step methods, Runge-Kutta's method, multi-step methods.

Approximation: Different types of approximation, least square polynomial ap-proximation.

Reference Books:1.Numerical Analysis :Lalji Prasad

Unit – II Discrete Mathematics

Sets and Propositions-Cardinality.Mathematical Induction. Principle of Inclusion and exclusion.: Relations and Functions – Binary Relations. Equivalence Relations and partitions.Partial Order Relations and Lattices, chains and Antichains. Pigeon Hole Principle.

Graphs and Planar Graph, basic terminology.Multigraphs.Weighted Graphs.Paths and Circuits.Shortest paths.Eurelian Paths and Circuits.Travelling Salesman Problem.Planer Graphs.

Boolean Algebras – Lattices and algebraic structures. Duality.Distributive and complemented Lattices.Boolean lattices and Algebras.Boolean Functions and Expression.

Logic :

Statements, truth value of a statement, truth tables, negation, conjunction and disjunction.Conditional and Biconditionalstatements.Converse, inverse and contrapositive propositions.Tautologies and contradictions.Equivalent statements and law of duality.

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Reference Books:

1.Discrete Mathematics : C.L. Lieu, Elements of Discrete Mathematics : McGraw Hill
2. Mathematical Analysis : Shanti Narayan / MallickArora
3. Discrete Mathematics - M K Gupta.

Second Year:Semester –IV

Paper VIII: **Code no. : - 408**

Unit – I Complex Analysis

Comples number, Analytic Functions, Elementary Functions and mappings,Bilinear Transformations/Mobius transformations .Confonnal transformations of the plane and Cauchy Riemann equations.Continuity and differentiability of complex functions. Analytic functions. Harmonic functions. Elementary functions. Mapping by elementary functions.Fixed points. Cross ratio. Inverse points and critical mappings.Conformal maps.Gregory's series.

Reference Books:
1. Complex Analysis -Lalji Prasad
2.Real Analysis : DR.K.K.Jha
3. Complex Analysis : J.N. Sharma / Lalji Prasad

Unit – II Number Theory

A 1: Perfect Numbers, Fermat Numbers, Abundant Deficient Numbers, F-number, Mersenne Number, Super perfect or transcendental numbers, Amicable numbers, Necessary & Sufficient condition for a positive integer to be an even perfect number(Euler's Theorem)

A 2: Sum of squares of integers, Introduction, Sum of two square & related theorem, Expression of a prime number as the sum of two squares, Sum of more than two squares, Difference of two squares, Waring problem, The condition for an odd prime to be expressible as a sum of two squares.

A 3: Arithmetical functions $\tau(n)$ & $\mu(n)$ and related theorems.

Reference Books:

1. Basic Number Theory : S.B. Mallick
2. Number Theory : Hari Kishan / B.N. Prasad
3. Theory of Numbers: Pundir & Pundir

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Second Year:Semester –IV

Paper IX: **Code no. : - 409**

Unit – I REAL ANALYSIS - II

Differentiation.Derivatives.Rolle'stheorem. Mean Value Theorem. Darboux's theorem on intermediate value property of derivatives.Taylor's theorem. Indeterminate forms.

Integration.The Riemann Integral and its properties.Integrability of continuous and monotonic functions.Functions of bounded variation, their relation with monotonic functions, and integrability.

The fundamental theorem of calculus. Mean value theorems of integral calculus.

Convergence of improper integrals. Comparison tests, Abel's and Dirichlet's tests. Beta and Gamma functions.Frullani's integral. Integral as a function of a parameter, and its continuity, differentiability, and integrability.

Reference Books:

1. Elements of Real Analysis - Shanti Narayan & M D Raisinghania.
2. Higher Algebra - S Bernard & J M Child
3.Real Analysis : Lalji Prasad

Unit – II Ring Theory

Rings and ring homomorphisms. Ideals and quotient rings. Prime and maximal ideals.The quotient field of an integral domain.Euclidean rings. Polynomial rings. Polynomials over Q and Eisenstein's criterion. Polynomial rings over arbitrary commutative rings. UFDs. If A is a UFD, then so is $A[x\backslash, x_2,..., x_n]$

Reference Books:

3.Modern Algebra : A.R.VASISHTHA & A.K. VASISHTHA

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Second Year: Semester –IV

Paper X: Code no. : - 410

Unit – I Differential Equation - II

Ordinary Differential Equations.Series solutions of differential equations: Power series method, Bessel, Legendre, and Hypergeometric equations. Bessel, Legendre, and Hypergeometric functions and their properties: Convergence, recurrence, and generating relations. Orthogonality of functions.Sturra-Liouville problem.Orthog-onality of eigenfunctions.Reality of eigenvalues.Orthogonality of Bessel functions and Legendre polynomials.
Partial differential equation, formation, linear p.d.e. of order 1-Lagrange's method.
Non linear equation of order 1, four forms Charpits method, Jacobi Method.
Homogeneous linear equation with constant co-efficient Rules of C.F. and P.I.
Non-linear equations of second order, Monge's method.
Boundary Value Problem : Derivation and solution of one dimensional wave equation and one dimensional heat equation.

Unit – II Laplace transforms.

Introduction to infinite integrals.Linearity of Laplace trans-forms. Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals. Shifting theorems.Differentiation and integration of transforms.Convolution theorem. Solution of integral equations and systems of differential equations using Laplace transforms.

Reference Books:

1.Higher Differential Equation: A.R.Vasishtha&A.K.Vasishtha
2. Advanced Differential Equation : M.D. Raisingania
3. Differential equation : J.N. Sharma

Third Year: Semester –V

Paper XI: Code no. : - 511

Unit – I Differential Equations III

Partial differential equations.Formation of partial differential equations.Types of solutions.PDEs of the first order.Lagrange's solution.Some special types of equations which can be solved easily by methods other than the general methods.Charpit's and Jacobi's general method of solution.

Partial differential equations of second and higher order.Classification of linear partial differential equations of second order.Homogeneous and non-homogeneous equations with constant coefficients.Partial differential equations reducible to equations with constant coefficients.Monge's methods.

Unit – II Matric Space

Metric spaces.Definition and examples, neighbourhoods, limit points, interior, and boundary points. Open and closed sets. Closure, interior, and boundary of a set.Subspaces.Cauchy sequences and complete spaces.Cantor's intersection theorem and the contraction mapping principle.Dense and nowhere dense subsets.Baire Category Theorem. Compactness: Sequential compactness and Heine-Borel property, totally bounded spaces, finite intersection property, continuous functions on compact sets.

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Third Year: Semester –V

Paper XII: **Code no. : - 512**

Unit -I **Statics**

Forces.Couples.Co-planar forces. static equilibrium.Friction.Equi-librium of a particle on a rough curve. Virtual work.Catenary.Forces in three dimensions.Reduction of a system of forces in space. Invariance of the system.General conditions of equilibrium. Centre of gravity for different bodies. Stable and unstable equilibrium.

UNIT II : **Dynamics**

Radial and Transform motation in polar curve. Equations of motion referred to a set of rotating axes. Motion of a projectile in a resisting medium. Motion of a particle in a plane under different laws of resistance.

Central forces.Stability of nearly circular orbits. Motion under the,inverse square law. Kepler's laws.Time of describing an arc and area of any orbit.Slightly disturbed orbits.Motion of artificial satellites. Problems of motion of varying mass such as falling raindrops and rockets.

Tangential and normal accelerations.Motion of a particle on a smooth or rough curve.Principle of conservation of energy.

Reference Books: 1.Mechanics : Singh &Sen 2. Statics :Loney

4. Dynamics :Loney / A.R. Vasishtha

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Third Year: Semester –V

Paper XIII: **Code no. : - 513A**

UNIT I : Probability Theory

Probability Theory. Notation of probability: Random experiment, sample space, axioms of probability, elementary properties of probability, equally likely outcome problems. Measure of central tendency,Dispersion.

Random variables: Concept, cumulative distribution function, discrete and continuous random variables, expectation, mean, variance, moment generating function.

Discrete random variables: Bernoulli random variable, Binomial random variable, geometric random variable, Poisson random variable.

Continuous random variables: Uniform random variable, exponential random variable,Normal random variable.

Conditional probability and conditional expectations, Bayes theorem, independence, computing expectation by conditioning; some applications — a list model, a random graph, Polya's urn model.

Bivariate random variables: Joint distribution, joint and conditional distributions, the correlation coefficient. Bivariate normal distribution.

Functions of random variables: Sum of random variables, the laws of large numbers, central limit theorem, approximation of distributions.

Reference Books:
1. Statistics : R.K. Gupta / Lalji Prasad
2. Mathematical Statistics : Kapur& Gupta

UNIT II : Statistics

Measures of Skewness and Kurtosis
Curve fitting and method of least square.
Correlation and regression & their expectations and variance.

Reference Books:
1. Linear Programming Problem : R.K. Gupta / Lalji Prasad
2. Mathematical Statistics :Kapur& Gupta

OR

Third Year: Semester –V

Paper XIII: **Code no. : - 513B**

UNIT I : Linear Algebra

Vector Space : Def. & properties, subspaces, linear dependence, dimension and basis of a finite dimensional vector space, Quotient space, Direct sums and complements Matrices and change of basis. Inner product & norm in a I. S., properties of inner product, Schwartz inequality. Orthogonal set, orthogonal basis and Gram-Schmidt construction for finite dimensional inner product space. Linear transformation: Def, Sylvester Law of nullity, algebra of linear transformations. Dual spaces, principal of duality. Matrices and linear transformation, similar matrices, even matrices, diagonalisation. Eigen root (Algebraic geometric and multiplicity).

UNIT II : Linear Difference Equation

Difference Equation Order, Solution of Difference Equation, Existence & Uniquencess theorem, solution of the form Yn+1 = Ayn+C.
Linear Difference Equation with constant coefficient : Basic Definition. Combination of solution, Fundamental set of solution, Homogeneous Difference Equation & their solution (General & Particular), Special operator, variation of parameters.

Reference Books: 1. Modern Algebra: Surjeet Singh & Quazi Zameeruddin (Ch. 11 & 12)

2. Linear Difference Equation: R.K. Gupta & D.C. Agarwal

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Third Year: Semester –V

Paper XIV: **Code no. : - 514A**

UNIT I : Fluid Mechanics

Nature and Properties of Fluid pressure, pressure of heavy liquids.
Equilibrium of fluids under given system of forces.
Centre of pressure.
Thrust on plane and curved surfaces.
Lagarangian and Eulerian methods, Equation of continuity.
Euler's equation of motion for perfect fluid, Bernoulli's Theorem.

UNIT II : Special Functions

Series solution : Ordinary point, singular point (regular), General Methods and forms of series solution (Indicial equation-frobenius method).
Bessel's equation : Solution Recurrence formula for Jn(x); generating function for Jn(x), equations reducible to Bessel equation, Orthogonality of Bessel's functions.
Legendre equation : Solution, Rodrigue's formula, Legendre polynomials, generating function for Pn(x), Orthogonality of Legendre polynomials.
Hypergeometric functions, special cases, Integral representation. Summation theorem.
Reference Books:1. Hydrostatics : J.P. Sinha 2. Hydrodynamics : Ramsey / M.D. Raisingania
3. Advance differential equation : M. D. Raisinghania

OR

Paper XIV: **Code no. : - 514B**

UNIT I Mathematical Modeling

Difference & differential equation growth models: Single species population models, Population growth and age structure models
Higher order linear models: A model for the detection of diabetes
Non linear population growth models: Pray predator models, epidemic growth models
An application in environment: Urban waste water management planning models
Models from political sciences: Proportional representation(Cumulative & comparison voting) models

UNIT II Topology

Definition and examples of topological spaces. Open sets, interior. Closed sets closure,frontier
Convergence & Cauchy's sequences in topological spaces
Continuous maps, Uniform continuity and related extensions.
Reference Books:
1 Mathematical Modelling by J N Kapoor 2 Topology by M L Khanna 3 Topology by K K Jha

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Third Year:Semester –VI

Paper XV: **Code no. : - 615**

UNIT I: Tensor

Tensor Algebra : Transformation of co-ordinates, Contravarient & co-variant vector, Kronecker delta, Tensor of higher orders, Inner Product, conjugate tensor, Tensor field. Convariant Differentiation : Christoffells three index symbols, Transformation of symbol, covariant derivatives of scalar, Ricci theorem, Divergence, curl, Laplace operator.

UNIT II Fourier Transformation

Infinite Fourier Transform : Infinite Fourier sine transform, Infinite Fourier cosine transform, Relation between Fourier & Laplace transform.
The Finite Fourier Transform & Integral : Finite Fourier sine transform, Finite Fourier cosine transform, Fourier Integral.

Reference Books:
1. D.C. Agrawal, Tensor Calculus & Riemannian Geometry
2. Goel & Gupta, Laplace & Fourier Transform

Third Year:Semester –VI

Paper XVI: **Code no. : - 616**

Unit –I Introduction to C++

Basics of Object Oriented programming and software design
C++ object-oriented programming
C++ & ANSI standard C, Predefined classes in C++
Building objects with classes, Introduction to Constructor, Destructor, Defining operations on objects, Using Inheritance in C++, Concepts of
Overloading ,Virtual functions and Polymorphism
Using C libraries in C++ programs, Using commercial class libraries (Standard template library)
Advanced Topics in C++ (Templates, Exception Handling, file handling, Streams)

Reference Books:
1.Object Oriented Programming and C++, Balaguruswamy, TMH
2.Programming in C++, Shah &Thakker, ISTE/EXCEL
3.C++ Programming Today,Johnston,PHI
4.Revolutionary Guide to Object Oriented Programming Using C++,Olshevsky,SPD/WROX

Third Year:Semester –VI

Paper XVII: **Code no. : - 616**

UNIT I : Linear Programming

Convex sets in R2 and their properties, L.P.P., problem formulation, Graphical Method. Simplex method including Big M-method, Duality : Dual Simplex method. Transportation and Assignment.

Deterministic replacement models, sequencing problems on two machines and n jobs.

Reference Books:

1. Linear Programming Problem : R.K. Gupta / Lalji Prasad

Dr. M.A. Khan (External Expert)
Dr.M.R.Sinha (Pro-Vice Chancellor)
Prof.O.P.Sharma (Controller of Examinations)
Prof.S.Kakoli (Member)

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Prof.D.Shome (Head Academics)
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