

Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.**Department of Mathematics
Teaching Plan 2018-19****Class:-B.Sc. IstYear****Semester:- Ist****Paper:- I- Algebra & Trigonometry**

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	De Moivre's Theorem . Roots of complex number. Circular functions. Hyperbolic function, Inverse Hyperbolic function, Relation between circular & hyperbolic functions. Separation of real & imaginary parts of the circular. Hyperbolic functions of complex variable.	02 01 02 02 02 03	12
2	July- Aug	Unit II	Trigonometric series :Gregory series,Eulers series Machin series,Rutherford series Series based upon $\sin x$, $\cos x$, $\sinh x$, $\cosh x$ Exponential Series,logarithmic series	02 02 02 02	08
3	Aug	Unit III	Elements of Quaternion : Defination,Equality and addition,multiplication,conjugate of quaternion Norm,Inverse,quaternion as a rotation operator Geometric interpretation A special quaternion product Operator algorithm,quaternion to matrices	03 03 02 02 02	12
4	Aug- Sept	Unit IV	Theory of Equations: Relations between roots and Coefficients . Transformation of equations. Cubic equation. Descartes' rule of signs Biquadratic equation	02 02 02 02 02	10
5	Sept	Unit V	Matrices: Rank of matrix, row rank, column rank Eigen values, Eigen vectors Characteristic Equation of a Matrix Cayley Hamilton theorem and its application	02 02 02 02	08

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- II- Differential &Integral Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit. I	Definition of Limit of function, Basic properties of limits, Continuous functions Classifications of discontinuities.	02 02 02 02	08
2	Aug	Unit II	Differentiability, Successive differentiation, Leibnitz theorem, Indeterminate forms L' Hospital rule .	01 02 02 02 02	09
3	Aug- Sept	Unit III	Rolle's theorem. Cauchy's Mean Value theorem, Lagrange's mean value theorem. Maclaurin series expansion Taylor series expansion.	02 02 02 02 02	10
4	Sept	Unit IV	Partial derivatives Differentiation of real valued function of two variables. Homogeneous function. Euler's theorem on homogeneous function.	02 03 02 02	09
5	Sept- Oct	Unit V	Integration of Irrational algebraic functions, Reduction formulae Walli's formulae Quadrature, Rectification	02 02 02 02 02	10

Class:-B.Sc. Ist Year

Semester:- IInd

Paper:- III- Differential Equations:Ordinary&Partial

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec- Jan	Unit. I	Degree and order of differential equation of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations & equations reducible to linear form. Exact differential equations. Orthogonal trajectories.	02 02 02 02 02 02	12
2	Jan	Unit II	Second order linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous differential equation.	03 03 04	10
3	Jan- Feb	Unit III	Reduction of order Transformation of the equation by changing the dependant variable and independent variable Normal form. Method of variation of parameters, Ordinary simultaneous differential equations.	02 02 02 02	08
4	Feb	Unit IV	Formation of Partial differential equations Partial differential equations of first order. Lagrange's method. Some special types of equations	02 02 02 02	08
5	Mar	Unit V	Compatible Differential equation Charpit method PDE of Higher order Homogenous & Non-Homogenous equation with constant coefficients	02 02 02 02	08

Class:-B.Sc. IstYear

Semester:- IInd

Paper:- IV Vector Analysis & Solid Geometry

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit. I	Scalar and Vector Product of three vectors. Product of four vectors, Vector differentiation Vector integration.	02 02 02 02	10
2	Jan- Feb	Unit II	Space Curves. t, n, b vectors. Fundamental planes. Curvature, Torsion, Frenet-Serete's Formulae.	02 02 03 03	10
3	Feb	Unit III	Gradient, divergent and curl Line integral, existence and evaluation, work done.,Greens Theorem.	02 02 03 03	10
4	March	Unit IV	Sphere: Different forms of Sphere Plane section of sphere Sphere through given circle Intersection of sphere & line Orthogonal Sphere & Condition of orthogonality	02 02 02 02 02	10
5	March	Unit V	Cone, The equation of a cone with a guiding curve, cone with vertex at origin, Right circular cone. Cylinder. Equation of right circular cylinder.	2 3 3	08

HOD
(Mathematics)

**Department of Mathematics
Teaching Plan 2018-19****Class:-B.Sc. IInd Year
Semester:- III****Paper:- V -Advanced Calculus**

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Sequence : Theorems on limits of sequences, bounded and monotonic sequences, Cauchy Sequence	04 03 03	10
2	July- Aug	Unit II	Series : Series of non negative terms, convergence of geometric series and the power series Comparison tests, Cauchy's integral test, Ratio test, Root test. Absolute Convergence, Conditional Convergence Leibnitz Rule ,Abel's Test, Dirichilet Test	02 02 02 02 02	12
3	Aug	Unit III	Limit and continuity of functions of two variables, Algebra of limits and continuity, Intermediate value property, Fixed point property Taylor's theorem for function of two variables.	02 01 02 02 03	10
4	Aug- sept	Unit IV	Maxima and minima of two variables Lagrange's multipliers method. Jacobians..	04 03 03	10
5	Sept- Oct	Unit V	Double integral : Definition and Evaluations Change of order of double integral, Triple integral. Gauss & Stoke's Theorem	03 03 03 03	12

B.Sc. IInd Year
Semester:- III

Paper:- VI –Elementary Number Theory

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Divisibility : Division algorithm, The greatest common divisor Euclidean algorithm Least common multiple	02 02 02 02	08
2	July- Aug	Unit II	Prime numbers The fundamental theorem of arithmetic Fermat numbers Linear Diophantine equation	02 03 02 03	10
3	Aug	Unit III	Congruence, Properties of congruence Special divisibility test Linear congruences, Chinese Remainder theorem	03 02 03 02	10
4	Aug- sept	Unit IV	Arithmetic Functions, Euler's Theorem Sigma function Mobius function	03 02 02 02	10
5	Sept-	Unit V	Primitive roots, Primitive roots for prime Polynomial congruences General quadratic congruences Quadratic residues	02 03 02 03	10

Class:-B.Sc. IInd Year

Semester- IVth

Paper:- VII Modern Algebra: Group & Ring

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec-Jan	Unit. I	Group: Definition, examples. properties Subgroup, Cyclic Groups Order of generator of cyclic group Permutation Group	02 03 02 03	10
2	Jan	Unit II	Cosets & Normal Subgroups : Cosets ,Lagrange's Theorem Normal Subgroups Different characterizations of normal subgroups, Algebra of normal subgroups, Quotient group.	02 02 02 02 02	10
3	Feb	Unit III	Homomorphism and Isomorphism: Homomorphism, Homomorphic image, Kernel of homomorphism, Isomorphism of groups, Fundamental theorem of homomorphism, Natural homomorphism. Second &Third isomorphism theorem	03 03 02 01 02	11
4	Feb-Mar	Unit IV	Ring, Integral domain and field: Definition, examples, Properties of ring Subring , Characteristics of a ring Integral domain Field, Subfield, Prime field,	02 03 02 03	10
5	Mar	Unit V	Ideal: Definition ,left Ideal, Right ideal Algebra of Ideals Prime ideal, Maximal ideal, Principle ideal Quotient Ring Ring Homomorphism	02 02 03 02 02	11

Class:-B.Sc. IInd Year

Semester:- IV

Paper: - VIII Mechanics

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit I	Constraints. Generalised Coordinates D'Alembert's principle Lagrange's equations of motion.	02 02 02 04	10
2	Jan- Feb	Unit II	Central force motion : Areal velocity. Equivalent one body problem. Central Orbit. Virial theorem. Kepler's laws of motions	02 02 02 02 02	10
3	Feb	Unit III	Calculus of Variation: Functional, Extremals Euler's differential equation Invariance of Euler's equation Euler-Poisson equation Euler-Ostogradsky equation	02 02 02 02 02	10
4	Feb- Mar	Unit IV	Hamilton's Principle Lagrange's equation Routh's Procedure Least action Principle	02 02 02 02	08
5	Mar	Unit V	Rigid body ,Generalized co-ordinates Eulerian angles Euler's theorem Finite rotation Infinitesimal rotations	02 02 02 02 02	10

HOD
(Mathematics)

Amrut Sevabhavi Sanstha, Parbhani.
Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.

Department of Mathematics
Teaching Plan 2018-19

Class:-B.Sc. IIIrd Year
Semester-Vth

Paper:-I X Mathematical Analysis

Sr.No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit. I	Riemann Integral. Integrability of continuous and monotonic function	04	12
			The fundamental theorem of integral calculus.	04	
			Mean value theorems of integral calculus.	04	
2	Aug	Unit II	Improper integrals and their convergence.	02	08
			Comparison Test	02	
			limit tests.	02	
			Beta & Gamma Function	02	
3	Aug	Unit III	Continuity and differentiability of complex functions.	03	10
			Analytic functions.	02	
			Cauchy-Riemann equations.	02	
			Harmonic and Conjugate functions.	02	
			Milne Thompson method	01	
4	Sept	Unit IV	Elementary functions Mapping by elementary functions.	02	10
			Mobius transformations.	02	
			Fixed points. Cross ratio.	02	
			Inverse points and critical points.	02	
			Conformal mappings.	02	
5	Sept- Oct	Unit V	Metric Spaces : Definition & examples of metric spaces.	02	10
			Neighbourhoods. Limit points. Interior points.	03	
			Open and closed sets.	02	
			Cauchy sequences. Completeness	03	

Class:-B.Sc. IIIrd Year

Semester:- V

Paper:- X- Mathematical Methods

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Legendre's equation and Polynomials Recurrences relations Generating functions. Orthogonality of Legendre's Polynomial Rodrigue's Formula	03 02 02 02 02	11
2	Aug	Unit II	Bessel's equation, solution of Bessel's equation Recurrences relations Generating functions Sturm- Liouville boundary value problem	02 02 02 03	09
3	Aug	Unit III	Fourier Series, Fourier series of Even and odd function. Half-range fourier sine series Half-range fourier cosine series	02 02 02 02	08
4	Sept	Unit IV	Laplace transform: Laplace transform of some elementary functions Existence of Laplace transform Properties of Laplace transform Laplace transform of Derivatives and Integral Inverse Laplace transform Convolution theorem Application of Laplace Transform	02 02 02 02 02 01 01	12
5	Sept- Oct	Unit V	Fourier Transform : Finite fourier sin transform Inverse finite Fourier sin transform and cosin transform Infinite Fourier transform Infinite Fourier sin transform and cosin transform Properties of Fourier transform	02 03 02 02 02	11

Class:-B.Sc. IIIrd Year
Semester-VIth

Paper:- XI Linear Algebra

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec- Jan	Unit. I	Vector Space : Definition and example of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis , Finite dimensional vector spaces . Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension.	02 02 02 02 01 01 01 01	12
2	Jan	Unit II	Linear Transformations Linear transformation & their representation as matrices. Algebra of linear transformations. The rank nullity theorem. Change of basis.	04 02 02 02	10
3	Feb	Unit III	Dual Spaces Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation.	03 02 04	09
4	Feb- Mar	Unit IV	Inner Product Spaces Inner product spaces. Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram Schmidt Orthogonalisation process.	03 03 02 02 02	12
5	Mar	Unit V	Modules Modules, Submodules, Quotient modules. Homomorphism and Isomorphism theorems.	03 02 03	08

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XII Special Theory of Relativity

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit I	Review of Newtonian Mechanics: Inertial frames. Speed of light and Galilean relativity Relative character of space and time. Postulates of Special theory of relativity. Lorentz Transformations and its geometrical interpretation. Group properties of transformation	02 02 02 04	10
2	Jan- Feb	Unit II	Relativistic Kinematics: Composition of parallel velocities. Length contraction. Time Dilation. Transformation equation for components of velocities and acceleration of a particle Lorentz contraction factor.	02 02 04 02	10
3	Feb	Unit III	Geometrical representation of Space-Time: 4D Minkowskian space-time of relativity. Time, Light Like & space like intervals. Proper time. World line of a particle. Four vector and tensors in Minkowskian space-time. Operation on Tensors, Outer Product, Inner Product	02 02 04 03	11
4	Feb- Mar	Unit IV	Relativistic Mechanics: Variation of mass with velocity Equivalence of mass and energy. Transformation equ. for mass, momentum & energy. Relativistic force & transf ⁿ equn for its components. Relativistic Lagrangian and Hamiltonian.	03 03 03 03	12
5	Mar	Unit V	Electromagnetism: Maxwell's equation in vacuum. Propagation of electric and magnetic field strengths. Transformation equation for electromagnetic four potential vector. Transformation equation for electric & magnetic field strengths. Gauge transformation. Maxwell's equation Lorentz force on a charged particle.	01 02 02 02 03 01	11

HOD
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Teaching Plan 2019-20****Class:-B.Sc. IstYear****Semester:- Ist****Paper:- I- Algebra & Trigonometry**

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	De Moivre's Theorem . Roots of complex number. Circular functions. Hyperbolic function, Inverse Hyperbolic function, Relation between circular & hyperbolic functions. Separation of real & imaginary parts of the circular & hyperbolic functions of complex variable.	02 02 02 02 02	10
2	July- Aug	Unit II	Trigonometric series Gregory series, Euler's series Machin series, Rutherford series Series based upon $\sin x$, $\cos x$, $\sinh x$, $\cosh x$ Exponential Series, logarithmic series	03 03 03 03	12
3	Aug	Unit III	Elements of Quaternion Definition ,Equality and addition of quaternion multiplication , conjugate of quaternion Norm, Inverse, quaternion as a rotation operator Geometric interpretation A special quaternion product Operator algorithm, quaternion to matrices	02 03 03 02 02 02	14
4	Aug- Sept	Unit IV	Theory of Equations Relations between roots and Coefficients . Transformation of equations. Cubic equation. Descartes' rule of signs Biquadratic equation	02 02 02 02 02	10
5	Sept	Unit V	Matrices Rank of matrix, row rank, column rank Eigen values, Eigen vectors Characteristic Equation of a Matrix Cayley Hamilton theorem and its application	04 03 02 03	12

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- II- Differential &Integral Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit. I	Limit- Definition of Limit of function, Basic properties of limits, Continuous functions Classifications of discontinuities.	02 02 02 02	08
2	Aug	Unit II	Differentiability- Definition & examples Successive differentiation, Leibnitz theorem, Indeterminate forms L' Hospital rule .	02 02 02 02	10
3	Aug- Sept	Unit III	Mean Value Theorem's – Rolle's theorem. Cauchy's Mean Value theorem, Lagrange's mean value theorem. Maclaurin series expansion Taylor series expansion.	02 02 02 02 02	10
4	Sept	Unit IV	Partial derivatives – Introduction & examples Differentiation of real valued function of two variables. Homogeneous function. Euler's theorem on homogeneous function.	02 03 02 03	10
5	Sept- Oct	Unit V	Integration of Irrational algebraic functions Integration of irrational algebraic function Reduction formulae Walli's formulae Quadrature, Rectification	02 02 02 02 02	10

Class:-B.Sc. Ist Year

Semester:- IInd

Paper:- III- Differential Equations :Ordinary & Partial

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec- Jan	Unit. I	Differential equation of 1st order & 1st degree. Degree and order of differential equation of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations Exact differential equations. Orthogonal trajectories.	02 02 02 02 02	12
2	Jan	Unit II	Second order linear differential equations with constant coefficients. Definition , Examples Homogeneous linear ordinary differential equations. Equations reducible to homogeneous differential equation.	03 03 04	10
3	Jan- Feb	Unit III	Reduction of order Transformation of the equation by changing the dependant variable and independent variable Normal form. Method of variation of parameters, Ordinary simultaneous differential equations.	02 03 03 02	10
4	Feb	Unit IV	Partial differential equation Formation of Partial differential equations Partial differential equations of first order. Lagrange's method. Some special types of equations	02 03 02 03	10
5	Mar	Unit V	Compatible Differential equation Charpit method PDE of Higher order Homogenous & Non-Homogenous equation with constant coefficients	03 02 02 03	10

Class:-B.Sc. IstYear

Semester:- IInd

Paper:- IV Vector Analysis & Solid Geometry

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit I	Scalars and Vectors Scalar and Vector Product of three vectors. Product of four vectors, Vector differentiation Vector integration.	02 02 02 02	10
2	Jan- Feb	Unit II	Curve in Spaces Space Curves. t, n, b vectors. Fundamental planes. Curvature, Torsion, Frenet-Serete's Formulae.	02 02 03 03 02	12
3	Feb	Unit III	Differential Operator & Line Integral Gradient, divergent and curl Line integral, existence and evaluation, work done Greens Theorem.	03 03 03 03	12
4	March	Unit IV	Sphere Different forms of Sphere Plane section of sphere Sphere through given circle Intersection of sphere & line Orthogonal Sphere & Condition of orthogonality	02 02 02 02 02	10
5	March	Unit V	Cone & Cylinder The equation of a cone with a guiding curve, cone with vertex at origin, Right circular cone. Cylinder ,Equation of right circular cylinder.	2 3 3 02	10

HOD
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Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
Department of Mathematics
Teaching Plan 2019-20
Class:-B.Sc. IInd Year
Semester:- III
Paper:- V -Advanced Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Sequence- Definition of sequence , Uniqueness of limit, Algebra of limit of sequence, Theorems on limits of sequences, bounded and monotonic sequences, Cauchy Sequence	03 02 03 03 03	14
2	July- Aug	Unit II	Series- Series of non negative terms, convergence of geometric series & p-series Comparison tests, Cauchy's integral test, Ratio test, Root test. Absolute Convergence, Conditional Convergence Leibnitz Rule ,Abel's Test, Dirichilet Test	02 02 02 02 02 02	12
3	Aug	Unit III	Limit & continuity of functions of two variables- Algebra of limits and continuity, Intermediate value property, Fixed point property Taylor's theorem for function of two variables.	02 02 01 03	10
4	Aug- sept	Unit IV	Maxima and minima- Maxima and minima of two variables Lagrange's multipliers method. Jacobians.	03 02 03	08
5	Sept- Oct	Unit V	Double integral – Definition and Evaluations Change of order of double integral, Triple integral. Gauss & Stoke's Theorem	03 03 03 03	12

B.Sc. IInd Year
Semester:- III

Paper:- VI –Elementary Number Theory

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Divisibility – Definition & examples Division algorithm, The greatest common divisor Euclidean algorithm Least common multiple	02 02 02 02 02	10
2	July- Aug	Unit II	Prime numbers- Introduction The fundamental theorem of arithmetic Fermat numbers Linear Diophantine equation	02 03 02 03	10
3	Aug	Unit III	Congruence- Properties of congruence Special divisibility test Linear congruences, Chinese Remainder theorem	03 02 03 02	10
4	Aug- sept	Unit IV	Arithmetic Functions- Different arithmetic function Euler's Theorem Sigma function Mobius function	03 02 02 02	10
5	Sept-	Unit V	Primitive roots- Primitive roots for prime Polynomial congruences General quadratic congruences Quadratic residues	02 03 02 03	10

Class:-B.Sc. IInd Year

Semester- IVth

Paper:- VII Modern Algebra: Group & Ring

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec-Jan	Unit. I	Group: Definition, examples. properties Subgroup, Cyclic Groups Order of generator of cyclic group Permutation Group Even & Odd permutation	03 03 02 02 02	12
2	Jan	Unit II	Cosets & Normal Subgroups : Cosets ,Lagrange's Theorem Normal Subgroups Different characterizations of normal subgroups, Algebra of normal subgroups, Quotient group.	02 02 02 02 02	10
3	Feb	Unit III	Homomorphism and Isomorphism: Homomorphism, Homomorphic image, Kernel of homomorphism, Isomorphism of groups, Fundamental theorem of homomorphism, Natural homomorphism. Second &Third isomorphism theorem	02 03 02 01 02	10
4	Feb-Mar	Unit IV	Ring, Integral domain and field: Definition, examples, Properties of ring Subring , Characteristics of a ring Integral domain Field, Subfield, Prime field.	02 03 02 03	10
5	Mar	Unit V	Ideal: Definition ,left Ideal, Right ideal Algebra of Ideals Prime ideal, Maximal ideal, Principle ideal Quotient Ring Ring Homomorphism	02 02 03 02 02	11

Class:-B.Sc. IInd Year

Semester:- IV

Paper: - VIII Mechanics

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit. I	Lagrangian Dynamics : Constraints. Generalised Coordinates D'Alembert's principle Lagrange's equations of motion.	01 02 03 04	10
2	Jan- Feb	Unit II	Central force motion : Areal velocity Equivalent one body problem. Central Orbit Virial theorem Kepler's laws of motions	02 02 02 02 02	10
3	Feb	Unit III	Calculus of Variation: Functional, Extremals Euler's differential equation Invariance of Euler's equation Euler-Poisson equation Euler-Ostogradsky equation	02 02 02 02 02	10
4	Feb- Mar	Unit IV	Hamilton's Principle : Hamilton principal Lagrange's equation for non holonomic system Routh's Procedure Least action Principle	02 02 02 02	08
5	Mar	Unit V	Rigid body : Generalized co-ordinates Eulerian angles Euler's theorem Finite rotation Infinitesimal rotations	02 02 02 02 02	10

HOD
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Department of Mathematic
Teaching Plan 2019-20
Class:-B.Sc. IIIrd Year
Semester-Vth

Paper:-I X Mathematical Analysis

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit. I	Riemann Integral : Definition & Examples Integrability of continuous and monotonic function The fundamental theorem of integral calculus. Mean value theorems of integral calculus.	02 03 02 03	12
2	Aug	Unit II	Improper integrals : Types of improper integrals Comparison Test limit tests. Beta & Gamma Function	02 03 03 02	10
3	Aug	Unit III	Analytic functions : Continuity & differentiability of complex functions Analytic functions. Cauchy-Riemann equations. Harmonic and Conjugate functions. Milne Thompson method	02 02 02 02 02	10
4	Sept	Unit IV	Elementary functions : Mapping by elementary functions. Mobius transformations. Fixed points. Cross ratio. Inverse points and critical points. Conformal mappings.	02 02 02 02 02	10
5	Sept- Oct	Unit V	Metric Spaces : Definition & examples of metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets. Cauchy sequences. Completeness	02 03 02 03	10

Class:-B.Sc. IIIrd Year

Semester:- V

Paper:- X- Mathematical Methods

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Legendre's equation : Legendre's equation and Polynomials Recurrences relations Generating functions. Orthogonality of Legendre's Polynomial Rodrigue's Formula	02 02 02 02 02	10
2	Aug	Unit II	Bessel's equation solution of Bessel's equation Recurrences relations Generating functions Sturm- Liouville boundary value problem	02 03 02 03	10
3	Aug	Unit III	Fourier Series : Fourier Series -introduction Fourier series of Even and odd function. Half-range fourier sine series Half-range fourier cosine series	02 02 02 02	08
4	Sept	Unit IV	Laplace transform: Laplace transform of some elementary functions Existence of Laplace transform Properties of Laplace transform Laplace transform of Derivatives and Integral Inverse Laplace transform Convolution theorem Application of Laplace Transform	02 02 02 02 02 01 01	12
5	Sept- Oct	Unit V	Fourier Transform : Finite Fourier sin transform Inverse finite Fourier sin transform Inverse finite Fourier cosin transform Infinite Fourier transform Infinite Fourier sin transform and cosin transform Properties of Fourier transform	02 02 02 02 02 02	12

Class:-B.Sc. IIIrd Year
Semester-VIth

Paper:- XI Linear Algebra

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec- Jan	Unit. I	Vector Space : Definition and example of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis , Finite dimensional vector spaces . Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension.	02 02 02 02 01 01 01 01	12
2	Jan	Unit II	Linear Transformations Linear transformation & their representation as matrices. Algebra of linear transformations. The rank nullity theorem. Change of basis.	04 02 02 02	10
3	Feb	Unit III	Dual Spaces Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation.	03 02 04	09
4	Feb- Mar	Unit IV	Inner Product Spaces Inner product spaces. Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram Schmidt Orthogonalisation process.	03 03 02 02 02	12
5	Mar	Unit V	Modules Modules, Submodules, Quotient modules. Homomorphism and Isomorphism theorems.	03 02 03	08

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XII Special Theory of Relativity

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit I	Review of Newtonian Mechanics: Inertial frames. Speed of light and Galilean relativity Relative character of space and time Postulates of Special theory of relativity Lorentz Transformations geometrical interpretation of L.T Group properties of transformation	02 02 01 02 02 01	10
2	Jan- Feb	Unit II	Relativistic Kinematics: Composition of parallel velocities. Length contraction. Time Dilation Transformation equation for components of velocities Transformation equation acceleration of a particle Lorentz contraction factor.	02 02 01 01 02	08
3	Feb	Unit III	Geometrical representation of Space-Time: 4D Minkowskian space-time of relativity. Time, Light Like & space like intervals. Proper time. Four vector and tensors in Minkowskian space-time. Operation on Tensors, Outer Product, Inner Product	02 02 03 03	10
4	Feb- Mar	Unit IV	Relativistic Mechanics: Variation of mass with velocity Equivalence of mass and energy. Transformation equ. for mass, momentum & energy. Relativistic force & transf ⁿ equn for its components. Relativistic Lagrangian and Hamiltonian.	02 02 02 02 02	10
5	Mar	Unit V	Electromagnetism: Maxwell's equation in vacuum. Propagation of electric and magnetic field strengths. Transformation equation for electromagnetic four potential vector. Transformation equation for electric & magnetic field strengths. Gauge transformation. Maxwell's equation Lorentz force on a charged particle.	01 02 02 02 03 01	11

HOD
(Mathematics)

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Department of Mathematics
Teaching Plan 2020-21

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- I- Algebra & Trigonometry (CBCS)

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Matrices Various types of matrices, Adjoint and inverse of matrix. Elementary transformation of a matrix, Inverse of elementary transformation of a matrix , normal form of a matrix.	04 02 02 02 02	12
2	Sept- Oct	Unit II	Eigen Values & Eigen Vectors Row rank, column rank Eigenvalues, eigenvectors, characteristic equation Cayley-Hamilton theorem Inverse by Cayley-Hamilton theorem	02 04 03 03	12
3	Oct- Nov	Unit III	Theory of Equations Descartes rule of signs Relations between roots and Coefficients Transformation of equations. Cubic equation. Biquadratic equation	02 03 02 03 02	12
4	Nov- Dec	Unit IV	De Moivre's Theorem . Roots of complex number. Circular functions, Hyperbolic function, Inverse Hyperbolic function, Relation between circular & hyperbolic functions. Separation of real & imaginary parts of the circular & hyperbolic functions of complex variable.	04 02 02 02 02	12
5	Jan	Unit V	Trigonometric series Gregory series, Euler's series Machin series, Rutherford series Series based upon $\sin x$, $\cos x$, $\sinh x$, $\cosh x$ Exponential Series, logarithmic series	03 03 03 04	13

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- II- Differential &Integral Calculus (CBCS)

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Limit- Definition of Limit of function, Basic properties of limits, Some standard limit	04 04 04	12
2	Sept- Oct	Unit II	Continuous functions Continuous and Discontinuous functions Types of discontinuity, Properties of continuous functions, Uniform continuous functions, Properties of uniform continuous functions.	03 02 03 02 02	12
3	Oct- Nov	Unit III	Differentiability- Definition & examples Successive differentiation, Leibnitz theorem, Indeterminate forms L' Hospital rule	03 03 02 02 02	12
4	Nov- Dec	Unit IV	Mean Value Theorem's – Rolle's theorem. Cauchy's Mean Value theorem, Lagrange's mean value theorem. Maclaurin series expansion Taylor series expansion.	02 03 02 02 03	12
5	Jan	Unit V	Integration of Irrational algebraic functions Integration of irrational algebraic function Reduction formulae Walli's formulae	06 04 03	13

Class:-B.Sc. Ist Year

Semester:- IInd

Paper:- III- Differential Equations :Ordinary & Partial (CBCS)

Sr.No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Mar	Unit. I	Differential equation of 1st order & 1st degree. Formation of ordinary differential equation, Degree and order of a ordinary differential equation, homogeneous differential equations, Linear differential equations, Bernoulli's equation, Differential equations reducible to the linear form, exact differential equations.	01 01 02 02 02 02 02	12
2	Apr	Unit II	Differential equations of first order & higher degree, differential equations solvable for p, x and y, Clairaut's equation, orthogonal trajectories (Cartesian and Polar form)	03 03 03 03	12
3	Apr- May	Unit III	Linear differential equations with constant coefficients, Complementary function of the differential equation, particular integral of the differential equation, homogeneous linear ordinary differential equations.	03 03 03 03	12
4	May- June	Unit IV	Second order differential equation, Wronskian, method of change of dependent variable, normal form, method of change of independent variable, variation by parameters.	02 03 02 03 02	12
5	June- July	Unit V	Applications of ODE: Electric circuit, steady state heat flow, radioactive decay and carbon dating, Newton's law of cooling, compound interest	03 02 02 03 02	13

Class:-B.Sc. IstYear
Semester:- IInd
Paper:- IV Vector Analysis & Solid Geometry (CBCS)

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Mar	Unit. I	Scalars and Vectors Scalar and Vector Product of three vectors. Product of four vectors, Vector differentiation Vector integration.	03 03 03 03	10
2	Apr	Unit II	Curve in Spaces Space Curves. t, n, b vectors. Fundamental planes. Curvature, Torsion, Frenet-Serete's Formulae.	02 02 03 03 02	12
3	Apr- May	Unit III	Differential Operator & Line Integral Gradient, divergence and curl Line integral, existence and evaluation, work done Circulation	03 03 03 03	12
4	May- June	Unit IV	Sphere Different forms of Sphere Plane section of sphere Sphere through given circle Intersection of sphere & line Orthogonal Sphere & Condition of orthogonality	03 02 03 03 02	13
5	June- July	Unit V	Cone & Cylinder The equation of a cone with a guiding curve, cone with vertex at origin, Right circular cone. Cylinder-Equation of right circular cylinder.	03 03 03 03	12

HOD
(Mathematics)

Amrut Sevabhavi Sanstha, Parbhani.
Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
Department of Mathematics
Teaching Plan 2020-21
Class:-B.Sc. IInd Year
Semester:- III
Paper:- V -Advanced Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit I	Sequence- Definition of sequence , Uniqueness of limit, Algebra of limit of sequence, Theorems on limits of sequences, bounded and monotonic sequences, Cauchy Sequence	03 02 03 03 02	13
2	Sept- Oct	Unit II	Series- Series of non negative terms, convergence of geometric series & p-series Comparison tests, Cauchy's integral test, Ratio test, Root test. Absolute Convergence, Conditional Convergence Leibnitz Rule ,Abel's Test, Dirichilet Test	02 02 02 02 02 02	12
3	Oct- Nov	Unit III	Limit & continuity of functions of two variables- Algebra of limits and continuity, Intermediate value property, Fixed point property Taylor's theorem for function of two variables.	03 03 03 03	12
4	Nov- Dec	Unit IV	Maxima and minima- Maxima and minima of two variables Lagrange's multipliers method. Jacobians.	04 04 04	12
5	Jan	Unit V	Double integral – Definition and Evaluations Change of order of double integral, Triple integral. Gauss & Stoke's Theorem	03 03 03 03	12

B.Sc. IInd Year
Semester:- III
Paper:- VI –Elementary Number Theory

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit I	Divisibility – Definition & examples Division algorithm, The greatest common divisor Euclidean algorithm Least common multiple	02 03 02 02 03	12
2	Sept- Oct	Unit II	Prime numbers- Introduction The fundamental theorem of arithmetic Fermat numbers Linear Diophantine equation	03 03 03 03	12
3	Oct- Nov	Unit III	Congruence- Properties of congruence Special divisibility test Linear congruences, Chinese Remainder theorem	03 03 03 03	12
4	Nov- Dec	Unit IV	Arithmetic Functions- Different arithmetic function Euler's Theorem Sigma function Mobius function	03 03 03 03	12
5	Jan	Unit V	Primitive roots- Primitive roots for prime Polynomial congruences General quadratic congruences Quadratic residues	03 03 03 04	13

Class:-B.Sc. IInd Year
Semester- IVth
Paper:- VII Modern Algebra: Group & Ring

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Mar	Unit. I	Group: Definition, examples. properties Subgroup, Cyclic Groups Order of generator of cyclic group Permutation Group Even & Odd permutation	03 03 02 02 02	12
2	Apr	Unit II	Cosets & Normal Subgroups : Cosets, Lagrange's Theorem Normal Subgroups Different characterizations of normal subgroups, Algebra of normal subgroups, Quotient group.	02 03 02 03 02	12
3	Apr- May	Unit III	Homomorphism and Isomorphism: Homomorphism, Homomorphic image, Kernel of homomorphism, Isomorphism of groups, Fundamental theorem of homomorphism, Natural homomorphism. Second & Third isomorphism theorem	02 03 02 02 02	12
4	May- June	Unit IV	Ring, Integral domain and field: Definition, examples, Properties of ring Subring , Characteristics of a ring Integral domain Field, Subfield, Prime field.	03 03 03 03	12
5	June- July	Unit V	Ideal: Definition ,left Ideal, Right ideal Algebra of Ideals Prime ideal, Maximal ideal, Principle ideal Quotient Ring Ring Homomorphism	02 03 03 02 03	13

Class:-B.Sc. IInd Year

Semester:- IV

Paper: - VIII Mechanics

Sr.No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Mar	Unit I	Lagrangian Dynamics : Constraints. Generalised Coordinates D'Alembert's principle Lagrange's equations of motion.	02 03 03 04	12
2	Apr	Unit II	Central force motion : Areal velocity Equivalent one body problem. Central Orbit Virial theorem Kepler's laws of motions	02 03 03 02 02	12
3	Apr- May	Unit III	Calculus of Variation: Functional, Extremals Euler's differential equation Invariance of Euler's equation Euler-Poisson equation Euler-Ostogradsky equation	03 03 02 02 02	12
4	May- June	Unit IV	Hamilton's Principle : Hamilton principal Lagrange's equation for non holonomic system Routh's Procedure Least action Principle	03 03 03 03	12
5	June- July	Unit V	Rigid body : Generalized co-ordinates Eulerian angles Euler's theorem Finite rotation Infinitesimal rotations	02 03 03 03 02	13

HOD
(Mathematics)

Amrut Sevabhavi Sanstha, Parbhani.
Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
 Department of Mathematics
Teaching Plan 2020-21
Class:-B.Sc. IIIrd Year
Semester-Vth
Paper:-I X Mathematical Analysis

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Riemann Integral : Definition & Examples Integrability of continuous and monotonic function The fundamental theorem of integral calculus. Mean value theorems of integral calculus.	04 04 04 04	12
2	Sept- Oct	Unit II	Improper integrals : Types of improper integrals Comparison Test limit tests. Beta & Gamma Function	04 04 04 04	12
3	Oct- Nov	Unit III	Analytic functions : Continuity & differentiability of complex functions Analytic functions. Cauchy-Riemann equations. Harmonic and Conjugate functions. Milne Thompson method	02 03 03 02 02	12
4	Nov- Dec	Unit IV	Elementary functions : Mapping by elementary functions. Mobius transformations. Fixed points. Cross ratio. Inverse points and critical points. Conformal mappings.	03 03 02 02 02	12
5	Jan	Unit V	Metric Spaces : Definition & examples of metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets. Cauchy sequences. Completeness	03 03 03 02 02	13

Class:-B.Sc. IIIrd Year
Semester:- V
Paper:- X- Mathematical Methods

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Legendre's equation : Legendre's equation and Polynomials Recurrences relations Generating functions. Orthogonality of Legendre's Polynomial Rodrigue's Formula	02 03 03 02 02	12
2	Sept- Oct	Unit II	Bessel's equation solution of Bessel's equation Recurrences relations Generating functions Sturm- Liouville boundary value problem	03 03 03 03	12
3	Oct- Nov	Unit III	Fourier Series : Fourier Series -introduction Fourier series of Even and odd function. Half-range fourier sine series Half-range fourier cosine series	02 02 02 02	08
4	Nov- Dec	Unit IV	Laplace transform: Laplace transform of some elementary functions Existence of Laplace transform Properties of Laplace transform Laplace transform of Derivatives and Integral Inverse Laplace transform Convolution theorem Application of Laplace Transform	02 02 02 02 02 01 01	12
5	Jan	Unit V	Fourier Transform : Finite Fourier sin transform Inverse finite Fourier sin transform Inverse finite Fourier cosin transform Infinite Fourier transform Infinite Fourier sin transform and cosin transform Properties of Fourier transform	02 03 02 02 02 02	13

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XI Linear Algebra

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Mar	Unit. I	Vector Space : Definition and example of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis , Finite dimensional vector spaces . Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension.	02 02 02 02 02 01 01 01	13
2	Apr	Unit II	Linear Transformations Linear transformation & their representation as matrices. Algebra of linear transformations. The rank nullity theorem. Change of basis.	04 03 02 02	12
3	Apr- May	Unit III	Dual Spaces Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation.	04 04 04	12
4	May- June	Unit IV	Inner Product Spaces Inner product spaces. Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram Schmidt Orthogonalisation process.	03 03 02 02 02	12
5	June- July	Unit V	Modules Modules, Submodules, Quotient modules. Homomorphism Isomorphism	04 04 02 02	12

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XII Special Theory of Relativity

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Mar	Unit I	Review of Newtonian Mechanics: Inertial frames. Speed of light and Galilean relativity Relative character of space and time Postulates of Special theory of relativity Lorentz Transformations geometrical interpretation of L.T Group properties of transformation	02 02 02 02 02 02	12
2	Apr	Unit II	Relativistic Kinematics: Composition of parallel velocities. Length contraction. Time Dilation Transformation equation for components of velocities Transformation equation acceleration of a particle Lorentz contraction factor.	02 02 02 02 02	12
3	Apr- May	Unit III	Geometrical representation of Space-Time: 4D Minkowskian space-time of relativity. Time, Light Like & space like intervals. Proper time. Four vector and tensors in Minkowskian space-time. Operation on Tensors, Outer Product, Inner Product	03 03 03 03	12
4	May- June	Unit IV	Relativistic Mechanics: Variation of mass with velocity Equivalence of mass and energy. Transformation equ. for mass, momentum & energy. Relativistic force & transf ⁿ equ for its components. Relativistic Lagrangian and Hamiltonian.	02 03 02 03 02	12
5	June- July	Unit V	Electromagnetism: Maxwell's equation in vacuum. Propagation of electric and magnetic field strengths. Transformation equation for electromagnetic four potential vector. Transformation equation for electric & magnetic field strengths. Gauge transformation. Maxwell's equation Lorentz force on a charged particle.	02 02 02 02 03 02	13

HOD
(Mathematics)

Amrut Sevabhavi Sanstha, Parbhani.
Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
Department of Mathematics
Teaching Plan 2021-22

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- I- Algebra & Trigonometry (CBCS)

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Matrices Various types of matrices, Adjoint and inverse of matrix. Elementary transformation of a matrix, Inverse of elementary transformation of a matrix , normal form of a matrix.	04 02 02 02 02	12
2	Sept- Oct	Unit II	Eigen Values & Eigen Vectors Row rank, column rank Eigenvalues, eigenvectors, characteristic equation Cayley-Hamilton theorem Inverse by Cayley-Hamilton theorem	02 04 03 03	12
3	Oct- Nov	Unit III	Theory of Equations Descartes rule of signs Relations between roots and Coefficients Transformation of equations. Cubic equation. Biquadratic equation	02 03 02 03 02	12
4	Nov- Dec	Unit IV	De Moivre's Theorem . Roots of complex number. Circular functions, Hyperbolic function, Inverse Hyperbolic function, Relation between circular & hyperbolic functions. Separation of real & imaginary parts of the circular & hyperbolic functions of complex variable.	04 02 02 02 02	12
5	Jan	Unit V	Trigonometric series Gregory series, Euler's series Machin series, Rutherford series Series based upon $\sin x$, $\cos x$, $\sinh x$, $\cosh x$ Exponential Series, logarithmic series	03 03 03 04	13

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- II- Differential &Integral Calculus (CBCS)

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Limit- Definition of Limit of function, Basic properties of limits, Some standard limit	04 04 04	12
2	Sept- Oct	Unit II	Continuous functions Continuous and Discontinuous functions Types of discontinuity, Properties of continuous functions, Uniform continuous functions, Properties of uniform continuous functions.	03 02 03 02 02	12
3	Oct- Nov	Unit III	Differentiability- Definition & examples Successive differentiation, Leibnitz theorem, Indeterminate forms L' Hospital rule	03 03 02 02 02	12
4	Nov- Dec	Unit IV	Mean Value Theorem's – Rolle's theorem. Cauchy's Mean Value theorem, Lagrange's mean value theorem. Maclaurin series expansion Taylor series expansion.	02 03 02 02 03	12
5	Jan	Unit V	Integration of Irrational algebraic functions Integration of irrational algebraic function Reduction formulae Walli's formulae	06 04 03	13

Class:-B.Sc. Ist Year

Semester:- IInd

Paper:- III- Differential Equations :Ordinary & Partial (CBCS)

Sr.No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Feb	Unit. I	Differential equation of 1st order & 1st degree. Formation of ordinary differential equation, Degree and order of a ordinary differential equation, homogeneous differential equations, Linear differential equations, Bernoulli's equation, Differential equations reducible to the linear form, exact differential equations.	01 01 02 02 02 02 02	12
2	Mar	Unit II	Differential equations of first order & higher degree, differential equations solvable for p, x and y, Clairaut's equation, orthogonal trajectories (Cartesian and Polar form)	03 03 03 03	12
3	Mar- Apr	Unit III	Linear differential equations with constant coefficients, Complementary function of the differential equation, particular integral of the differential equation, homogeneous linear ordinary differential equations.	03 03 03 03	12
4	Apr- May	Unit IV	Second order differential equation, Wronskian, method of change of dependent variable, normal form, method of change of independent variable, variation by parameters.	02 03 02 03 02	12
5	May	Unit V	Applications of ODE: Electric circuit, steady state heat flow, radioactive decay and carbon dating, Newton's law of cooling, compound interest	03 02 02 03 02	13

Class:-B.Sc. IstYear
Semester:- IInd
Paper:- IV Vector Analysis & Solid Geometry (CBCS)

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Feb	Unit. I	Scalars and Vectors Scalar and Vector Product of three vectors. Product of four vectors, Vector differentiation Vector integration.	03 03 03 03	10
2	Mar	Unit II	Curve in Spaces Space Curves. t, n, b vectors. Fundamental planes. Curvature, Torsion, Frenet-Serete's Formulae.	02 02 03 03 02	12
3	Mar- Apr	Unit III	Differential Operator & Line Integral Gradient, divergence and curl Line integral, existence and evaluation, work done Circulation	03 03 03 03	12
4	Apr- May	Unit IV	Sphere Different forms of Sphere Plane section of sphere Sphere through given circle Intersection of sphere & line Orthogonal Sphere & Condition of orthogonality	03 02 03 03 02	13
5	May	Unit V	Cone & Cylinder The equation of a cone with a guiding curve, cone with vertex at origin, Right circular cone. Cylinder-Equation of right circular cylinder.	03 03 03 03	12

HOD
(Mathematics)

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Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
Department of Mathematics
Teaching Plan 2020-21
Class:-B.Sc. IInd Year
Semester:- III
Paper:- V -Advanced Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit I	Sequence- Definition of sequence , Uniqueness of limit, Algebra of limit of sequence, Theorems on limits of sequences, bounded and monotonic sequences, Cauchy Sequence	03 02 03 03 02	13
2	Sept- Oct	Unit II	Series- Series of non negative terms, convergence of geometric series & p-series Comparison tests, Cauchy's integral test, Ratio test, Root test. Absolute Convergence, Conditional Convergence Leibnitz Rule ,Abel's Test, Dirichilet Test	02 02 02 02 02 02	12
3	Oct- Nov	Unit III	Limit & continuity of functions of two variables- Algebra of limits and continuity, Intermediate value property, Fixed point property Taylor's theorem for function of two variables.	03 03 03 03	12
4	Nov- Dec	Unit IV	Maxima and minima- Maxima and minima of two variables Lagrange's multipliers method. Jacobians.	04 04 04	12
5	Jan	Unit V	Double integral – Definition and Evaluations Change of order of double integral, Triple integral. Gauss & Stoke's Theorem	03 03 03 03	12

B.Sc. IInd Year
Semester:- III
Paper:- VI –Elementary Number Theory

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit I	Divisibility – Definition & examples Division algorithm, The greatest common divisor Euclidean algorithm Least common multiple	02 03 02 02 03	12
2	Sept- Oct	Unit II	Prime numbers- Introduction The fundamental theorem of arithmetic Fermat numbers Linear Diophantine equation	03 03 03 03	12
3	Oct- Nov	Unit III	Congruence- Properties of congruence Special divisibility test Linear congruences, Chinese Remainder theorem	03 03 03 03	12
4	Nov- Dec	Unit IV	Arithmetic Functions- Different arithmetic function Euler's Theorem Sigma function Mobius function	03 03 03 03	12
5	Jan	Unit V	Primitive roots- Primitive roots for prime Polynomial congruences General quadratic congruences Quadratic residues	03 03 03 04	13

Class:-B.Sc. IInd Year
Semester- IVth
Paper:- VII Modern Algebra: Group & Ring

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Feb	Unit. I	Group: Definition, examples. properties Subgroup, Cyclic Groups Order of generator of cyclic group Permutation Group Even & Odd permutation	03 03 02 02 02	12
2	Mar	Unit II	Cosets & Normal Subgroups : Cosets, Lagrange's Theorem Normal Subgroups Different characterizations of normal subgroups, Algebra of normal subgroups, Quotient group.	02 03 02 03 02	12
3	Mar- Apr	Unit III	Homomorphism and Isomorphism: Homomorphism, Homomorphic image, Kernel of homomorphism, Isomorphism of groups, Fundamental theorem of homomorphism, Natural homomorphism. Second &Third isomorphism theorem	02 03 02 02 02	12
4	Apr- May	Unit IV	Ring, Integral domain and field: Definition, examples, Properties of ring Subring , Characteristics of a ring Integral domain Field, Subfield, Prime field.	03 03 03 03	12
5	May	Unit V	Ideal: Definition ,left Ideal, Right ideal Algebra of Ideals Prime ideal, Maximal ideal, Principle ideal Quotient Ring Ring Homomorphism	02 03 03 02 03	13

Class:-B.Sc. IInd Year

Semester:- IV

Paper: - VIII Mechanics

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Feb	Unit I	Lagrangian Dynamics : Constraints. Generalised Coordinates D'Alembert's principle Lagrange's equations of motion.	02 03 03 04	12
2	Mar	Unit II	Central force motion : Areal velocity Equivalent one body problem. Central Orbit Virial theorem Kepler's laws of motions	02 03 03 02 02	12
3	Mar- Apr	Unit III	Calculus of Variation: Functional, Extremals Euler's differential equation Invariance of Euler's equation Euler-Poisson equation Euler-Ostogradsky equation	03 03 02 02 02	12
4	Apr- May	Unit IV	Hamilton's Principle : Hamilton principal Lagrange's equation for non holonomic system Routh's Procedure Least action Principle	03 03 03 03	12
5	May	Unit V	Rigid body : Generalized co-ordinates Eulerian angles Euler's theorem Finite rotation Infinitesimal rotations	02 03 03 03 02	13

HOD
(Mathematics)

Amrut Sevabhavi Sanstha, Parbhani.
Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
 Department of Mathematics
Teaching Plan 2020-21
Class:-B.Sc. IIIrd Year
Semester-Vth
Paper:-I X Mathematical Analysis

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Riemann Integral : Definition & Examples Integrability of continuous and monotonic function The fundamental theorem of integral calculus. Mean value theorems of integral calculus.	04 04 04 04	12
2	Sept-Oct	Unit II	Improper integrals : Types of improper integrals Comparison Test limit tests. Beta & Gamma Function	04 04 04 04	12
3	Oct-Nov	Unit III	Analytic functions : Continuity & differentiability of complex functions Analytic functions. Cauchy-Riemann equations. Harmonic and Conjugate functions. Milne Thompson method	02 03 03 02 02	12
4	Nov-Dec	Unit IV	Elementary functions : Mapping by elementary functions. Mobius transformations. Fixed points. Cross ratio. Inverse points and critical points. Conformal mappings.	03 03 02 02 02	12
5	Jan	Unit V	Metric Spaces : Definition & examples of metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets. Cauchy sequences. Completeness	03 03 03 02 02	13

Class:-B.Sc. IIIrd Year
Semester:- V
Paper:- X- Mathematical Methods

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Sept	Unit. I	Legendre's equation : Legendre's equation and Polynomials Recurrences relations Generating functions. Orthogonality of Legendre's Polynomial Rodrigue's Formula	02 03 03 02 02	12
2	Sept- Oct	Unit II	Bessel's equation solution of Bessel's equation Recurrences relations Generating functions Sturm- Liouville boundary value problem	03 03 03 03	12
3	Oct- Nov	Unit III	Fourier Series : Fourier Series -introduction Fourier series of Even and odd function. Half-range fourier sine series Half-range fourier cosine series	02 02 02 02	08
4	Nov- Dec	Unit IV	Laplace transform: Laplace transform of some elementary functions Existence of Laplace transform Properties of Laplace transform Laplace transform of Derivatives and Integral Inverse Laplace transform Convolution theorem Application of Laplace Transform	02 02 02 02 02 01 01	12
5	Jan	Unit V	Fourier Transform : Finite Fourier sin transform Inverse finite Fourier sin transform Inverse finite Fourier cosin transform Infinite Fourier transform Infinite Fourier sin transform and cosin transform Properties of Fourier transform	02 03 02 02 02 02	13

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XI Linear Algebra

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Feb	Unit. I	Vector Space : Definition and example of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis , Finite dimensional vector spaces . Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension.	02 02 02 02 02 01 01 01	13
2	Mar	Unit II	Linear Transformations Linear transformation & their representation as matrices. Algebra of linear transformations. The rank nullity theorem. Change of basis.	04 03 02 02	12
3	Mar- Apr	Unit III	Dual Spaces Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation.	04 04 04	12
4	Apr- May	Unit IV	Inner Product Spaces Inner product spaces. Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram Schmidt Orthogonalisation process.	03 03 02 02 02	12
5	May	Unit V	Modules Modules, Submodules, Quotient modules. Homomorphism Isomorphism	04 04 02 02	12

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XII Special Theory of Relativity

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Feb	Unit I	Review of Newtonian Mechanics: Inertial frames. Speed of light and Galilean relativity Relative character of space and time Postulates of Special theory of relativity Lorentz Transformations geometrical interpretation of L.T Group properties of transformation	02 02 02 02 02 02	12
2	Mar	Unit II	Relativistic Kinematics: Composition of parallel velocities. Length contraction. Time Dilation Transformation equation for components of velocities Transformation equation acceleration of a particle Lorentz contraction factor.	02 02 02 02 02	12
3	Mar- Apr	Unit III	Geometrical representation of Space-Time: 4D Minkowskian space-time of relativity. Time, Light Like & space like intervals. Proper time. Four vector and tensors in Minkowskian space-time. Operation on Tensors, Outer Product, Inner Product	03 03 03 03	12
4	Apr- May	Unit IV	Relativistic Mechanics: Variation of mass with velocity Equivalence of mass and energy. Transformation equ. for mass, momentum & energy. Relativistic force & transf ⁿ equ for its components. Relativistic Lagrangian and Hamiltonian.	02 03 02 03 02	12
5	May	Unit V	Electromagnetism: Maxwell's equation in vacuum. Propagation of electric and magnetic field strengths. Transformation equation for electromagnetic four potential vector. Transformation equation for electric & magnetic field strengths. Gauge transformation. Maxwell's equation Lorentz force on a charged particle.	02 02 02 02 03 02	13

HOD
(Mathematics)

Amrut Sevabhavi Sanstha, Parbhani.

Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.

**Department of Mathematics
Teaching Plan 2017-19**

Class:-B.Sc. IstYear

Semester:- Ist

Paper:- I- Algebra & Trigonometry

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	De Moivre's Theorem . Roots of complex number. Circular functions. Hyperbolic function, Inverse Hyperbolic function, Relation between circular & hyperbolic functions. Separation of real & imaginary parts of the circular. Hyperbolic functions of complex variable.	02 01 02 02 02 03	12
2	July- Aug	Unit II	Trigonometric series :Gregory series,Eulers series Machin series,Rutherford series Series based upon $\sin x$, $\cos x$, $\sinh x$, $\cosh x$ Exponential Series,logarithmic series	02 02 02 02	08
3	Aug	Unit III	Elements of Quaternion : Defination,Equality and addition,multiplication,conjugate of quaternion Norm,Inverse,quaternion as a rotation operator Geometric interpretation A special quaternion product Operator algorithm,quaternion to matrices	03 03 02 02 02	12
4	Aug- Sept	Unit IV	Theory of Equations: Relations between roots and Coefficients . Transformation of equations. Cubic equation. Descartes' rule of signs Biquadratic equation	02 02 02 02 02	10
5	Sept	Unit V	Matrices: Rank of matrix, row rank, column rank Eigen values, Eigen vectors Characteristic Equation of a Matrix Cayley Hamilton theorem and its application	02 02 02 02	08

Class:-B.Sc. IstYear
Semester:- Ist
Paper:- II- Differential &Integral Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit. I	Definition of Limit of function, Basic properties of limits, Continuous functions Classifications of discontinuities.	02 02 02 02	08
2	Aug	Unit II	Differentiability, Successive differentiation, Leibnitz theorem, Indeterminate forms L' Hospital rule .	01 02 02 02 02	09
3	Aug- Sept	Unit III	Rolle's theorem. Cauchy's Mean Value theorem, Lagrange's mean value theorem. Maclaurin series expansion Taylor series expansion.	02 02 02 02 02	10
4	Sept	Unit IV	Partial derivatives Differentiation of real valued function of two variables. Homogeneous function. Euler's theorem on homogeneous function.	02 03 02 02	09
5	Sept- Oct	Unit V	Integration of Irrational algebraic functions, Reduction formulae Walli's formulae Quadrature, Rectification	02 02 02 02 02	10

Class:-B.Sc. Ist Year

Semester:- IInd

Paper:- III- Differential Equations:Ordinary&Partial

Sr.No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec- Jan	Unit. I	Degree and order of differential equation of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations & equations reducible to linear form. Exact differential equations. Orthogonal trajectories.	02 02 02 02 02 02	12
2	Jan	Unit II	Second order linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous differential equation.	03 03 04	10
3	Jan- Feb	Unit III	Reduction of order Transformation of the equation by changing the dependant variable and independent variable Normal form. Method of variation of parameters, Ordinary simultaneous differential equations.	02 02 02 02	08
4	Feb	Unit IV	Formation of Partial differential equations Partial differential equations of first order. Lagrange's method. Some special types of equations	02 02 02 02	08
5	Mar	Unit V	Compatible Differential equation Charpit method PDE of Higher order Homogenous & Non-Homogenous equation with constant coefficients	02 02 02 02	08

Class:-B.Sc. IstYear
Semester:- IInd

Paper:- IV Vector Analysis & Solid Geometry

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit. I	Scalar and Vector Product of three vectors. Product of four vectors, Vector differentiation Vector integration.	02 02 02 02	10
2	Jan- Feb	Unit II	Space Curves. t, n, b vectors. Fundamental planes. Curvature, Torsion, Frenet-Serete's Formulae.	02 02 03 03	10
3	Feb	Unit III	Gradient, divergent and curl Line integral, existence and evaluation, work done.,Greens Theorem.	02 02 03 03	10
4	March	Unit IV	Sphere: Different forms of Sphere Plane section of sphere Sphere through given circle Intersection of sphere & line Orthogonal Sphere & Condition of orthogonality	02 02 02 02 02	10
5	March	Unit V	Cone, The equation of a cone with a guiding curve, cone with vertex at origin, Right circular cone. Cylinder. Equation of right circular cylinder.	2 3 3	08

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**Class:-B.Sc. IInd Year
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Paper:- V -Advanced Calculus

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Sequence : Theorems on limits of sequences, bounded and monotonic sequences, Cauchy Sequence	04 03 03	10
2	July- Aug	Unit II	Series : Series of non negative terms, convergence of geometric series and the power series Comparison tests, Cauchy's integral test, Ratio test, Root test. Absolute Convergence, Conditional Convergence Leibnitz Rule ,Abel's Test, Dirichilet Test	02 02 02 02 02	12
3	Aug	Unit III	Limit and continuity of functions of two variables, Algebra of limits and continuity, Intermediate value property, Fixed point property Taylor's theorem for function of two variables.	02 01 02 02 03	10
4	Aug- sept	Unit IV	Maxima and minima of two variables Lagrange's multipliers method. Jacobians..	04 03 03	10
5	Sept- Oct	Unit V	Double integral : Definition and Evaluations Change of order of double integral, Triple integral. Gauss & Stoke's Theorem	03 03 03 03	12

B.Sc. IInd Year
Semester:- III

Paper:- VI –Elementary Number Theory

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Divisibility : Division algorithm, The greatest common divisor Euclidean algorithm Least common multiple	02 02 02 02	08
2	July- Aug	Unit II	Prime numbers The fundamental theorem of arithmetic Fermat numbers Linear Diophantine equation	02 03 02 03	10
3	Aug	Unit III	Congruence, Properties of congruence Special divisibility test Linear congruences, Chinese Remainder theorem	03 02 03 02	10
4	Aug- sept	Unit IV	Arithmetic Functions, Euler's Theorem Sigma function Mobius function	03 02 02 02	10
5	Sept-	Unit V	Primitive roots, Primitive roots for prime Polynomial congruences General quadratic congruences Quadratic residues	02 03 02 03	10

Class:-B.Sc. IInd Year

Semester- IVth

Paper:- VII Modern Algebra: Group & Ring

Sr.No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec-Jan	Unit. I	Group: Definition, examples. properties Subgroup, Cyclic Groups Order of generator of cyclic group Permutation Group	02 03 02 03	10
2	Jan	Unit II	Cosets & Normal Subgroups : Cosets ,Lagrange's Theorem Normal Subgroups Different characterizations of normal subgroups, Algebra of normal subgroups, Quotient group.	02 02 02 02 02	10
3	Feb	Unit III	Homomorphism and Isomorphism: Homomorphism, Homomorphic image, Kernel of homomorphism, Isomorphism of groups, Fundamental theorem of homomorphism, Natural homomorphism. Second &Third isomorphism theorem	03 03 02 01 02	11
4	Feb-Mar	Unit IV	Ring, Integral domain and field: Definition, examples, Properties of ring Subring , Characteristics of a ring Integral domain Field, Subfield, Prime field,	02 03 02 03	10
5	Mar	Unit V	Ideal: Definition ,left Ideal, Right ideal Algebra of Ideals Prime ideal, Maximal ideal, Principle ideal Quotient Ring Ring Homomorphism	02 02 03 02 02	11

Class:-B.Sc. IInd Year

Semester:- IV

Paper: - VIII Mechanics

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit I	Constraints. Generalised Coordinates D'Alembert's principle Lagrange's equations of motion.	02 02 02 04	10
2	Jan- Feb	Unit II	Central force motion : Areal velocity. Equivalent one body problem. Central Orbit. Virial theorem. Kepler's laws of motions	02 02 02 02 02	10
3	Feb	Unit III	Calculus of Variation: Functional, Extremals Euler's differential equation Invariance of Euler's equation Euler-Poisson equation Euler-Ostogradsky equation	02 02 02 02 02	10
4	Feb- Mar	Unit IV	Hamilton's Principle Lagrange's equation Routh's Procedure Least action Principle	02 02 02 02	08
5	Mar	Unit V	Rigid body ,Generalized co-ordinates Eulerian angles Euler's theorem Finite rotation Infinitesimal rotations	02 02 02 02 02	10

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Amrut Sevabhavi Sanstha, Parbhani.
Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.

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Class:-B.Sc. IIIrd Year
Semester-Vth

Paper:-I X Mathematical Analysis

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit. I	Riemann Integral. Integrability of continuous and monotonic function	04	12
			The fundamental theorem of integral calculus.	04	
			Mean value theorems of integral calculus.	04	
2	Aug	Unit II	Improper integrals and their convergence.	02	08
			Comparison Test	02	
			limit tests.	02	
			Beta & Gamma Function	02	
3	Aug	Unit III	Continuity and differentiability of complex functions.	03	10
			Analytic functions.	02	
			Cauchy-Riemann equations.	02	
			Harmonic and Conjugate functions.	02	
			Milne Thompson method	01	
4	Sept	Unit IV	Elementary functions Mapping by elementary functions.	02	10
			Mobius transformations.	02	
			Fixed points. Cross ratio.	02	
			Inverse points and critical points.	02	
			Conformal mappings.	02	
5	Sept-Oct	Unit V	Metric Spaces : Definition & examples of metric spaces.	02	10
			Neighbourhoods. Limit points. Interior points.	03	
			Open and closed sets.	02	
			Cauchy sequences. Completeness	03	

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Semester:- V

Paper:- X- Mathematical Methods

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	July	Unit I	Legendre's equation and Polynomials Recurrences relations Generating functions. Orthogonality of Legendre's Polynomial Rodrigue's Formula	03 02 02 02 02	11
2	Aug	Unit II	Bessel's equation, solution of Bessel's equation Recurrences relations Generating functions Sturm- Liouville boundary value problem	02 02 02 03	09
3	Aug	Unit III	Fourier Series, Fourier series of Even and odd function. Half-range fourier sine series Half-range fourier cosine series	02 02 02 02	08
4	Sept	Unit IV	Laplace transform: Laplace transform of some elementary functions Existence of Laplace transform Properties of Laplace transform Laplace transform of Derivatives and Integral Inverse Laplace transform Convolution theorem Application of Laplace Transform	02 02 02 02 02 01 01	12
5	Sept- Oct	Unit V	Fourier Transform : Finite fourier sin transform Inverse finite Fourier sin transform and cosin transform Infinite Fourier transform Infinite Fourier sin transform and cosin transform Properties of Fourier transform	02 03 02 02 02	11

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Semester-VIth

Paper:- XI Linear Algebra

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Dec- Jan	Unit. I	Vector Space : Definition and example of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis , Finite dimensional vector spaces . Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension.	02 02 02 02 01 01 01 01	12
2	Jan	Unit II	Linear Transformations Linear transformation & their representation as matrices. Algebra of linear transformations. The rank nullity theorem. Change of basis.	04 02 02 02	10
3	Feb	Unit III	Dual Spaces Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation.	03 02 04	09
4	Feb- Mar	Unit IV	Inner Product Spaces Inner product spaces. Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram Schmidt Orthogonalisation process.	03 03 02 02 02	12
5	Mar	Unit V	Modules Modules, Submodules, Quotient modules. Homomorphism and Isomorphism theorems.	03 02 03	08

Class:-B.Sc. IIIrd Year
Semester-VIth
Paper:- XII Special Theory of Relativity

Sr. No.	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
1	Jan	Unit I	Review of Newtonian Mechanics: Inertial frames. Speed of light and Galilean relativity Relative character of space and time. Postulates of Special theory of relativity. Lorentz Transformations and its geometrical interpretation. Group properties of transformation	02 02 02 04	10
2	Jan-Feb	Unit II	Relativistic Kinematics: Composition of parallel velocities. Length contraction. Time Dilation. Transformation equation for components of velocities and acceleration of a particle Lorentz contraction factor.	02 02 04 02	10
3	Feb	Unit III	Geometrical representation of Space-Time: 4D Minkowskian space-time of relativity. Time, Light Like & space like intervals. Proper time. World line of a particle. Four vector and tensors in Minkowskian space-time. Operation on Tensors, Outer Product, Inner Product	02 02 04 03	11
4	Feb-Mar	Unit IV	Relativistic Mechanics: Variation of mass with velocity Equivalence of mass and energy. Transformation equ. for mass, momentum & energy. Relativistic force & transf ⁿ equ for its components. Relativistic Lagrangian and Hamiltonian.	03 03 03 03	12
5	Mar	Unit V	Electromagnetism: Maxwell's equation in vacuum. Propagation of electric and magnetic field strengths. Transformation equation for electromagnetic four potential vector. Transformation equation for electric & magnetic field strengths. Gauge transformation. Maxwell's equation Lorentz force on a charged particle.	01 02 02 02 03 01	11

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