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

	Month	Unit	Name of Unit & Topics	Required	
No	July	Unit. I	De Moivre's Theorem .	Lect.	Lect.
1	July	Unit. I		02	
1			Roots of complex number.	01	
			Circular functions. Hyperbolic function,	02	10
			Inverse Hyperbolic function,	02	12
			Relation between circular & hyperbolic functions.	02	
			Separation of real & imaginary parts of the circular.	03	
			Hyperbolic functions of complex variable.		
2	July-	Unit II		02	
	Aug		Machin series, Rutherford series	02	08
			Series based upon sinx, cosx ,sinhx,coshx	02	
			Exponential Series, logarithmic series	02	
3	Aug	Unit III	Elements of Quaternion : Defination, Equality and	03	
			addition, multiplication, conjugate of quaternion		
			Norm, Inverse, quaternion as a rotation operator	03	12
			Geometric interpretation	02	
			A special quaternion product	02	
			Operator algorithm, quaternion to matrices	02	
4	U	Unit IV		02	
	Sept		Coefficients .		
			Transformation of equations.	02	10
			Cubic equation.	02	
			Descartes' rule of signs	02	
			Biquadratic equation	02	
	Sept	Unit V		02	
5			Eigen values, Eigen vectors	02	
			Characteristic Equation of a Matrix	02	08
			Cayley Hamilton theorem and its application	02	

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

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	July	Unit. I	Definition of Limit of function,	02	
1			Basic properties of limits,	02	
			Continuous functions	02	08
			Classifications of discontinuities.	02	
2	Aug	Unit II	Differentiability,	01	
			Successive differentiation,	02	09
			Leibnitz theorem,	02	
			Indeterminate forms	02	
			L' Hospital rule.	02	
3	Aug-	Unit III	Rolle's theorem.	02	
	Sept		Cauchy's Mean Value theorem,	02	
			Lagrange's mean value theorem.	02	10
			Maclaurin series expansion	02	
			Taylor series expansion.	02	
4	Sept	Unit IV	Partial derivatives	02	
			Differentiation of real valued function of two		00
			variables.	03	09
			Homogeneous function.	02	
			Euler's theorem on homogeneous function.	02	
	Sept-	Unit V	Integration of Irrational algebraic functions,	02	
5	Oct		Reduction formulae	02	
			Walli's formulae	02	
			Quadrature,	02	10
			Rectification	02	

Class:-B.Sc. Ist Year

Semester:- IInd

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

Paper:- III- Differential Equations:Ordinary&Partial

5	Mar	Unit V	Compatible Differential equation	02	
			Charpit method	02	
			PDE of Higher order	02	08
			Homogenious & Non-Homogenious equation with	02	
			constant coefficients		

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.	02	
			Product of four vectors,	02	10
			Vector differentiation	02	
			Vector integration.	02	
2	Jan-	Unit II	Space Curves.	02	
	Feb		t, n, b vectors.	02	
			Fundamental planes. Curvature,	03	10
			Torsion, Frenet-Serete's Formulae.	03	
3	Feb	Unit III	Gradient, divergent and curl	02	
			Line integral,	02	
			existance and evaluation,	03	10
			work done., Greens Theorem.	03	
4	March	Unit IV	Sphere: Different forms of Sphere	02	
			Plane section of sphere	02	
			Sphere through given circle	02	10
			Intersection of sphere &line	02	
			Orthogonal Sphere & Condition of orthogonality	02	
5	March	Unit V	Cone, The equation of a cone with a guiding curve,	2	
			cone with vertex at origin, Right circular cone.	3	08
			Cylinder. Equation of right circular cylinder.	3	

HOD (Mathematics)

Department of Mathematics Teaching Plan 2018-19

Class:-B.Sc. II nd Year Semester:- III

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

Paper:- V -Advanced Calculus

B.Sc. II nd Year **Semester:-** III

Paper:- VI –Elementary Number Theory

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

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.
	Dec-	Unit. I	Group: Definition, examples. properties	02	
1	Jan		Subgroup, Cyclic Groups	03	10
			Order of generator of cyclic group	02	
			Permutation Group	03	
2	Jan	Unit II	Cosets & Normal Subgroups :		
			Cosets ,Lagrange's Theorem	02	
			Normal Subgroups	02	10
			Different characterizations of normal subgroups,	02	
			Algebra of normal subgroups,	02	
			Quotient group.	02	
3	Feb	Unit III	Homomorphism and Isomorphism:		
			Homomorphism, Homomorphic image,	03	11
			Kernel of homomorphism, Isomorphism of groups,	03	
			Fundamental theorem of homomorphism,	02	
			Natural homomorphism.	01	
			Second & Third isomorphism theorem	02	
4		Unit IV	Ring, Integral domain and field:		
	Mar		Definition, examples, Properties of ring	02	
			Subring, Characteristics of a ring	03	10
			Integral domain	02	
			Field, Subfield, Prime field,	03	
	Mar	Unit V	Ideal: Definition , left Ideal, Right ideal	02	
5			Algebra of Ideals	02	
			Prime ideal, Maximal ideal, Principle ideal	03	11
			Quotient Ring	02	
			Ring Homomorphism	02	

Class:-B.Sc. II nd Year

Semester:- IV

Paper: - VIII Mechanics

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	Jan	Unit. I	Constraints.	02	
1			Generalised Coordinates	02	10
			D'Alembert's principle	02	10
			Lagrange's equations of motion.	04	
2	Jan-	Unit II	Central force motion : Areal velocity.	02	
	Feb		Equivalent one body problem.	02	
			Central Orbit.	02	10
			Virial theorem.	02	
			Kepler's laws of motions	02	
3	Feb	Unit III	Calculus of Variation: Functional, Extremals	02	
			Euler's differential equation	02	
			Invariance of Euler's equation	02	10
			Euler-Poisson equation	02	
			Euler-Ostogradsky equation	02	
4	Feb-	Unit IV	Hamilton's Principle	02	
	Mar		lagrange's equation	02	00
			Routh's Procedure	02	08
			Least action Principle	02	
5	Mar	Unit V	Rigid body ,Generalized co-ordinates	02	
			Eulerian angles	02	
			Euler's theorem	02	10
			Finite rotation	02	
			Infinitesimal rotations	02	

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

Sr.	Month	Unit	Name of Unit & Topics	Required	Total
No				Lect.	Lect.
	July	Unit. I	Riemann Integral. Integrability of continuous and	04	
1			monotonic function		
			The fundamental theorem of integral calculus.	04	10
			Mean value theorems of integral calculus.	04	12
2	Aug	Unit II	Improper integrals and their convergence.	02	
			Comparison Test	02	
			limit tests.	02	00
			Beta & Gamma Function	02	08
3	Aug	Unit III	Continuity and differentiability of complex	03	
			functions.		
			Analytic functions.	02	
			Cauchy-Riemann equations.	02	
			Harmonic and Conjugate functions.	02	10
			Milne Thompson method	01	
4	Sept	Unit IV	Elementary functions Mapping by elementary	02	
			functions.		
			Mobius transformations.	02	
			Fixed points. Cross ratio.	02	
			Inverse points and critical points.	02	10
			Conformal mappings.	02	
	Sept-	Unit V	Metric Spaces : Definition & examples of metric	02	
5	Oct		spaces.		10
			Neighbourhoods. Limit points. Interior points.	03	-
			Open and closed sets.	02	
			Cauchy sequences. Completeness	03	

Paper:-I X Mathematical Analysis

Semester:- V

Paper:- X- Mathematical Methods

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

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-	Unit. I	Vector Space :		
	Jan		Definition and example of vector spaces.	02	
			Subspaces. Sum and direct sum of subspaces.	02	
			Linear span. Linear dependence,	02	12
			Independence and their basic properties.	02	
			Basis, Finite dimensional vector spaces.	01	
			Existence theorem for bases.	01	
			Invariance of the number of elements of a basis set.	01	
			Dimension.	01	
2	Jan	Unit II	Linear Transformations		
			Linear transformation & their representation as matrices.	04	
			Algebra of linear transformations.	02	10
			The rank nullity theorem.	02	
			Change of basis.	02	
3		Unit III	Dual Spaces		
	Feb		Dual space. Bidual space and natural isomorphism.	03	
			Adjoint of a linear transformation.	02	09
			Eigen values and eigenvectors of a linear transformation.	04	
4	Feb-	Unit IV	Inner Product Spaces		
	Mar		Inner product spaces. Cauchy-Schwarz inequality.	03	
			Orthogonal vectors. Orthogonal complements.	03	12
			Orthonormal sets and bases.	02	
			Bessel's inequality for finite dimensional spaces.	02	
			Gram Schmidt Orthogonalisation process.	02	
	Mar	Unit V	Modules		
5			Modules, Submodules,	03	08
			Quotient modules.	02	
			Homomorphism and Isomorphism theorems.	03	

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

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

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

Department of Mathematics Teaching Plan 2019-20

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

	Month	Unit	Name of Unit & Topics	Required	
No		TI:4 T	De Meiner's Theorem	Lect.	Lect.
1	July	Unit. I		02	
1			Roots of complex number.	02	
			Circular functions. Hyperbolic function,	02	10
			Inverse Hyperbolic function,	02	10
			Relation between circular & hyperbolic functions.	02	
			Separation of real & imaginary parts of the circular	02	
	T 1	T T 1 / T T	& hyperbolic functions of complex variable.		
2	July-	Unit II	Trigonometric series	02	
	Aug		Gregory series, Euler's series	03	10
			Machin series, Rutherford series	03	12
			Series based upon sinx , cosx , sinhx, coshx	03	
			Exponential Series, logarithmic series	03	
3	Aug	Unit III	Elements of Quaternion		
			Definition, Equality and addition of quaternion	02	
			multiplication, conjugate of quaternion	03	14
			Norm, Inverse, quaternion as a rotation operator	03	
			Geometric interpretation	02	
			A special quaternion product	02	
			Operator algorithm, quaternion to matrices	02	
4	Aug-	Unit IV	Theory of Equations		
	Sept		Relations between roots and Coefficients.	02	
			Transformation of equations.	02	10
			Cubic equation.	02	
			Descartes' rule of signs	02	
			Biquadratic equation	02	
	Sept	Unit V	Matrices		
5			Rank of matrix, row rank, column rank	04	
			Eigen values, Eigen vectors	03	12
			Characteristic Equation of a Matrix	02	
			Cayley Hamilton theorem and its application	03	

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

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

Class:-B.Sc. Ist Year

Semester:- IInd

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

Paper:- III- Differential Equations :Ordinary & Partial

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

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

Paper:- IV Vector Analysis & Solid Geometry

HOD (Mathematics)

Amrut Sevabhavi Sanstha, Parbhani. Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana. Department of Mathematics Teaching Plan 2019-20 Class:-B.Sc. II nd Year Semester:- III Paper:- V -Advanced Calculus

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

B.Sc. II nd Year **Semester:-** III

Paper:- VI –Elementary Number Theory

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

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.
110	Dec-	Unit. I	Group:		Leeu
1	Jan		Definition, examples. properties	03	
			Subgroup, Cyclic Groups	03	12
			Order of generator of cyclic group	02	
			Permutation Group	02	
			Even & Odd permutation	02	
2	Jan	Unit II	Cosets & Normal Subgroups :		
			Cosets ,Lagrange's Theorem	02	
			Normal Subgroups	02	10
			Different characterizations of normal subgroups,	02	
			Algebra of normal subgroups,	02	
			Quotient group.	02	
3	Feb	Unit III	Homomorphism and Isomorphism:		
			Homomorphism, Homomorphic image,	02	10
			Kernel of homomorphism, Isomorphism of groups,	03	
			Fundamental theorem of homomorphism,	02	
			Natural homomorphism.	01	
			Second & Third isomorphism theorem	02	
4		Unit IV	Ring, Integral domain and field:		
	Mar		Definition, examples, Properties of ring	02	
			Subring, Characteristics of a ring	03	10
			Integral domain	02	
			Field, Subfield, Prime field.	03	
	Mar	Unit V	Ideal:		
5			Definition , left Ideal, Right ideal	02	
			Algebra of Ideals	02	11
			Prime ideal, Maximal ideal, Principle ideal	03	
			Quotient Ring	02	
			Ring Homomorphism	02	

Semester:- IV

Paper: - VIII Mechanics

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	Jan	Unit. I	Lagrangian Dynamics :		
1			Constraints.	01	10
			Generalised Coordinates	02	10
			D'Alembert's principle	03	
			Lagrange's equations of motion.	04	
2	Jan-	Unit II	Central force motion :		
	Feb		Areal velocity	02	
			Equivalent one body problem.	02	10
			Central Orbit	02	
			Virial theorem	02	
			Kepler's laws of motions	02	
3	Feb	Unit III	Calculus of Variation:		
			Functional, Extremals	02	
			Euler's differential equation	02	10
			Invariance of Euler's equation	02	10
			Euler-Poisson equation	02	
			Euler-Ostogradsky equation	02	
4	Feb-	Unit IV	Hamilton's Principle :		
	Mar		Hamilton principal	02	00
			Lagrange's equation for non holonomic system	02	08
			Routh's Procedure	02	
			Least action Principle	02	
5	Mar	Unit V	Rigid body :		
			Generalized co-ordinates	02	
			Eulerian angles	02	10
			Euler's theorem	02	
			Finite rotation	02	
			Infinitesimal rotations	02	

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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.
	July	Unit. I	Riemann Integral :		
1			Definition & Examples	02	
			Integrability of continuous and monotonic function	03	10
			The fundamental theorem of integral calculus.	02	12
			Mean value theorems of integral calculus.	03	
2	Aug	Unit II	Improper integrals :		
			Types of improper integrals	02	
			Comparison Test	03	10
			limit tests.	03	10
			Beta & Gamma Function	02	
3	Aug	Unit	Analytic functions :		
		III	Continuity & differentiability of complex functions	02	
			Analytic functions.	02	10
			Cauchy-Riemann equations.	02	10
			Harmonic and Conjugate functions.	02	
			Milne Thompson method	02	
4	Sept	Unit IV	Elementary functions :		
			Mapping by elementary functions.	02	
			Mobius transformations.	02	10
			Fixed points. Cross ratio.	02	10
			Inverse points and critical points.	02	
			Conformal mappings.	02	
	Sept-	Unit V	Metric Spaces :		
5	Oct		Definition & examples of metric spaces.	02	10
			Neighborhoods. 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.
	July	Unit. I	Legendre's equation :		
1			Legendre's equation and Polynomials	02	
			Recurrences relations	02	10
			Generating functions.	02	
			Orthogonality of Legendre's Polynomial	02	
			Rodrigue's Formula	02	
2	Aug	Unit II	Bessel's equation		
			solution of Bessel's equation	02	
			Recurrences relations	03	10
			Generating functions	02	
			Sturm- Liouville boundary value problem	03	
3	Aug	Unit III	Fourier Series :		
			Fourier Series -introduction	02	
			Fourier series of Even and odd function.	02	08
			Half-range fourier sine series	02	
			Half-range fourier cosine series	02	
4	Sept	Unit IV	Laplace transform:		
			Laplace transform of some elementary functions	02	
			Existence of Laplace transform	02	12
			Properties of Laplace transform	02	
			Laplace transform of Derivatives and Integral	02	
			Inverse Laplace transform	02	
			Convolution theorem	01	
			Application of Laplace Transform	01	
	Sept-	Unit V	Fourier Transform :		
5	Oct		Finite Fourier sin transform	02	
			Inverse finite Fourier sin transform	02	
			Inverse finite Fourier cosin transform	02	12
			Infinite Fourier transform	02	
			Infinite Fourier sin transform and cosin transform	02	
			Properties of Fourier transform	02	

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-	Unit. I	Vector Space :		
	Jan		Definition and example of vector spaces.	02	
			Subspaces. Sum and direct sum of subspaces.	02	
			Linear span. Linear dependence,	02	12
			Independence and their basic properties.	02	
			Basis, Finite dimensional vector spaces.	01	
			Existence theorem for bases.	01	
			Invariance of the number of elements of a basis set.	01	
			Dimension.	01	
2	Jan	Unit II	Linear Transformations		
			Linear transformation & their representation as matrices.	04	
			Algebra of linear transformations.	02	10
			The rank nullity theorem.	02	-
			Change of basis.	02	
3		Unit III	Dual Spaces		
	Feb		Dual space. Bidual space and natural isomorphism.	03	
			Adjoint of a linear transformation.	02	09
			Eigen values and eigenvectors of a linear transformation.	04	
4	Feb-	Unit IV	Inner Product Spaces		
	Mar		Inner product spaces. Cauchy-Schwarz inequality.	03	
			Orthogonal vectors. Orthogonal complements.	03	12
			Orthonormal sets and bases.	02	
			Bessel's inequality for finite dimensional spaces.	02	
			Gram Schmidt Orthogonalisation process.	02	
	Mar	Unit V	Modules		
5			Modules, Submodules,	03	08
			Quotient modules.	02	
			Homomorphism and Isomorphism theorems.	03	

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.
	Jan	Unit. I	Review of Newtonian Mechanics:		
1			Inertial frames. Speed of light and Galilean relativity	02	
			Relative character of space and time	02	
			Postulates of Special theory of relativity	01	10
			Lorentz Transformations	02	
			geometrical interpretation of L.T	02	
			Group properties of transformation	01	
2	Jan-	Unit II	Relativistic Kinematics:		
	Feb		Composition of parallel velocities.	02	
			Length contraction. Time Dilation	02	
			Transformation equation for components of velocities	01	08
			Transformation equation acceleration of a particle	01	
			Lorentz contraction factor.	02	
3	Feb	Unit III	Geometrical representation of Space-Time:		
			4D Minkowskian space-time of relativity.	02	
			Time, Light Like& space like intervals. Proper time.	02	10
			Four vector and tensors in Minkowskian space-time.	03	
			Operation on Tensors, Outer Product, Inner Product	03	
4		Unit IV	Relativistic Mechanics:		
	Feb-		Variation of mass with velocity	02	
	Mar		Equivalence of mass and energy.	02	10
			Transformation equ. for mass, momentum & energy.	02	
			Relativistic force & transf ⁿ equn for its components.	02	
			Relativistic Lagrangian and Hamiltonian.	02	
	Mar	Unit V	Electromagnetism:		
5			Maxwell's equation in vacuum.	01	
			Propagation of electric and magnetic field strengths.	02	11
			Transformation equation for electromagnetic four	02	
			potential vector.		
			Transformation equation for electric & magnetic	02	
			field strengths.		
			Gauge transformation. Maxwell's equation	03	
			Lorentz force on a charged particle.	01	

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

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

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

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

Class:-B.Sc. Ist Year

Semester:- IInd

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

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

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.	03	
			Product of four vectors,	03	10
			Vector differentiation	03	
			Vector integration.	03	
2	Apr	Unit II	Curve in Spaces		
			Space Curves.	02	
			t, n, b vectors.	02	12
			Fundamental planes.	03	
			Curvature, Torsion,	03	
			Frenet-Serete's Formulae.	02	
3	Apr-	Unit III	Differential Operator & Line Integral		
	May		Gradient, divergence and curl	03	
			Line integral, existence and evaluation,	03	12
			work done	03	
			Circulation	03	
4	May-	Unit IV	Sphere		
	June		Different forms of Sphere	03	
			Plane section of sphere	02	13
			Sphere through given circle	03	
			Intersection of sphere & line	03	
			Orthogonal Sphere & Condition of orthogonality	02	
5	June-	Unit V	Cone & Cylinder		
	July		The equation of a cone with a guiding curve,	03	
			cone with vertex at origin,	03	12
			Right circular cone.	03	
			Cylinder-Equation of right circular cylinder.	03	

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. II nd Year Semester:- III Paper:- V -Advanced Calculus

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

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

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

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.
	Mar	Unit. I	Group:		
1			Definition, examples. properties	03	
			Subgroup, Cyclic Groups	03	12
			Order of generator of cyclic group	02	
			Permutation Group	02	
			Even & Odd permutation	02	
2	Apr	Unit II	Cosets & Normal Subgroups :		
			Cosets, Lagrange's Theorem	02	
			Normal Subgroups	03	12
			Different characterizations of normal subgroups,	02	
			Algebra of normal subgroups,	03	
			Quotient group.	02	
3	Apr-	Unit III	Homomorphism and Isomorphism:		
	May		Homomorphism, Homomorphic image,	02	
			Kernel of homomorphism, Isomorphism of groups,	03	
			Fundamental theorem of homomorphism,	02	12
			Natural homomorphism.	02	
			Second & Third isomorphism theorem	02	
4	May-	Unit IV	Ring, Integral domain and field:		
	June		Definition, examples, Properties of ring	03	
			Subring, Characteristics of a ring	03	12
			Integral domain	03	
			Field, Subfield, Prime field.	03	
	June-	Unit V	Ideal:		
5	July		Definition, left Ideal, Right ideal	02	
			Algebra of Ideals	03	13
			Prime ideal, Maximal ideal, Principle ideal	03	
			Quotient Ring	02	
			Ring Homomorphism	03	

Class:-B.Sc. II nd Year Semester:- IV Paper: - VIII Mechanics

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	Mar	Unit. I	Lagrangian Dynamics :		
1			Constraints.	02	12
			Generalised Coordinates	03	12
			D'Alembert's principle	03	
			Lagrange's equations of motion.	04	
2	Apr	Unit II	Central force motion :		
			Areal velocity	02	
			Equivalent one body problem.	03	12
			Central Orbit	03	
			Virial theorem	02	
			Kepler's laws of motions	02	
3	Apr-	Unit III	Calculus of Variation:		
	May		Functional, Extremals	03	
			Euler's differential equation	03	12
			Invariance of Euler's equation	02	
			Euler-Poisson equation	02	
			Euler-Ostogradsky equation	02	
4	May-	Unit IV	Hamilton's Principle :		
	June		Hamilton principal	03	10
			Lagrange's equation for non holonomic system	03	12
			Routh's Procedure	03	
			Least action Principle	03	
5	June-	Unit V	Rigid body :		
	July		Generalized co-ordinates	02	
			Eulerian angles	03	13
			Euler's theorem	03	
			Finite rotation	03	
			Infinitesimal rotations	02	

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.
	Sept	Unit. I	Riemann Integral :		
1			Definition & Examples	04	
			Integrability of continuous and monotonic function	04	
			The fundamental theorem of integral calculus.	04	12
			Mean value theorems of integral calculus.	04	
2	Sept-	Unit II	Improper integrals :		
	Oct		Types of improper integrals	04	
			Comparison Test	04	10
			limit tests.	04	12
			Beta & Gamma Function	04	
3	Oct-	Unit	Analytic functions :		
	Nov	III	Continuity & differentiability of complex functions	02	
			Analytic functions.	03	10
			Cauchy-Riemann equations.	03	12
			Harmonic and Conjugate functions.	02	
			Milne Thompson method	02	
4	Nov-	Unit IV	Elementary functions :		
	Dec		Mapping by elementary functions.	03	
			Mobius transformations.	03	10
			Fixed points. Cross ratio.	02	12
			Inverse points and critical points.	02	
			Conformal mappings.	02	
	Jan	Unit V	Metric Spaces :		
5			Definition & examples of metric spaces.	03	13
			Neighborhoods. Limit points. Interior points.	03	
			Open and closed sets.	03	
			Cauchy sequences.	02	
			Completeness	02	

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

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

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.	02	
			Subspaces. Sum and direct sum of subspaces.	02	
			Linear span. Linear dependence,	02	13
			Independence and their basic properties.	02	
			Basis, Finite dimensional vector spaces.	02	
			Existence theorem for bases.	01	
			Invariance of the number of elements of a basis set.	01	
			Dimension.	01	
2	Apr	Unit II	Linear Transformations		
			Linear transformation & their representation as matrices.	04	
			Algebra of linear transformations.	03	12
			The rank nullity theorem.	02	
			Change of basis.	02	
3	Apr-	Unit III	Dual Spaces		
	May		Dual space. Bidual space and natural isomorphism.	04	
			Adjoint of a linear transformation.	04	12
			Eigen values and eigenvectors of a linear transformation.	04	
4	May-	Unit IV	Inner Product Spaces		
	June		Inner product spaces. Cauchy-Schwarz inequality.	03	
			Orthogonal vectors. Orthogonal complements.	03	12
			Orthonormal sets and bases.	02	
			Bessel's inequality for finite dimensional spaces.	02	
			Gram Schmidt Orthogonalisation process.	02	
	June-	Unit V	Modules		
5	July		Modules, Submodules,	04	12
			Quotient modules.	04	
			Homomorphism	02	
			Isomorphism	02	

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.
	Mar	Unit. I	Review of Newtonian Mechanics:		
1			Inertial frames. Speed of light and Galilean relativity	02	
			Relative character of space and time	02	
			Postulates of Special theory of relativity	02	12
			Lorentz Transformations	02	
			geometrical interpretation of L.T	02	
			Group properties of transformation	02	
2	Apr	Unit II	Relativistic Kinematics:		
			Composition of parallel velocities.	02	
			Length contraction. Time Dilation	02	
			Transformation equation for components of velocities	02	12
			Transformation equation acceleration of a particle	02	
			Lorentz contraction factor.	02	
3	Apr-	Unit III	Geometrical representation of Space-Time:		
	May		4D Minkowskian space-time of relativity.	03	
	iviay		Time, Light Like& space like intervals. Proper time.	03	12
			Four vector and tensors in Minkowskian space-time.	03	
			Operation on Tensors, Outer Product, Inner Product	03	
4	May-	Unit IV	Relativistic Mechanics:		
	June		Variation of mass with velocity	02	
			Equivalence of mass and energy.	03	12
			Transformation equ. for mass, momentum & energy.	02	
			Relativistic force & transf ⁿ equn for its components.	03	
			Relativistic Lagrangian and Hamiltonian.	02	
	June-	Unit V	Electromagnetism:		
5	July		Maxwell's equation in vacuum.	02	
	2		Propagation of electric and magnetic field strengths.	02	13
			Transformation equation for electromagnetic four	02	
			potential vector.		
			Transformation equation for electric & magnetic	02	
			field strengths.		
			Gauge transformation. Maxwell's equation	03	
			Lorentz force on a charged particle.	02	

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)

	Month	Unit	Name of Unit & Topics	Required	
No	Sept	Unit. I	Matrices	Lect.	Lect.
1	Sept	Unit, I		04	
1			Various types of matrices, Adjoint and inverse of matrix.	04 02	
				02	10
			Elementary transformation of a matrix,	02	12
			Inverse of elementary transformation of a matrix , normal form of a matrix.	02	
	Caret	TT •4 TT		02	
2	Sept-	Unit II	8	02	
	Oct		Row rank, column rank	02 04	12
			Eigenvalues, eigenvectors, characteristic equation		12
			Cayley-Hamilton theorem	03 03	
		T T •4 TTT	Inverse by Cayley-Hamilton theorem	03	
3		Unit III	č i	02	
	Nov		Descartes rule of signs	02	10
			Relations between roots and Coefficients	03	12
			Transformation of equations.	02	
			Cubic equation.	03	
	ŊŢ		Biquadratic equation	02	
4		Unit IV		0.4	
	Dec		Roots of complex number.	04	10
			Circular functions, Hyperbolic function,	02	12
			Inverse Hyperbolic function,	02	
			Relation between circular & hyperbolic functions.	02	
			Separation of real & imaginary parts of the circular	02	
-	-		& hyperbolic functions of complex variable.		
_	Jan	Unit V		0.2	
5			Gregory series, Euler's series	03	10
			Machin series, Rutherford series	03	13
			Series based upon sinx, cosx, sinhx, coshx	03	
			Exponential Series, logarithmic series	04	

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

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

Class:-B.Sc. Ist Year

Semester:- IInd

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

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

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.	03	
			Product of four vectors,	03	10
			Vector differentiation	03	
			Vector integration.	03	
2	Mar	Unit II	Curve in Spaces		
			Space Curves.	02	
			t, n, b vectors.	02	12
			Fundamental planes.	03	
			Curvature, Torsion,	03	
			Frenet-Serete's Formulae.	02	
3	Mar-	Unit III	Differential Operator & Line Integral		
	Apr		Gradient, divergence and curl	03	
			Line integral, existence and evaluation,	03	12
			work done	03	
			Circulation	03	
4	Apr-	Unit IV	Sphere		
	May		Different forms of Sphere	03	
			Plane section of sphere	02	13
			Sphere through given circle	03	
			Intersection of sphere & line	03	
			Orthogonal Sphere & Condition of orthogonality	02	
5	May	Unit V	Cone & Cylinder		
			The equation of a cone with a guiding curve,	03	
			cone with vertex at origin,	03	12
			Right circular cone.	03	
			Cylinder-Equation of right circular cylinder.	03	

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. II nd Year Semester:- III Paper:- V -Advanced Calculus

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

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

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

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.
	Feb	Unit. I	Group:		
1			Definition, examples. properties	03	
			Subgroup, Cyclic Groups	03	12
			Order of generator of cyclic group	02	
			Permutation Group	02	
			Even & Odd permutation	02	
2	Mar	Unit II	Cosets & Normal Subgroups :		
			Cosets, Lagrange's Theorem	02	
			Normal Subgroups	03	12
			Different characterizations of normal subgroups,	02	
			Algebra of normal subgroups,	03	
			Quotient group.	02	
3	Mar-	Unit III	Homomorphism and Isomorphism:		
	Apr		Homomorphism, Homomorphic image,	02	
			Kernel of homomorphism, Isomorphism of groups,	03	
			Fundamental theorem of homomorphism,	02	12
			Natural homomorphism.	02	
			Second & Third isomorphism theorem	02	
4	Apr-	Unit IV	Ring, Integral domain and field:		
	May		Definition, examples, Properties of ring	03	
			Subring, Characteristics of a ring	03	12
			Integral domain	03	
			Field, Subfield, Prime field.	03	
_	May	Unit V	Ideal:		
5			Definition ,left Ideal, Right ideal	02	
			Algebra of Ideals	03	13
			Prime ideal, Maximal ideal, Principle ideal	03	
			Quotient Ring	02	
			Ring Homomorphism	03	

Class:-B.Sc. II nd Year Semester:- IV Paper: - VIII Mechanics

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	Feb	Unit. I	Lagrangian Dynamics :		
1			Constraints.	02	12
			Generalised Coordinates	03	12
			D'Alembert's principle	03	
			Lagrange's equations of motion.	04	
2	Mar	Unit II	Central force motion :		
			Areal velocity	02	
			Equivalent one body problem.	03	12
			Central Orbit	03	
			Virial theorem	02	
			Kepler's laws of motions	02	
3	Mar-	Unit III	Calculus of Variation:		
	Apr		Functional, Extremals	03	
			Euler's differential equation	03	12
			Invariance of Euler's equation	02	
			Euler-Poisson equation	02	
			Euler-Ostogradsky equation	02	
4	Apr-	Unit IV	Hamilton's Principle :		
	May		Hamilton principal	03	10
			Lagrange's equation for non holonomic system	03	12
			Routh's Procedure	03	
			Least action Principle	03	
5	May	Unit V	Rigid body :		
			Generalized co-ordinates	02	
			Eulerian angles	03	13
			Euler's theorem	03	
			Finite rotation	03	
			Infinitesimal rotations	02	

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.
	Sept	Unit. I	Riemann Integral :		
1	1		Definition & Examples	04	
			Integrability of continuous and monotonic function	04	
			The fundamental theorem of integral calculus.	04	12
			Mean value theorems of integral calculus.	04	
2	Sept-	Unit II	Improper integrals :		
	Oct		Types of improper integrals	04	
			Comparison Test	04	10
			limit tests.	04	12
			Beta & Gamma Function	04	
3	Oct-	Unit	Analytic functions :		
	Nov	III	Continuity & differentiability of complex functions	02	
			Analytic functions.	03	10
			Cauchy-Riemann equations.	03	12
			Harmonic and Conjugate functions.	02	
			Milne Thompson method	02	
4	Nov-	Unit IV	Elementary functions :		
	Dec		Mapping by elementary functions.	03	
			Mobius transformations.	03	10
			Fixed points. Cross ratio.	02	12
			Inverse points and critical points.	02	
			Conformal mappings.	02	
	Jan	Unit V	Metric Spaces :		
5			Definition & examples of metric spaces.	03	13
			Neighborhoods. Limit points. Interior points.	03	
			Open and closed sets.	03	
			Cauchy sequences.	02	
			Completeness	02	

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

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

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.	02	
			Subspaces. Sum and direct sum of subspaces.	02	
			Linear span. Linear dependence,	02	13
			Independence and their basic properties.	02	
			Basis, Finite dimensional vector spaces.	02	
			Existence theorem for bases.	01	
			Invariance of the number of elements of a basis set.	01	
			Dimension.	01	
2	Mar	Unit II	Linear Transformations		
			Linear transformation & their representation as matrices.	04	
			Algebra of linear transformations.	03	12
			The rank nullity theorem.	02	
			Change of basis.	02	
3	Mar-	Unit III	Dual Spaces		
	Apr		Dual space. Bidual space and natural isomorphism.	04	
			Adjoint of a linear transformation.	04	12
			Eigen values and eigenvectors of a linear transformation.	04	
4	Apr-	Unit IV	Inner Product Spaces		
	May		Inner product spaces. Cauchy-Schwarz inequality.	03	
			Orthogonal vectors. Orthogonal complements.	03	12
			Orthonormal sets and bases.	02	
			Bessel's inequality for finite dimensional spaces.	02	
			Gram Schmidt Orthogonalisation process.	02	
	May	Unit V	Modules		
5			Modules, Submodules,	04	12
			Quotient modules.	04	
			Homomorphism	02	
			Isomorphism	02	

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.
	Feb	Unit. I	Review of Newtonian Mechanics:		
1			Inertial frames. Speed of light and Galilean relativity	02	
			Relative character of space and time	02	
			Postulates of Special theory of relativity	02	12
			Lorentz Transformations	02	
			geometrical interpretation of L.T	02	
			Group properties of transformation	02	
2	Mar	Unit II	Relativistic Kinematics:		
			Composition of parallel velocities.	02	
			Length contraction. Time Dilation	02	
			Transformation equation for components of velocities	02	12
			Transformation equation acceleration of a particle	02	
			Lorentz contraction factor.	02	
3	Mar-	Unit III	Geometrical representation of Space-Time:		
	Apr		4D Minkowskian space-time of relativity.	03	
	- P1		Time, Light Like& space like intervals. Proper time.	03	12
			Four vector and tensors in Minkowskian space-time.	03	
			Operation on Tensors, Outer Product, Inner Product	03	
4	Apr-	Unit IV	Relativistic Mechanics:		
	May		Variation of mass with velocity	02	
	1.100		Equivalence of mass and energy.	03	12
			Transformation equ. for mass, momentum & energy.	02	
			Relativistic force & transf ⁿ equn for its components.	03	
			Relativistic Lagrangian and Hamiltonian.	02	
	May	Unit V	Electromagnetism:		
5			Maxwell's equation in vacuum.	02	
			Propagation of electric and magnetic field strengths.	02	13
			Transformation equation for electromagnetic four	02	
			potential vector.		
			Transformation equation for electric & magnetic	02	
			field strengths.		
			Gauge transformation. Maxwell's equation	03	
			Lorentz force on a charged particle.	02	

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

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

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	July	Unit. I	Definition of Limit of function,	02	
1			Basic properties of limits,	02	
			Continuous functions	02	08
			Classifications of discontinuities.	02	
2	Aug	Unit II	Differentiability,	01	
			Successive differentiation,	02	09
			Leibnitz theorem,	02	
			Indeterminate forms	02	
			L' Hospital rule.	02	
3	Aug-	Unit III	Rolle's theorem.	02	
	Sept		Cauchy's Mean Value theorem,	02	
			Lagrange's mean value theorem.	02	10
			Maclaurin series expansion	02	
			Taylor series expansion.	02	
4	Sept	Unit IV	Partial derivatives	02	
			Differentiation of real valued function of two		00
			variables.	03	09
			Homogeneous function.	02	
			Euler's theorem on homogeneous function.	02	
	Sept-	Unit V	Integration of Irrational algebraic functions,	02	
5	Oct		Reduction formulae	02	
			Walli's formulae	02	
			Quadrature,	02	10
			Rectification	02	

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-	Unit. I	Degree and order of differential equation of first		
	Jan		order and first degree.	02	12
			Equations in which the variables are separable.	02	
			Homogeneous equations.	02	
			Linear equations & equations reducible to linear	02	
			form.		
			Exact differential equations.	02	
			Orthogonal trajectories.	02	
2	Jan	Unit II	Second order linear differential equations with	03	
			constant coefficients.		10
			Homogeneous linear ordinary differential	03	
			equations.		
			Equations reducible to homogeneous differential	04	
			equation.		
3	Jan-	Unit III	Reduction of order	02	
	Feb		Transformation of the equation by changing the		08
			dependant variable and independent variable	02	
			Normal form. Method of variation of parameters,	02	
			Ordinary simultaneous differential equations.	02	
4	Feb	Unit IV	Formation of Partial differential equations	02	
			Partial differential equations of first order.	02	
			Lagrange's method.	02	08
			Some special types of equations	02	
				1	

5	Mar	Unit V	Compatible Differential equation	02	
			Charpit method	02	
			PDE of Higher order	02	08
			Homogenious & Non-Homogenious equation with	02	
			constant coefficients		

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.	02	
			Product of four vectors,	02	10
			Vector differentiation	02	
			Vector integration.	02	
2	Jan-	Unit II	Space Curves.	02	
	Feb		t, n, b vectors.	02	
			Fundamental planes. Curvature,	03	10
			Torsion, Frenet-Serete's Formulae.	03	
3	Feb	Unit III	Gradient, divergent and curl	02	
			Line integral,	02	
			existance and evaluation,	03	10
			work done., Greens Theorem.	03	
4	March	Unit IV	Sphere: Different forms of Sphere	02	
			Plane section of sphere	02	
			Sphere through given circle	02	10
			Intersection of sphere &line	02	
			Orthogonal Sphere & Condition of orthogonality	02	
5	March	Unit V	Cone, The equation of a cone with a guiding curve,	2	
			cone with vertex at origin, Right circular cone.	3	08
			Cylinder. Equation of right circular cylinder.	3	

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

Department of Mathematics Teaching Plan 2017-19

Class:-B.Sc. II nd Year Semester:- III

Paper:- V -Advanced Calculus

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

B.Sc. II nd Year **Semester:-** III

Paper:- VI –Elementary Number Theory

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

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.
	Dec-	Unit. I	Group: Definition, examples. properties	02	
1	Jan		Subgroup, Cyclic Groups	03	10
			Order of generator of cyclic group	02	
			Permutation Group	03	
2	Jan	Unit II	Cosets & Normal Subgroups :		
			Cosets ,Lagrange's Theorem	02	
			Normal Subgroups	02	10
			Different characterizations of normal subgroups,	02	
			Algebra of normal subgroups,	02	
			Quotient group.	02	
3	Feb	Unit III	Homomorphism and Isomorphism:		
			Homomorphism, Homomorphic image,	03	11
			Kernel of homomorphism, Isomorphism of groups,	03	
			Fundamental theorem of homomorphism,	02	
			Natural homomorphism.	01	
			Second & Third isomorphism theorem	02	
4		Unit IV	Ring, Integral domain and field:		
	Mar		Definition, examples, Properties of ring	02	
			Subring, Characteristics of a ring	03	10
			Integral domain	02	
			Field, Subfield, Prime field,	03	
	Mar	Unit V	Ideal: Definition , left Ideal, Right ideal	02	
5			Algebra of Ideals	02	
			Prime ideal, Maximal ideal, Principle ideal	03	11
			Quotient Ring	02	
			Ring Homomorphism	02	

Class:-B.Sc. II nd Year

Semester:- IV

Paper: - VIII Mechanics

Sr. No	Month	Unit	Name of Unit & Topics	Required Lect.	Total Lect.
	Jan	Unit. I	Constraints.	02	
1			Generalised Coordinates	02	10
			D'Alembert's principle	02	10
			Lagrange's equations of motion.	04	
2	Jan-	Unit II	Central force motion : Areal velocity.	02	
	Feb		Equivalent one body problem.	02	
			Central Orbit.	02	10
			Virial theorem.	02	
			Kepler's laws of motions	02	
3	Feb	Unit III	Calculus of Variation: Functional, Extremals	02	
			Euler's differential equation	02	
			Invariance of Euler's equation	02	10
			Euler-Poisson equation	02	
			Euler-Ostogradsky equation	02	
4	Feb-	Unit IV	Hamilton's Principle	02	
	Mar		lagrange's equation	02	00
			Routh's Procedure	02	08
			Least action Principle	02	
5	Mar	Unit V	Rigid body ,Generalized co-ordinates	02	
			Eulerian angles	02	
			Euler's theorem	02	10
			Finite rotation	02	
			Infinitesimal rotations	02	

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Department of Mathematics Teaching Plan 2017-19

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

Paper:-I X Mathematical Analysis

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

Class:-B.Sc. III rd Year

Semester:- V

Paper:- X- Mathematical Methods

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

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-	Unit. I	Vector Space :		
	Jan		Definition and example of vector spaces.	02	
			Subspaces. Sum and direct sum of subspaces.	02	
			Linear span. Linear dependence,	02	12
			Independence and their basic properties.	02	
			Basis, Finite dimensional vector spaces.	01	
			Existence theorem for bases.	01	
			Invariance of the number of elements of a basis set.	01	
			Dimension.	01	
2	Jan	Unit II	Linear Transformations		
			Linear transformation & their representation as matrices.	04	
			Algebra of linear transformations.	02	10
			The rank nullity theorem.	02	
			Change of basis.	02	
3		Unit III	Dual Spaces		
	Feb		Dual space. Bidual space and natural isomorphism.	03	
			Adjoint of a linear transformation.	02	09
			Eigen values and eigenvectors of a linear transformation.	04	
4	Feb-	Unit IV	Inner Product Spaces		
	Mar		Inner product spaces. Cauchy-Schwarz inequality.	03	
			Orthogonal vectors. Orthogonal complements.	03	12
			Orthonormal sets and bases.	02	
			Bessel's inequality for finite dimensional spaces.	02	
			Gram Schmidt Orthogonalisation process.	02	
	Mar	Unit V	Modules		
5			Modules, Submodules,	03	08
			Quotient modules.	02	
			Homomorphism and Isomorphism theorems.	03	

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

Sr.	Month	Unit	Name of Unit & Topics	Required	
No.	Jan	Unit. I	Review of Newtonian Mechanics:	Lect.	Lect.
1	Jan	Umi. I	Inertial frames. Speed of light and Galilean relativity	02	
1			Relative character of space and time.	02	
			Postulates of Special theory of relativity.	02	10
			Lorentz Transformations and its geometrical	02	10
			interpretation. Group properties of transformation	04	
2	Jan-	Unit II	Relativistic Kinematics:		
2	Feb	Unit H		02	
	гео		Composition of parallel velocities.	02	
			Length contraction. Time Dilation.	02	10
			Transformation equation for components of velocities	04	10
			and acceleration of a particle	04 02	
2	E-1	TT •4 TTT	Lorentz contraction factor.	02	
3	Feb	Unit III	Geometrical representation of Space-Time:	02	
			4D Minkowskian space-time of relativity.	02	
			Time, Light Like& space like intervals. Proper time.	02	11
			World line of a particle. Four vector and tensors in	0.4	11
			Minkowskian space-time.	04	
			Operation on Tensors, Outer Product, Inner Product	03	
4		Unit IV	Relativistic Mechanics: Variation of mass with	03	
	Feb-		velocity		
	Mar		Equivalence of mass and energy.	03	12
			Transformation equ. for mass, momentum & energy.	03	
			Relativistic force & transf ⁿ equn for its components.	03	
			Relativistic Lagrangian and Hamiltonian.		
	Mar	Unit V	Electromagnetism: Maxwell's equation in vacuum.	01	
5			Propagation of electric and magnetic field strengths.	02	
			Transformation equation for electromagnetic four	02	11
			potential vector.		
			Transformation equation for electric & magnetic	02	
			field strengths.		
			Gauge transformation. Maxwell's equation	03	
			Lorentz force on a charged particle.	01	