



# GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG

Department of Mathematics

Teaching Plan

Academic Year – 2023-24



NAME OF THE TEACHER :- DR. SHOBHA RANI

CLASS :B.SC. I SEM

PAPER- I

TITLE- CALCULUS

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mo de of Delivery
August September	I/II	Differentiability and its geometrical interpretation; Rolle's theorem, Lagranges mean value theorem, cauchy's mean value theorem and their geometrical interpretation, Darbox's theorem. Successive differentiation and Lebnitz theorem , Maclaurin's and taylor's theorem for expansion of function	19	1.Flip the class  2.Group discussion  3.Problem Solving
October	II/III	Taylor's theorem in finite form with lagrange, Cauchy and Roche- Schlomilch forms of remainder. Curvature; Aymptotes of general algebraic curves , parallel Aymptotes ,asymptotes parallel to axes. Point of inflection, tangent at origin, multiple points	20	4.Virtual Classes
November	III/IV	Position and nature of double points, tracing of cartesian, polar and parametric curves. Limit, continuity and first order partial derivatives , higher order partial derivatives ,change of variable ,Euler's theorem for homogeneous functions .Taylor's theorem ,total differentiation and jacobian	22	
December	V	Double integration and rectangular and non rectangular regions ,Double integrals in polar coordiantes, Tripal integral over a parallelepiped and solid regions, volume by tripal integrals .		

Teacher

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Academic Year – 2023-24



NAME :- DR. SHOBHA RANI

CLASS :B.SC. II SEM

PAPER- DSC

TITLE- DIFFERENTIAL EQUATION

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mode of Delivery
JANUARY	I	Basic Concept and genesis of ordinary differential equations, order and degree of a differential equation, differential equation of first order and first degree.	19	1.Flip the class 2.Group discussion 3.Problem Solving
FEBRUARY	I/II	Equations in which variables are separable, homogeneous equations, linear differential equations and equations reducible to linear form. Statement of existence and uniqueness theorem for linear differential equations, general theory of linear differential equations of second order with variable coefficients ,solution of homogeneous linear ordinary differential equations of second order with constant coefficients.	20	4.Virtual Classes
MARCH	III/IV	linearly dependent and linearly independent solutions on an Interval, Wronskian and its properties,concept of a general solution of a linear differential equation. Power series method, Bessel's equation, Bessel's function and their properties, Recurrence relations.	22	
APRIL	V	Simple harmonic motion, Velocities and acceleration along radial and transverse direction		

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**NAME :- DR. SHOBHA RANI**

**CLASS :B.SC. III SEM**

**PAPER- DSC**

**TITLE- ABSTRACT ALGEBRA**

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mode of Delivery
August September	I/II	Definition and examples of groups, Elementary Properties of groups, Symmetric group, Abelian Group, The Dihedral groups. Modulo, its properties and examples. Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.	22	1.Flip the class 2.Group discussion 3.Problem Solving
October	III	Cyclic groups, Properties of Cyclic groups, Normal subgroups, Cosets, Properties of Cosets, Factor groups, Lagrange's theorem.	20	4.Virtual Classes
November	IV	Permutation groups, Cycle notation for permutations, Properties of Permutations, Even and odd Permutations, alternating groups. Group homomorphisms, Properties of homomorphisms	25	
December	V	Kernel of homomorphism, Group isomorphisms, Cayley's theorem, Properties of isomorphisms, First, Second and Third isomorphism theorem for groups.		

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Academic Year – 2023-24



NAME :- DR. SHOBHA RANI

CLASS :B.SC. IV SEM

PAPER- DSC

TITLE- REAL ANALYSIS

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mode of Delivery
JANUARY	I	Algebraic and order properties of Absolute value of a real number; Bounded above and bounded below sets, Supremum and infimum of a nonempty subset of Real number.	19	1.Flip the class 2.Group discussion 3.Problem Solving
FEBRUARY	II/III	The completeness property of $\mathbb{R}$ , Archimedean property, Density of rational numbers in Definition and types of intervals, Nested intervals property; Neighborhood of a point in $\mathbb{R}$ , Open and closed sets in real number. Convergent sequence, Limit of a sequence, Bounded sequence,	20	4.Virtual Classes
MARCH	III/IV	Limit theorems, Monotone sequences, Monotone convergence theorem, Subsequences, Bolzano-Weierstrass theorem for sequences, Limit superior and limit inferior for bounded sequence, Cauchy sequence, Cauchy's convergence criterion. Convergence and divergence of infinite series of real numbers, Necessary condition for convergence, Cauchy criterion for convergence; Tests for convergence of positive term series: Integral test,	29	
APRIL	V	Basic comparison test, Limit comparison test, D'Alembert's ratio test, Cauchy's $n$ th root test. Alternating series, Leibniz test, Absolute and conditional convergence, Abel's test, Dirichlet test, Test for absolute Convergence.		

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NAME OF THE TEACHER :- Dr. SHOBHA RANI

CLASS : B.SC. IV

PAPER- DSE

TITLE – MECHANICS

Month	Unit/ Title	Topic of lectures	No. of lect ure	Method/Mode of Delivery
JANUARY	I	Stability, Stable and Unstable equilibrium, Test for Determining the Nature of Stability.	19	1.Flip the class
FEBRUARY	II/III	Virtual Displacement and Virtual Work, Principle of Virtual Work for a System of Coplanar Forces Acting on a Particle and Different Points of a Rigid Body, Method of Solving the Problems, Problems on Simple Frame Work. Definitions, Intrinsic Equation of the Common Catenary..	20	2.Group discussion 3.Problem Solving
MARCH	III/IV	Cartesian Equation of the Common Catenary, Geometrical Properties of the Catenary. Equation of Projectile, Vertex, Axis, Latus-Rectum, Focus and Directrix of the Trajectory, Velocity and Direction of the Projectile at a given time & at the given Height, Greatest Height of Projectile, Time of Flight, Horizontal Range, Maximum Horizontal Range.	29	4.Virtual Classes
APRIL	V	Sag of Telegraph Wires (Tightly Stretched Wire), Approximation to the Common Catenary, Projection on an Inclined Plane, The Range and Time of Flight Down an Inclined Plane.		

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NAME OF THE TEACHER :- Dr. SHOBHA RANI

CLASS : B.SC. III

PAPER- III

TITLE – DISCRETE MATHEMATICS

Month	Unit/Title	Topic of lectures	No. of lecture	Method/Mode of Delivery
August	I	Sets and proposition - cardinality. Mathematical induction. Principle of inclusion and exclusion.	17	1. Flip the class 2. Group discussion
September	I	Computability and formal languages - Ordered sets. Languages, Phrase structure grammars. Types of grammars and languages. Permutations, Combinations and Discrete probability	13	3. Problem Solving 4. Virtual Classes
October	II	Graphs and planar Graphs - Basic terminology, Multi graphs, Weighed graphs, Paths and circuits, Shortest paths,	12	
November	II	Eularian paths and circuits. Travelling salesman problem, Planar graphs. Trees.	11	
December	III	Finite state machines Equivalent machines. Finite state machines as language recognizers. Analysis of algorithms - Time complexity. Complexity of problems. Discrete numeric functions and Generating functions.	12	
January	IV	Recurrence relations and Recursive algorithms – Linear recurrence relations with constant coefficients. Homogeneous solutions. Particular solution. Total solution. Solution by the method of generating functions	11	
February	V	Boolean algebras - Lattice and algebraic structures. Duality. Distributive and complemented Lattices. Boolean lattices and Boolean algebras. Boolean functions and expressions	12	
March	V	Proposition calculus. Design and implementation of Digital Networks. Switching circuits.	11	

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NAME OF THE TEACHER :- DR. SHOBHA RANI

CLASS : M.SC. III SEM

PAPER- I

TITLE – INTEGRATION THEORY AND FUNCTIONAL ANALYSIS(I)

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mode of Delivery
August	I	Signed measure. Hahn decomposition theorem. mutually singular measures. Radon-Nikodym theorem. Lebesgue decomposition. Riesz representation theorem. Extension theorem (Caratheodory). Product measures. Fubini's theorem.	10	1. Flip the class 2. Group discussion 3. Problem Solving 4. Virtual Classes
September	II	Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness. equivalent norms. Riesz Lemma.	24	
October	III	Basic properties of finite dimensional normed linear spaces and compactness. Weak convergence and bounded linear transformations, normed linear spaces	24	
November	III IV	Bounded linear transformations, dual spaces with examples. Contraction mapping theorem and its application. Banach fixed point theorem. Picard's theorem.		
December	IV	Banach fixed point theorem as a source of existence and uniqueness theorem for integral equations. Nonlinear operator, examples convex function, epigraph, monotone mapping, $\alpha$ -monotone, coercive mapping duality maps.	20	

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NAME OF THE TEACHER :- DR. SHOBHA RANI

CLASS : M.SC. IV SEM.

PAPER- I

TITLE – FUNCTIONAL ANALYSIS -II

Month	Unit/Title	Topic of lectures	No. of lecture	Method/Mode of Delivery
January	Unit-I	Uniform boundedness theorem and some of its consequences. Open mapping and closed graph theorem. Hahn-Banach theorem for real linear spaces, complex linear spaces and linear spaces	12	1. Flip the class 2. Group discussion 3. Problem Solving
February	Unit- II	Normed linear spaces. Reflexive spaces. Weak Sequential Compactness. Compact Operators. Solvability of Linear equations in Banach spaces (Fredholm alternatives). The closed Range Theorem. Inner product spaces.	22	4. Virtual Classes
March	Unit II & III	Hilbert spaces. Orthonormal Sets. Bessel's inequality. Complete orthonormal sets and Parseval's identity. Structure of Hilbert spaces. Projection theorem. Riesz representation theorem. Adjoint of an operator on a Hilbert space. Reflexivity of Hilbert spaces.	26	
April	UnitIV	Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata. Moore and mealy Machines. Turing Machine and Partial Recursive Functions.	24	

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