



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

Department of Mathematics Teaching Plan Academic Year – 2023-24



NAME – BIJMA KUMARI

CLASS – M.Sc. III SEM

PAPER- II

TITLE- PARTIAL DIFFERENTIAL EQUATIONS

Month	Covered Topic	Classes	Method/Mode of Delivery
September	Examples of PDE. Classification. Transport Equation - Initial value Problem. Non-homogeneous equation. Laplace's Equation - Fundamental Solution. Mean Value Formulas. Properties of Harmonic Functions. Green's Function. Energy Methods. Heat Equation - Fundamental Solution. Mean Value Formula. Properties of Solutions. Energy Methods. Wave Equation - Solution by Spherical Means. Non-homogeneous Equations. Energy Methods	20	1. Chalk and talk method 2. Flip the class 3. Group discussion
October	Nonlinear First Order PDE-Complete Integrals. Envelopes, Characteristics. Hamilton Jacobi Equations (Calculus of Variations. Hamilton's ODE. Legendre Transform. Hopf-Lax Formula. Weak Solutions. Uniqueness). Conservation Laws	17	4. Problem Solving
November	Representation of Solutions - Separation of Variables. Similarity Solutions (Plane and Travelling Waves. Solitons. Similarity under Scaling). Fourier and Laplace Transform. Hopf-Cole Transform. Hodograph and Legendre Transforms. Potential Functions	23	
December	Asymptotic (Singular Perturbations. Laplace's Method. Geometric Optics. Stationary Phase. Homogenization). Power Series (Non-characteristic Surfaces. Real Analytic Functions. Cauchy-Kovalevskaya Theorem).	15	

Teacher

HOD

Principal



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NAME -BIJMA KUMARI

CLASS - M.SC. IV SEM

PAPER- II

TITLE- MECHANICS

Month	Covered Topic	Classes	Method/Mode of Delivery
January	Generalized coordinates. Holonomic and Non-holonomic systems. Scleronomic and Rheonomic systems. Generalized potential. Lagrange's equations of first kind. Lagrange's equations of second kind. Uniqueness of solution. Energy equation for conservative fields. Hamilton's variables. Donkin's theorem. Hamilton canonical equations. Cyclic coordinates. Routh's equations	18	1.Chalk and talk method 2. Flip the class
February	Poisson's Bracket. Poisson's Identity. Jacobi-Poisson Theorem. Motivating problems of calculus of variations, Shortest distance. Minimum surface of revolution. Brachistochrone problem. Isoperimetric problem. Geodesic. Fundamental lemma of calculus of variations. Euler's equation for one dependent function and its generalization to (1) 'n' dependent functions, (ii) higher order derivatives. Conditional extremum under geometric constraints and under integral constraints. Hamilton's Principle. Principle of least action. Poincare Cartan Integral invariant	18	3.Group discussion 4.Problem Solving
March	Whittaker's equations. Jacobi's equations. Statement of Lee Hwa Chung's theorem. Hamilton-Jacobi equation. Jacobi theorem. Method of separation of variables. Lagrange Brackets. Condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets, invariance of Lagrange brackets and Poisson brackets under canonical transformations	24	
April	Attraction of rod, disc, spherical shells and sphere. Surface integral of normal attraction (application & Gauss' theorem). Potential of rod, disc, spherical shells and sphere. Laplace and Poisson equations. Work done by self attracting systems. Distributions for a given potential. Equipotential surfaces. Surface and solid harmonics. Surface density in terms of surface harmonics	24	

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Department of Mathematics Teaching Plan Academic Year – 2023-24



NAME :- BIJMA KUMARI

CLASS :B.SC. I SEM

PAPER- DSC

TITLE- CALCULUS

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mode 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	Curvature; Aymptotes of general algebraic curves, parallel Asymptotes, 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 .Taylors theorem ,total differentiation and jacobian	22	
December	V	Double integration and rectangular and non rectangular regions , Double integrals in polar cooridianates ,Tripal integral over a parallelepiped and solid regions ,volume by tripal integrals .		

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NAME :- BIJMA KUMARI

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
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	3.Problem Solving 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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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
October	III	Cyclic groups, Properties of Cyclic groups, Normal subgroups, Cosets, Properties of Cosets, Factor groups, Lagrange's theorem.	20	3.Problem Solving
November	IV	Permutation groups, Cycle notation for permutations, Properties of Permutations, Even and odd Permutations, alternating groups. Group homomorphisms, Properties of homomorphisms	25	4.Virtual Classes
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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NAME :- BIJMA KUMARI

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
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 , Open and closed sets in real number. Convergent sequence, Limit of a sequence, Bounded sequence,	20	2.Group discussion
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	3.Problem Solving
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.		4.Virtual Classes

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TEACHER :- BIJMA KUMARI

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.	7	1.Flip the class 2.Group discussion 3.Problem Solving 4.Virtual Classes
September	I	Computability and formal languages - Ordered sets. Languages, Phrase structure grammars. Types of grammars and languages. Permutations, Combinations and Discrete probability	13	
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. Finitestate 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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