Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.) 491111

<mark>DEPARTMENT OF MATHEMATICS</mark>
Teaching Plan
Academic Year: 2023-2024

Name of department – **Mathematics**   CLASS: <mark>M.Sc. I Sem.</mark>
Name of teacher –**Jaynendra Shrivas**   Course Title: **Advanced Abstract Algebra -**I
Course type: **Theory**   Paper- I

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Groups - Normal and Subnormal series. Composition series. Jordan-Holder theorem. Solvable groups. Nilpotent groups.	**20**	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
August	Unit – 2	Field theory- Extension fields. Algebraic and transcendental extensions. Separable and inseparable extensions. Algebraically closed fields.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
September	Unit – 3	Perfect fields. Finite fields. Primitive elements. Normal extensions, Splitting field.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
October	Unit-4	Automorphism of extensions. Galois extensions. Fundamental theorem of Galois theory.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
November	Unit –5	Solution of polynomial equations by radicals. Insolvability of the general equation of degree 5 by radicals.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
December	Exam. Prep.	Problem solving Old Question Paper solving Extra Class for Slow and Advance Learner Project Preparation Internal Exam P.L. University Exam	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes

Signature of teacher   Signature of H.O.D   Signature of principal

Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.) 491111

DEPARTMENT OF MATHEMATICS
Teaching Plan
Academic Year: 2023-2024

Name of department – **Mathematics**
Course Title: **Real Analysis-I**
Name of Teacher- Priya Chandrakar

Class: M.Sc. I Sem.
Course type: **Theory**
Paper-II

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Sequences and series of functions, point-wise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel 's and Dirichlet 's tests for uniform convergence, uniform convergence and continuity, definition and simple properties of Riemann -Stieltjes integral, uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation, Weierstrass approximation theorem	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
August	Unit – 2	Power series, uniqueness theorem for power series, Abel's and Tauber's theorems. Rearrangements of terms of a series, Riemann's theorem.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit - 3	Functions of several variables, linear transformations, Derivatives in an open subset of R n , Chain rule, Partial derivatives, interchange of the order of differentiation, Derivatives of higher orders, Taylor 's theorem, Inverse function theorem, Implicit function theorem.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
October	Unit – 4	Jacobians, extremum problems with constraints, Lagrange's multiplier method, Differentiation of integrals.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
November	Unit – 5	Partitions of unity, Differential forms, Stoke's theorem.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
December	Exam. Prep.	Problem solving Old Question Paper solving Extra Class for Slow and Advance Learner Project Preparation Internal Exam P.L. University Exam	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes

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Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: M.Sc. I- Sem.
Course Title: **Topology-I**   Course type: **Theory**
Teacher- Priya Chandrakar   Paper- III

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Countable and uncountable sets. Infinite sets a n d the Axiom of. Choice. Cardinal numbers and its arithmetic. Schroeder-Bernstein theorem. Cantor's theorem and the continuum hypothesis. Zorn 's lemma, well-ordering theorem. Definition and examples of topological spaces. Closed sets. Closure. Dense subsets. Neighbor-hoods. Interior, exterior and boundary. Accumulation points and derived sets. Bases and sub-bases. Subspaces and relative topology.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
August	Unit - 2	Alternate methods of defining a topology in terms of Kuratowski Closure Operator and Nbd. Systems. Continuous functions and homeomorphism. First and Second Countable spaces. Lindelof 's theorems. Separable spaces. Second countability and separability.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit – 3	Separation axioms; their Characterizations and basic properties. Urysohn's lemma, Tietze extension theorem.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
October	Unit – 4	Compactness. Continuous functions and compact sets. Basic properties of Compactness. Compactness and finite intersection property. Sequentially and countably compact sets. Local compactness and one point compactification. Stone-Cech compactification	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
November	Unit – 5	Compactness in metric spaces. Equivalence of compactness, countable Compactness, and sequential compactness in metric space. Connected spaces. Connectedness on the real line. Components. Locally connected spaces.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
December	Exam. Prep.	Problem solving Old Question Paper solving Extra Class for Slow and Advance Learner Project Preparation Internal Exam P.L. University Exam	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes

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Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   CLASS: **M.Sc. I- Sem.**
Name of teacher –**Jaynendra Shrivas**   Course Title: **Advanced Complex Analysis-I**
Course type: **Theory**   Paper- IV

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Complex integration, Cauchy- Goursat. Theorem. Cauchy's integral formula. Higher order derivatives. Morera's Theorem. Cauchy 's Inequality and Liouville's theorem. The fundamental theorem of algebra. Taylor's theorem. Laurent's series. Isolated singularities. Meromorphic functions.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
August	Unit - 2	Maximum modulus principle. Schwarz lemma. The argument principle. Rouche's theorem Inverse function theorem.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit – 3	Residues. Cauchy's residue theorem. Evaluation of integrals. Branches of many valued functions with special reference to arg z, log z.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
October	Unit-4	Definitions and examples of conformal mapping Bilinear transformations, their properties and classifications.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
November	Unit –5	Spaces of analytic functions. Hurwitz 's theorem. Montel 's theorem Riemann mapping theorem.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
December	Exam. Prep.	Problem solving Old Question Paper solving Extra Class for Slow and Advance Learner Project Preparation Internal Exam P.L. University Exam	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes

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Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: **M.Sc. I Sem.**
Name of teacher –**Dr. R. K. Verma**   Course Title: **Advance Discrete Mathematics- I**
Course type: **Theory**   Paper- V

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Formal Logic-Statements. Symbolic Representation and Tautologies. Quantifiers, Predicates and Validity. Propositional Logic. Semigroups & Monoids-Definitions and Examples of Semigroups and Monoids (including those pertaining to concatenation operation).	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
August	Unit – 2	Homomorphism of semigroups and monoids. Congruence relation and Quotient Semigroups. Sub-semigroup and sub-monoids. Direct Products. Basic Homomorphism Theorem.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit-3	Lattices-Lattices as partially ordered sets. Their properties. Lattices as Algebraic Systems. Sublattices, Direct products, and Homomorphisms. Some Special Lattices e.g., Complete, Complemented and Distributive Lattices. Boolean Algebras-Boolean Algebras as Lattices. Various Boolean Identities. The Switching Algebra example. Sub-algebras.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
October	Unit - 4	Direct Products and Homomorphisms. Join-Irreducible elements, Atoms and Minterms. Boolean Forms and Their Equivalence. Minterm Boolean Forms, Sum of Products Canonical Forms. Minimization of Boolean Functions. Applications of Boolean algebra to Switching Theory (using AND, OR & NOT gates). The Karnaugh Map Method.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
November	Unit - 5	Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules. Derivations. Sentential Forms. Language generated by a Grammar. Regular, Context-Free, and Context Sensitive Grammars and Languages. Regular sets, Regular Expressions and the Pumping Lemma. Kleene's Theorem. Notions of Syntax Analysis, Polish Notations. Conversion of Infix Expressions to Polish Notations. The Reverse Polish Notation.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
December	Exam Prep.	Problem solving Old Question Paper solving Extra Class for Slow and Advance Learner Project Preparation Internal Exam P.L. University Exam	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: **M.Sc. II Sem.**
Name of teacher –**Jaynendra Shrivas**   Course Title: **Advanced Abstract Algebra -**II
Paper No.- I   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
January	Unit – 1	Modules - Cyclic modules. Simple modules. Semi-simple modules. Schuler's Lemma. Free modules. Noetherian and Artinian modules and rings-Hilbert basis theorem. Wedderburn Artin theorem. Uniform Modules, primary modules, and Noether-Lasker theorem.	15	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
February	Unit – 2	Linear Transformations - Algebra of linear transformation, Singular and non-singular transformation, characteristic roots and vectors, matrices and linear transformations.	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit-3	Canonical Forms - Similarity of linear transformations. Invariant subspaces. Reduction to triangular forms. Nilpotent transformations. Index of nilpotency. Invariants of a nilpotent transformation. The primary decomposition theorem. Jordan blocks and Jordan forms	10	
March	Unit –4	Smith normal form over a principal ideal domain and rank. Fundamental structure theorem for finitely generated modules over a Principal ideal domain and its applications to finitely generated abelian groups.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit- 5	Rational canonical from. Generalized Jordan form over any field.	10	
April	Revision	**Rest Part of above topics**	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Exam. Prep.	Problem Solving Classes Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, Remedial/ Tutorial Classes etc	15	

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

DEPARTMENT OF MATHEMATICS
Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**

Name of teacher –**Priya Chandrakar**

Paper No.-II

Class: **M.Sc. II Sem.**

Course Title: **Real Analysis -II**

Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
January	Unit – 1	Definition and existence of Riemann-Stieltjes integral, Properties of the Integral, integration and differentiation, the fundamental theorem of Calculus, integration of vector-valued functions, Rectifiable curves.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
February	Unit – 2	Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability. Non-measurable sets. Integration of Non-negative functions. The General integral. Integration of Series.	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit-3	Measures and outer measures, Extension of a measure. Uniqueness of Extension. Completion of a measure. Measure spaces. Integration with respect to a measure. Reimann and Lebesgue Integrals.	10	
March	Unit – 4	The Four derivatives. Lebesgue Differentiation Theorem. Differentiation and Integration.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit – 5	Functions of Bounded variation. The Lp -spaces. Convex functions. Jensen 's inequality. Holder and Minkowski inequalities. Completeness P of Lp, Convergence in Measure, Almost uniform convergence	10	
April	Revision	**Rest Part of above Units.** .	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, Remedial and Tutorial Coachings. etc.	15	

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

Name of department – **Mathematics**   Class: **M.Sc. II Sem.**
Name of teacher –**Priya Chandraker**   Course Title: **Algebraic Topology-II**
Paper No.-III   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
January	Unit – 1	Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
February	Unit – 2	Product spaces, separation axioms, Connectedness (Tychonoff's theorem). Compactness, product spaces Countability in product space.	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit-3	Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Metrization theorems and Paracompactness-Local finiteness. The Nagata-Smirnov metrization theorem. Paracompactness. The Smirnov metrization theorem	10	
March	Unit – 4	Nets and filter. Topology and convergence of nets. Hausdorffness and nets. Compactness and nets. Filters and their convergence. Canonical way of converting nets to filters and vice-versa. Ultra-filters and Compactness.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit – 5	The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering spaces. The fundamental group of the circle and the fundamental theorem of algebra.	10	
April		**Rest Part of above Units.**	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, etc.	15	

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: **M.Sc. II Sem.**
Name of teacher –**Jaynendra Shrivas**   Course Title: **Advanced Complex Analysis-I**I
Paper No.-IV   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
January	Unit – 1	Weierstrass factorization theorem. Gamma function and its properties. Riemann Zeta function. Riemann's functional equation. Runge's theorem. Mittag-Leffler 's theorem.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
February	Unit – 2	Analytic Continuation. Uniqueness of direct analytic continuation. Uniqueness of analytic continuation along a curve. Power series method of analytic continuation Schwarz Reflection Principle. Monodromic theorem and its consequences.	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit –3	Harmonic functions on a disk. Harnack's inequality and theorem. Dirichlet Problem. Green's function.	10	
March	Unit- 4	Canonical products. Jensen's formula. Poisson – Jensen formula. Hadamard's three circles theorem. Order of an entire function. Exponent of Convergence. Borel's theorem. Hadamard's factorization theorem.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit-5	The range of an analytic function. Bloch's theorem. The Little Picard theorem. Schottky 's theorem. Montel Caratheodory and The Great Picard theorem. Univalent functions. Bieberbach 's conjecture (Statement only) only) and the "1/4 -theorem	10	
April	Revision	**Rest Part of above Units.**	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, etc	15	

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: **M.Sc. II Sem.**
Name of teacher –**Dr. R. K. Verma**   Course Title: **Advanced Discrete Mathematics-I**I
Paper No.-V   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
January	Unit – 1	Graph Theory-Definition of (Undirected) Graphs, Paths, Circuits, Cycles, & Subgraphs. Induced Subgraphs. Degree of a vertex. Connectivity. Planar Graphs and their properties. Trees. Euler's Formula for connected planar Graphs. Complete & Complete Bipartite Graphs. Kuratowski's Theorem (statement only) and its use.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
February	Unit – 2	Spanning Trees, Cut-sets, Fundamental Cut -sets, and Cycle. Minimal Spanning Trees and Kruskal's Algorithm. Matrix Representations of Graphs. Euler 's Theorem on the Existence of Eulerian Paths and Circuits.	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Unit-3	Directed Graphs. In degree and Out degree of a Vertex. Weighted undirected Graphs. Dijkstra's Algorithm..strong Connectivity & Warshall's Algorithm. Directed Trees. Search Trees. Tree Traversals.	10	
March	Unit-4	Introductory Computability Theory-Finite State Machines and their Transition Table Diagrams. Equivalence of finite State Machines. Reduced Machines. Homomorphism.	15	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test
	Unit-5	Finite Automata. Acceptors. 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	10	
April	Revision	**Rest Part of above Units.**	10	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation Remedial/ Tutorial Coachings, etc	15	

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

DEPARTMENT OF MATHEMATICS
Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**

Name of teacher –**Jaynendra Shrivas**

Paper No.-I

Class: **M.Sc. III Sem.**

Course Title: **Functional Analysis**

Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Signed measure. Hahn decomposition theorem, mutually singular measures. Radon-Nikodym theorem. Lebesgue decomposition. Riesz-representation theorem. Extension theorem (Caratheodory).	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
August	Unit – 2	Lebesgue-Stieltjes integral, product measures, Fubini 's theorem. Differentiation and Integration. Decomposition into absolutely continuous and singular parts.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit – 3	Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness, equivalent norms. Riesz Lemma, basic properties of finite dimensional normed linear spaces and compactness.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
October	Unit – 4	Weak convergence and bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
November	Unit- 5	Contraction mapping theorem and its application, Banach fixed point theorem, Picard's theorem, Banach fixed point theorem as a source of existence and uniqueness theorem for integral equations, Nonlinear operator, example's convex function, epigraph, monotone mapping, monotone, coercive mapping duality maps.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
December	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, etc. P.L. University Exam	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes

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Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

<mark>DEPARTMENT OF MATHEMATICS</mark>
Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: <mark>M.Sc. III Sem.</mark>
Name of teacher –**Jaynendra Shrivas**   Course Title: **Partial Differential Equations**
Paper No.-II   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Sequences and series of functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel 's and Dirichlet 's tests for uniform convergence, uniform convergence and continuity, definition and simple properties of Riemann -Stieltjes integral, uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation, Weierstrass approximation theorem.	20	1.Chalk and talk method 2.Collection of projects 3.Group discussion 4.Test 5.Notes
August	Unit – 2	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.Collection of projects 3.Group discussion 4.Test 5.Notes
September	Unit – 3	Non-linear 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 (Shocks, Entropy Condition, Lax Olenik formula, Weak Solutions, Uniqueness, Riemann 's Problem, Long Time Behaviour)	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
October	Unit – 4	Representation of Solutions-Separation of Variables, Similarity Solutions (Plane and Travelling Waves, Solutions, Similarity under Scaling), Fourier and Laplace Transform, Hopf-Cole Transform, Hodograph and Legendre Transforms, Potential Functions.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test
November	Unit-5	Asymptotic (Singular Perturbations, Laplace 's Method, Geometric Optics, Stationary Phase, Homogenization), Power Series (Non-characteristic Surfaces, Real Analytic Functions, Cauchy-Kovalevskaya Theorem).	20	1.Chalk and talk method 2.Collection of projects 3. Group discussion 4. Test 5.Notes
December	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, etc. P.L. University Exam	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes

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DEPARTMENT OF MATHEMATICS
Teaching Plan
Academic Year: 2022-2023

Name of department – **Mathematics**   Class: **M.Sc. III Sem.**
Name of teacher –**Jaynendra Shrivas**   Course Title: **Fuzzy Set Theory & Its Applications-I**
Paper No.-III   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Fuzzy sets-Basic definitions, ƒÑ-level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products, Algebraic products. Bounded sum and difference, t-norms and t-conorms.	20	1. Chalk and talk method 2. Group discussion 3. Test 4. Notes
August	Unit – 2	The Extension Principle- The Zadeh's extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic.	20	1. Chalk and talk method 2. Group discussion 3. Test 4. Notes
September	Unit – 3	Fuzzy Relations on Fuzzy sets, Composition of Fuzzy relations. Min- Max composition and its properties.	20	1. Chalk and talk method 2. Group discussion 3. Test 4. Notes
October	Unit – 4	Fuzzy equivalence relations. Fuzzy compatibility relations. Fuzzy relation equations. Fuzzy graphs, Similarity relation.	20	1. Use of ICT 2. Chalk and talk method 3. Group discussion 4. Test 5. Notes
November	Unit- 5	Possibility Theory-Fuzzy measures. Evidence theory. Necessity measure. Possibility measure. Possibility distribution. Possibility theory and fuzzy sets. Possibility theory versus probability theory.	20	1.Use of ICT 2. Chalk and talk method 3. Group discussion 4. Test 5. Notes
December	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, Remedial/Tutorial Classes, etc. P..L. University Exam	20	1.Use of ICT 2. Chalk and talk method 3. Group discussion 4. Test 5. Notes

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Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics** Class: **M.Sc. I Sem.**
Name of teacher –**Jaynendra Shrivas** Course Title: **Operations Research-I**
Paper No.-IIV Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Operations Research and its Scope. Necessity of Operations Research in Industry. Linear Programming-Simplex Method. Theory of the Simplex Method. Duality and Sensitivity Analysis.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
August	Unit – 2	Other Algorithms for Linear Programming-Dual Simplex Method.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit – 3	Parametric Linear Programming. Upper Bound Technique. Interior Point Algorithm. Linear Goal Programming.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
October	Unit – 4	Transportation and Assignment Problems. .	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
November	Unit- 5	Network Analysis-Shortest Path Problem. Minimum Spanning Tree Probiem. Maximum Flow I Problem. Minimum Cost Flow Problem. Network Simplex Method. Project Planning and Control I with PERT-CPM	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test Notes
December	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, Remedial/Tutorial, etc. P.L. University Exam	20	1. Chalk and talk method 2. Collection of project. 3.Group discussion 4.Test 5.Notes

Signature of teacher Signature of H.O.D Signature of principal

Government Chandulal Chandrakar Art and Science College, Patan, Dist.-Durg (C.G.)

DEPARTMENT OF MATHEMATICS
Teaching Plan
Academic Year: 2023-24

Name of department – **Mathematics**   Class: **M.Sc. I Sem.**
Name of teacher –**Dr. R. K. Verma**   Course Title: **Graph theory-I**
Paper No.-V   Course type: **Theory**

Month	Title unit	Topic of lecture	No. of lectures	Methods of delivery
July	Unit – 1	Operations on graphs, matrices and vector spaces: Topological operations, Homeomorphisms, homomorphism, contractions, derived graphs, Binary operations.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
August	Unit – 2	Matrices and vector spaces: Matrices and vector spaces: The adjacency matrix, The determinant and the spectrum, Spectrum properties, The incidence matrix, cycle space and Bond space, Cycle bases and cycle graphs.	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes
September	Unit – 3	Colouring packing and covering: Vertex coverings, critical graphs, Girth and chromatic number, uniquely colourable graphs, edge-colourings, Face colourings and Beyond, The achromatic and the Adjoint Numbers.	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
October	Unit- 4	Combinational formulations: Setting up of combinational formulations, the classic pair of duals, Gallai, Norman-Rabin Theorems, Clique parameters, The Rosenfeld Numbers	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
November	Unit- 5	Perfect Graphs: Introduction to the "SPGC", Triangulated (Chordal) graphs, Comparability graphs, Interval graphs, permutation graphs, circular arc graphs, split graphs, weakly triangulated graphs	20	1. Use of ICT 2. Chalk and talk method 3. Collection of projects 4. Group discussion 5. Test 6. Notes
December	Exam. Prep.	Problem Solving Old Question Paper Solving Extra Class for slow and advance learner Internal Exam Project Preparation Examination Preparation, etc. P.L. University Exam	20	1. Chalk and talk method 2. Collection of projects 3. Group discussion 4. Test 5. Notes

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