



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

Department of Mathematics
Teaching Plan

Academic Year – 2023-24



NAME- DR. RAKESH TIWARI

CLASS – B.SC. III YEAR

PAPER- I

TITLE - ANALYSIS

Month	Unit/ Title	Topic of lectures	No. of lecture	Method/Mod e of Delivery
August	I	Construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field. Definition and examples of metric spaces.	17	1. Flip the class 2. Group discussion 3. Problem Solving 4. Virtual Classes
September	I	Neighborhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Sub- Space of a metric space. Cauchy sequences. Completeness. Cantor's intersection theorem. Contraction principle.	13	
October	II	Dense subsets. Baire Category theorem. Separable space, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity. Isometric and homeomorphism. Equivalent metrics. Compactness.	12	
November	II	Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets. Connectedness. Components. Continuous functions and connected sets	11	
December	III	Complex numbers as ordered pair. Geometric representation of Complex numbers. Stereographic projection. Continuity and differentiability of complex functions. Analytic functions. Cauchy- Riemann equations. Harmonic functions. Elementary functions. Mapping by elementary functions. Mobius transformations. Fixed point. Cross ratio. Inverse points and critical mappings. Conformal mappings.	12	
January	IV	Riemann integral. Integrability of continuous and monotonic functions. The fundamental Theorem of integral calculus. Mean value theorems of integral calculus. Improper integrals and their convergence, comparison tests, Abel's and Dirichlet's tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter.	11	
February	V	Series of arbitrary terms. Convergence, divergence and oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real valued functions of two variables.	12	
March	V	Schwarz and Youngs theorem. Implicit function theorem. Fourier series. Fourier expansion of piece wise monotonic function.	11	

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Principal



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Academic Year – 2023-24



NAME- DR. RAKESH TIWARI
PAPER- III

CLASS – M.Sc. I SEM
TITLE – TOPOLOGY

Month	Covered Topic	Classes	Method/Mode of Delivery
July	Countable and uncountable sets. Infinite sets and 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.	12	1. Chalk and talk method 2. Flip the class
Aug	Closed sets, Closure, Dense subsets, Neighborhoods, Interior, Exterior and boundary. Accumulation points and derived sets. Bases and sub-bases. Subspaces and relative topology. Alternate methods of defining a topology in terms of terms of Kuratowski Closure Operator and Neighbourhood Systems.	15	3. Group discussion Problem Solving
Sep	Continuous functions and homeomorphism. First and Second Countable Spaces. Lindelof's theorems. Separable spaces. Second countability and separability.	16	
Oct	Separation axioms - their Characterizations and basic properties. Urysohn's lemma. Tietze extension theorem. Compactness. Continuous functions and compact sets. Basic properties of Compactness. Compactness and finite intersection property.	10	
Nov	Sequentially and Countably compact sets. Local compactness and one point compactification. Stone-Vech compactification. 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.	14	

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**NAME- DR. RAKESH TIWARI
PAPER- IV**

**CLASS – M.SC. III SEM
TITLE – OPERATION RESEARCH(I)**

Month	Covered Topic	Classes	Method/Mode of Delivery
July	Operations Research and its Scope. Necessity of Operations Research in Industry. Linear Programming-graphical method of solutions, Simplex Method. Theory of the Simplex Method.	15	• Flip Chalk and talk method • the class • Group discussion • Problem Solving
Aug	Two phase method. Big M method of solution to an LPP. Duality in linear programming. Duality theorems, Dual Simplex method. Other Algorithms for Linear Programming-Dual Simplex Method.	17	
Sep	Parametric Linear Programming. Upper Bound Technique. Transportation problems. Formulation of transportation problems. Solutions of Transportation problems, North-West corner method.	16	
Oct	Least cost method. Assignment Problems. It's mathematical formulation, Solution of assignment problems. Optimality test. Network Analysis-Shortest Path Problem. Minimum Spanning Tree Problem.	14	
Nov	Maximum Flow Problem. Minimum Cost Flow Problem. Network Simplex Method. Project Planning and Control with PERT-CPM.	12	

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NAME- DR. RAKESH TIWARI

CLASS – M.SC. II SEM

PAPER- III

TITLE – GENERAL AND ALGEBRAIC TOPOLOGY

Month	Covered Topic	Classes	Method/Mode of Delivery
January	Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Product spaces. Connectedness and product spaces. Compactness and product spaces (Tychonoff's theorem). Countability and Product spaces.	20	4. Chalk and talk method 5. Flip the class 6. Group discussion Problem Solving
February	Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Local finiteness. The Nagata-Smirnov metrization theorem. Paracompactness. The Smirnov metrization theorem.	17	
March	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.	20	
April	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	

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NAME- DR. RAKESH TIWARI

CLASS – M.SC. IV SEM

PAPER- IV

TITLE – OPERATION RESEARCH(II)

Month	Covered Topic	Classes	Method/Mode of Delivery
January	Dynamic Programming-Deterministic and Probabilistic Dynamic programming. Integer Programming- Branch and Bound Technique.	19	Chalk and talk method
February	Game Theory-Two-Person, Zero-Sum Games. Games with Mixed Strategies. Graphical, Solution. Solution by Linear Programming.	20	Flip the class Group discussion
March	Nonlinear Programming-One and Multi-Variable Unconstrained Optimization. Kuhn-Tucker \Conditions for Constrained Optimization. Quadratic Programming.	20	Problem Solving
April	Queueing system: Deterministic Queueing system, probability distribution in Queueing, classification of Queueing models, Poission Queueing system ((M/M/I): (∞ /FIFO), (M/M/I): (SIRO) (M/M/I): (N/FIFO)), Inventory control : The concept of EOQ, Deterministic inventory problem with no shortages.	15	

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