



Department of Mathematics
Govt. V.Y.T. PG. Autonomous College
Durg (C. G.)



Vision

To generate skilled mathematical mind, consolidated with all scientific aptitude for every seeker of knowledge based society, to produce both applied and basic mathematical knowledge, revive the basic ancient traditional mathematical knowledge of India and to develop the Department as a centre of academic and research excellence

Mission

- To develop strong knowledge of mathematical science in the students
- To develop interest and understanding of traditional Indian mathematical knowledge
- To motivate young minds to undertake research
- To motivate and prepare students for competitive exams.

Program Outcomes for UG

Code-BMT

PO No.	Program outcomes upon completion of the B. Sc. Degree program, the graduate will be able to
PO No. - 1	Peruse as higher studies in mathematics in reputed institute of our country like IITs, IESER and central university etc.
PO No. – 2	To appear in several competitive examination like CGPSC, UPSC, MAT, Railways, SSC etc.
PO No. – 3	To explain the core ideas and the techniques of mathematics at the college and school.
PO No.- 4	To develop the logical approach to take decision in complicated decision.

Program Specific Outcomes for UG

Code-BMT

PSO No.	Program outcomes upon completion of the B. Sc. Degree program, the graduate learn to
PSO No. - 1	Apply techniques of differential equation in finding general and singular solution.
PSO No. – 2	To learn geometric meaning of differential equation.
PSO No. – 3	To apply Method of variation of parameters for obtaining solution of given differential equations

Course Outcomes for UG

Course Title	B. Sc. Part – I, Algebra and Trigonometry	Code:BMT- 01
CO No.	Course Outcomes	
CO No. – 1	To solve linear equation using matrix method.	
CO No. – 2	To apply Caley Hamilton Theorem for finding inverse of matrix.	
CO No.- 3	To learn about solution of cubic equation (Cardon Method) and biquadratic equation.	

Course Title	B. Sc. Part – I, Calculus
CO No.	Course Outcomes
CO No. – 1	To apply higher order derivation in order to get expansion of functions (Taylor and Maclaurins series)
CO No. – 2	To trace various equations by applying concept of asymptotes, nodes, cusps, singular point etc.
CO No.- 3	To apply techniques of differential equation in finding general and singular solution.
CO No.- 4	To learn geometric meaning of differential equation.
CO No.- 5	Method of variation of parameters for obtaining solution of given differential equations

Course Title	B. Sc. Part – I, Vector analysis and geometry
CO No.	Course Outcomes
CO No. – 1	To learn analytical geometry with the help of vectors.
CO No. – 2	To learn application of Gauss Theorem, Stokes theorem in the setting of differential forms.
CO No.- 3	To learn about various surface represented by general equation of conicoids.
CO No.- 4	To learn geometric meaning of differential equation.
CO No.- 5	Method of variation of parameters for obtaining solution of given differential equations

Course Title	B. Sc. Part – II, Advanced Calculus
CO No.	Course Outcomes
CO No. – 1	To understand concept of convergence of sequence, series and their various properties.
CO No. – 2	To learn about continuity, sequential continuity, uniform continuity.
CO No.- 3	To learn the application of mean value theorem and its geometrical meaning.
CO No.- 4	Understand function of several variables and its partial derivatives.
CO No.- 5	To learn application of partial differentiation in obtaining envelopes and evaluates of given family of curves.
CO No.- 6	To understanding Beta Gamma function and its applications.

Course Title	B. Sc. Part – II, Differential Equation
CO No.	Course Outcomes
CO No. – 1	To solve Laplace transformation of derivatives and integral, solution of integrals and system of differential equations.
CO No. – 2	To learn partial differential equations and its various type, Charpits general method of solutions.
CO No.- 3	To learn partial differential equation of second and higher order, Homogeneous and nonhomogeneous equation with constant coefficient, Mobious method.
CO No.- 4	To learn series solution of differential equation, series method Bessels and Legendrs function with their properties, Orthogonalityof functions, Legendre polynomial etc.

CO No.- 5	To understand variational problem with fixed boundary, Euler equation for functional containing first order derivatives, variational problem with moving boundaries, variational principle of least action.
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Course Title	B. Sc. Part – II, Mechanics
CO No.	Course Outcomes
CO No. – 1	To understand various analytic condition of equilibrium principle of virtual work, catenary.
CO No. – 2	To learn forces in three dimensional, poinsot central axis with problem, null lines and planes.
CO No.- 3	To understand simple harmonic motion, Velocity and Acceleration along radial and crossradial direction, problem on central orbits.
CO No.- 4	To understand Kaplers Law, motion on smooth and rough plane curves, Resisting medium, Motion of particle of varying mass, acceleration in terms of different coordinates.

Course Title	B. Sc. Part – III, Analysis
CO No.	Course Outcomes
CO No. – 1	To learn series and their convergence, various test of convergence, Implicit function, Fourier series etc.
CO No. – 2	To learn Reimahn integration, mean value theorem, Integral as a function of parameter etc.
CO No.- 3	To understand concept of complex number, complex valued function, Analytic function, Conformal mapping etc.
CO No.- 4	To learn metric spaces, Quasi metric space, Contraction principle, Complete metric space, various types of spaces, viz separable, countable etc.
CO No.- 5	To learn sequential compactness, Connectedness etc.

Course Title	B. Sc. Part – III, Abstract Algebra
CO No.	Course Outcomes
CO No. – 1	To understand Group Automorphism, Sylow's theorems.
CO No. – 2	To understand Homomorphism of rings, Idea of Ideals, Euclidian rings, Modules etc.
CO No.- 3	To learn Vector spaces its property, Idea of dimension, dimension of sums of subspace.
CO No.- 4	To learn Linear transformation with their matrix representation, Rank and nullity, digonalization, bilinear quadratic Hamiltons forms etc.
CO No.- 5	To understand Inner product space, Orthogonal vectors, Gram Schmidh orthogonalization process etc.

Course Title	B. Sc. Part – III, Discrete Mathematics
CO No.	Course Outcomes
CO No. – 1	To understand the concept of directed graphs, connected and strongly connected graphs etc.
CO No. – 2	To understand various graphs. Eulerian and Hamiltonian graph with special importance.
CO No.- 3	To understand finite state machine and their application.
CO No.- 4	To learn discrete numeric function its use in recurrence relation and generating function.
CO No.- 5	Application of Boolean algebra in switching circuits.

PG Department of Mathematics

Program Outcomes for PG:-

PO No.	Program outcomes upon completion of the M. Sc. Degree program, the student will be able to
PO No. - 1	Pursue as higher studies in mathematics in reputed institute of our country like IITs, IESER and central university etc.
PO No. – 2	To appear in several competitive examination like CGPSC, UPSC, MAT, Railways, SSC etc.
PO No. – 3	To explain the core ideas and the techniques of mathematics at the college and school.
PO No.- 4	To develop the logical approach to take decision in complicated decision.
PO No.- 5	To motivate for research in mathematical scheme.
PO No.- 6	To train computational scientist who can work on real life challenging problem
PO No.- 7	To apply rigorous, analytic, highly numerate approach to analysis execute tasks and solve problems in daily life at work.
PO No.- 8	To produce a mature oral presentation of non trivial mathematical topic.
PO No.- 9	To understand the concept of normal and subnormal series, solvability group and nilpotent group.
PO No.- 10	To learn various types of extension of fields.
PO No.- 11	To understand moduls, various types of modules.

Program Specific Outcomes for PG:

PSO No.	Program outcomes upon completion of the B. Sc. Degree program, the graduate learn to
PSO No. - 1	To motivate research in mathematical science.
PSO No. - 2	To train computational scientists who can work on real life challenging problems.
PSO No. - 3	To apply rigorous, analytic, highly numerate approach to analyze, execute tasks and solve problems in daily life at works .
PSO No. - 4	To produce a mature oral presentation of non trivial mathematical topic.
PSO No. - 5	To understand the concept of normed and subnormed series, solvability of group and nilpotent group.
PSO No. - 6	To learn various types of extension of fields.
PSO No. - 7	To understand modules, various types of modules.

Course Outcomes for UG

Learning Outcomes:

After learning this course students are able to recognize and explain all about algebra.

Course Title	M. Sc. previous, Advance Abstract Algebra
CO No.	Course Outcomes
CO No. - 1	To recall properties of group specially normal series and use of series in Jordan Holder Theorem.
CO No. - 2	To understand field extension with types of extension as- algebraic, transcendental, separable, inseparable and normal extension .
CO No.- 3	More types and properties of field extension is recognized.
CO No.- 4	To uderstand Galois theory and solvability of general equation by radicals.
CO No.- 5	To recall module, Noetherian, Artinian modules and examples, Hilbert basis theorem and Wedderburn Artin theorem.
CO No.- 6	To recall Linear transformation, canonical form and nilpotent transformation, understand Jordan blocks and jorden forms.
CO No.- 7	To understand smith normal form and rational canonical form.
CO No.- 8	To understand the structure and construction of finite fields.

Learning Outcomes:

Student able to go to deep analytic approach which is eligent proves of research.

Course Title	M. Sc. previous, Real Analysis
CO No.	Course Outcomes
CO No. – 1	To learn sequences and series of functions and their convergence, various test for convergence.
CO No. – 2	To learn Function of several variables, derivatives in open subsets, derivatives of higher order, partition of unity and Stock's Theorem.
CO No.- 3	To understand Riemann and Stieltjes integral and its properties.
CO No.- 4	To understand Idea of measures, measurable sets, Borel and Lebesgue measures.
CO No.- 5	To understand the concept of extremum problem with constraints.
CO No.- 6	To understand various inequalities viz Jensen inequality, Holder and Minkowski's inequality.

Learning Outcomes:

Student able to go to deep concept of topological spaces which is useful in research.

Course Title	M. Sc. previous, Topology
CO No.	Course Outcomes
CO No. – 1	To understand the concept of countability of sets.
CO No. – 2	To learn the concept of topology and algebraic topology.
CO No.- 3	To learn the concept of separation axioms, connectedness, compactness and related topics.
CO No.- 4	To understand the product topology, embedding, metrization and paracompactness.
CO No.- 5	To understand Nets, Filters and ultrafilters. Fundamental group and covering spaces.
CO No.- 6	To prove some related theorems on above topics.

Learning Outcomes:

Student able to go to deep concept valued function and their analytic approach in mathematics.

Course Title	M. Sc. previous,Complex Analysis
CO No.	Course Outcomes
CO No. – 1	To apply the concept and consequences of analyticity and the Cauchy Riemman equations and results on harmonic and entire functions including the fundamental theorem of algebra.
CO No. – 2	To understand the application of the power series, expansion of analytic functions.
CO No.- 3	To understand Conformal mapping and bilinear transformation and their properties.
CO No.- 4	To use the Cauchy residue theorem to evaluate integral and sum series, analytic continuation and its properties, canonical products.
CO No.- 5	To learn the range of analytic functions, Little Picard theorem, Montel theorem etc.
CO No.- 6	To understand spaces of analytical functions.

Learning Outcomes:

Student able to learn how to apply discrete mathematics in the field of engineering.

Course Title	M. Sc. previous,Advance Discrete Mathematics
CO No.	Course Outcomes
CO No. – 1	To understand Algebraic structure, semigroups, monoids and operations on strings. Specially using in concatenation operations
CO No. – 2	To learn various types of grammars, Application of Pumping lemma, Polish Notations.
CO No.- 3	To learn Finite autometa acceptors, nondeterministic finite autometa
CO No.- 4	To learn mean terms, max terms, Boolean forms, Karnough mappings and minimization of Boolean function.
CO No.- 5	To learn cosets, Partial order relations, Lattices and its various types.

Learning Outcomes:

Student able to learn various types of spaces, weak and strong convergence and contraction mapping which is very powerful tools of research in fixed point theory.

Course Title	M. Sc. Final, Integration Theory & Functional Analysis
CO No.	Course Outcomes
CO No. – 1	To understand Sign measures and various theorems on measures, Riesz representation theorem, Fubini's Theorem.
CO No. – 2	To learn Normed linear space and their completeness, Finite dimension norm linear space and compactness.
CO No.- 3	To understand Nonlinear operators, convex functions, epi-graphs, Coercive mapping etc.
CO No.- 4	To understand uniform boundedness theorem, Open and closed graph theorem and Hahn Banach theorem.
CO No.- 5	To learn Hilbert space, Reflexibility of Hilbert space. Self adjoint, Normal, Unitary operators.
CO No.-	To learn the idea of contraction mapping, Theorem, the fixed point theorem and its applications.

Learning Outcomes:

Upon completion of this course student should be able to learn various types of partial differential equations in different fields.

Course Title	M. Sc. Final, Partial Differential Equations
CO No.	Course Outcomes
CO No. – 1	To understand Laplace equations, Heat equations, wave equations, solution by spherical means.
CO No. – 2	To understand first order PDE, Envelopes, Conservation Laws, Riemann's Problem. Long time behavior.
CO No.- 3	To learn Hodograph and Legendre Transforms and potential functions.
CO No.- 4	To understand Geometric optics, Stationary phase and Homogenization.

Learning outcomes :

Students able to understand specially natural events, forces, gravitational and attraction forces to bodies .

Course Title	M. Sc. Final, Mechanics
CO No.	Course Outcomes
CO No. – 1	To learn Genralized coordinates Langrange’s equation of first kind Cyclic coordinates.
CO No. – 2	To understand Poisson’s bracket hamilton’s principle, principle of least action Poincare Cardan integral invariant.
CO No.- 3	To learn Whittaker equations Hamillton Jacobi equation invariation of lagrange bracket under canonical transformation.
CO No - 4	To Calculate the attraction for different types of objects.

Learning outcomes :

Application of computers using ‘C’- Language and different fields of mathematical problem.

Course Title	M. Sc. Final, Programming in “C” (with ANSCI features)
CO No.	Course Outcomes
CO No. – 1	To learn over view of programming, Anatomy of C-functions, variables and constants.
CO No. – 2	To find Different types of data.
CO No.- 3	To learn the main function Complex declaration, Conditional Compilation, Line Control etc.
CO No - 4	To learn Input and output streams, Buffering, closing and opening files. The slandered library for input \ output.
CO No - 5	To address of an objects and pointers.
CO No - 6	To learn Control flow conditional branching various types of loop.

Learning outcomes:

Application of Marketing field using this (Operation Research) and different fields of mathematical problems.

Course Title	M. Sc. Final, Operations Research
CO No.	Course Outcomes
CO No. – 1	To know the scope of operation research.
CO No. – 2	To Formulate real world problems to linear programming problems. Solve this problem with various methods.
CO No.- 3	Get acquired with various algorithm and techniques of above used methods.
CO No - 4	To understand mathematical formulation and solution of assignment problems and transportation problems.
CO No - 5	Know network analysis and methods to solve it.
CO No - 6	To understand the use of dynamic programming in various fields.
CO No. - 7	To understand Game theory, apply theory of queueing system and Inventory control to particle problems.
CO No. - 8	Develop understanding of nonlinear programming.

Learning outcomes:

After the study of this paper, students are familiar with the new branch of which is nearer to the real world.

Course Title	M. Sc. Final, (A) Fuzzy Sets and their Logics
CO No.	Course Outcomes
CO No. – 1	Relate mathematical logic with real life. In this unit some models are explained.
CO No. – 2	To designed an expert system, this unit gives basic propositional rules.
CO No.- 3	To learn the application of fuzzy set theory in the topic decision making, which is some what vague in nature.
CO No - 4	Introduction and operation between fuzzy sets and fuzzy numbers.
CO No - 5	To understand the difference between probability and possibility theory is explained through fuzzy sets.
CO No - 6	To understand Fuzzy linear programming.

Learning outcomes:

After the study of this paper, students are familiar with the new branch of which is nearer to the real world as well as graphics.

Course Title	M. Sc. Final, (B) Graph Theory
CO No.	Course Outcomes
CO No. – 1	Relate mathematical logic with real life. In this unit some models are explained.
CO No. – 2	To construct Polynomials and Graph Enumeration: The colour polynomials, The chromatic polynomial, bivariate coloring polynomials.
CO No.- 3	To learn the concept of Perfectness-preserving operations, Forbidden Subgraph orientations, Ramsey numbers and Ramsey graphs.
CO No - 4	To understand the spectrum, Spectrum properties.
CO No - 5	To study Coloring packing and covering i. e. colourable graphs, edge-colourings, Face colourings.

Program Outcomes for Ph. D.

PO No.	Program outcomes upon completion of the Ph.D. Degree program, the candidate will be able to
PO No. - 1	To motivate for research in various fields of mathematics.
PO No. – 2	To understand subject classification in details.
PO No. – 3	To understand the importance of selection of effective and significant word in science writing.
PO No.- 4	To learn advantage of mathematical review..
PO No.- 5	To learn use the MathSciNet and the e-resources.
PO No.- 6	To learn mathematical type setting.




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