Department of Mathematics

After the completion of B.Sc. Honours Degree Programme, the students will be able to achieve the following outcomes:

PO1: Professional knowledge: Acquire comprehensive knowledge of major concepts, theoretical principles and experimental findings of various subjects in pure sciences.

PO2: Critical thinking and Cognitive skills: Convey the intricate science information effectively and efficiently, analyze and solve the problems related to plants, animal sciences without relying on assumptions and guesses.

PO3: Environment and sustainability: Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO4: Effective Communication: Demonstrate familiarity with and will be able to analyze both verbally and in writing issues and forms of contemporary art with a clear understanding of historical precedents.

PO5: Instruments and Experiments: Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments and drawing logical inferences from the scientific experiments.

PO6: Research and Analysis: Demonstrate analytical skill and proficiency in a range of tools and techniques used in research in science and interdisciplinary programmes.

PO7: Employability and higher Education: Show proficiency in professional, employability and develop soft skills required for higher education and placements.

PO8: Ethics: Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality in the field of science.

PO9: Science and Society: Apply reasoning acquired by the scientific knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional science practice.

PO10: Interdisciplinary Learning: Integrate academic curriculum with other co-curricular goals, such as career development, life-long learning, develop interdisciplinary learning and opportunity to extend their knowledge across all disciplines.

PO11: Nation Building: Introspect and evolve into dynamic and creative individuals capable of socially productive, constructive actions that positively impact our Nation and the World at large.

PROGRAM SPECIFIC OUTCOMES (PSO)

Upon completion of the programme, the student will attain the ability to:

PSO1: Develop basic concepts of the topic taught, which will help them in solving problems related to the topic and uplift their analytical abilities require to pursue

higher studies of their choice so that they can achieve higher academic excellence.

PSO2: Apply the concepts to various fields such as Bio-Mathematics, Environmental science, Mathematical Finance, Mathematical Economics, Actuarial Science, Industrial Mathematics, Medical Sciences etc.

PSO3: Apply well equipped at different competitive examinations like IIT-JAM, NBHM, MTTS training programs etc. for higher studies in Mathematics. They also become eligible for public service examinations and other employment related examinations.

PSO4: Develop skills in problem solving, critical thinking and analytical reasoning.

PSO5: Develop logical capacity to great extent which will lay down a firm foundation of the fundamental concept.

PSO6: Gain advanced knowledge on topics in pure and applied Mathematics empowering the student to pursue higher degrees at reputed academic Institutions

PSO7: Acquire awareness towards gender, environment, sustainability, human values, and professional ethics and understand the difference between acting, responding, reacting to various social issues.

Semester I

MATH CC101 : Calculus (Practical)

Course Outcomes:

After the completion of the course, the student will be able to:

CO1: Sketch the curves in Cartesian and polar coordinate system and understand the ideas of derivatives and their higher order**.**

CO2: Understand geometrical terminology for angles, triangles, quadrilaterals and circles.

CO3: Provide geometrical and physical explanation of the integral of a vector field over a curve**.**

CO4: Apply these topics to solve the problems in physics and mechanical engineering.

SEMESTER – I

MATH CC102 : Algebra

Course Outcomes:

After the completion of the course, the student will be able to:

CO1:   Learn various set theoretic concepts, divisibility and Euclidean algorithm, principles of mathematical induction and fundamental theorem of arithmetic.

CO2: Learn various notions related to fuzzy sets and their recent applications.

CO3:   Solve systems of linear equations and apply various concepts related to linear transformations and their applications to real world problems.

CO4: Gain knowledge about different trigonometric identities.

SEMESTER – II

MATH CC203 : Real Analysis

Course Outcomes:

After the completion of the course, the student will be able to:

CO1: Explain the basic ideas of real numbers and this set as a complete
ordered field.

CO2:   Acquire the basic knowledge of convergence and divergence of
sequences and series.

CO3: Demonstrate an understanding of limits with their applications and
rearrangement of series with their convergence.

CO4: Produce rigorous proofs of results that arise in the context of real
analysis**.**

SEMESTER – II

MATH CC204 : Differential Equations (Practical)
Course Outcomes:
After the completion of the course, the student will be able to:

CO1: Solve problems in Applied Mathematics using differential equations and learn drawing
surfaces and   mesh grid   through MATLAB.

CO2:   Solve real life situation problem and Identify research problem where differential
equations can be   used to model the system.

CO3: Develop the ideas how Applied Mathematics can be applied and generalized .

CO4: Solve linear second and higher order ordinary differential equations with constant
coefficients using the methods of undetermined coefficients and variation of
parameters, direct formulas .

MATH CC305 : Theory of Real Functions

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Explain the notion of continuity and discontinuity in different contexts.

CO2: Acquire knowledge about the Uniform continuity and its difference with continuity.

CO3: Gain knowledge about expansions using Taylor's theorem.

CO4: Understand theorems associated with differentiability and their applications.

SEMESTER – III

MATH CC306 : Group Theory I

Course Outcomes:

After completion of the course, the student will be able to:

CO1:   Recognize the mathematical objects that are groups and classify them as abelian, cyclic and permutation groups, etc.

CO2: Acquire knowledge related to the fundamental concepts of Groups and symmetrical figures and determine whether a given set and binary operation form a group.

CO3: Develop the study of homomorphisms and isomorphisms with applications.

CO4: State and prove the classification of finite abelian groups and the corresponding result for finitely generated abelian groups. Additionally, they will be able to prove some of the classic theorems of finite group theory including Cauchy's theorem.

SEMESTER – III

MATH CC307 : PDE and Systems of ODE (Practical)

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Use knowledge of partial differential equations, modeling, the general structure of solutions and analytic and numerical methods for solutions.

CO2: Develop skills in the formulation, solution, understanding and interpretation of PDE models.

CO3: Know about classifications of second order differential equations, concept of wave and heat equations with applications to real life situations.

CO4: Learn to solve cauchy's   problem, wave equation ,heat equation through MATLAB Software and formulate physical   problems as PDE using conservation laws.

SEMESTER – IV

MATH CC408 : Numerical Methods (Practical)
Course Outcomes:
After completion of the course, the student will be able to:

CO1: Understand algorithms, convergence and various types of errors.

CO2: Apply numerical methods for solving transcendental and algebraic equations and system of algebraic equations by using different methods.

CO3: Apply different types of interpolation methods and numerical methods for numerical integration.

CO4: Learn how to solve first order initial value problems of ordinary differential equations numerically using Euler's and Runge Kutta methods

SEMESTER – IV

MATH CC409 : Riemann Integration and Series of Functions
After completion of the course, the student will be able to:

CO1: Acquire the idea about Riemann Integration and its applications to problems.

CO2: Develop skill in checking the Uniform Convergence of series using various tests.

CO3: Understand the notion of radius of Convergence in different contexts.

CO4: Understand Partitions and their refinements.

MATH CC410 : Ring Theory and Linear Algebra I

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Enhance their logical Capacity to a great extent.

CO2: Develop their analytical abilities in solving problems of Ring Theory.

CO3: Define Vector spaces, subspaces and some related concepts.

CO4: Learn linear transformations and its matrix representation including applications, isomorphism theorems and change of coordinate matrix

SEMESTER – V

MATH CC511 :   Multivariate Calculus

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Solve some problems arising in physics using mathematical equations.

CO2: Understand how calculus is applied to geometrical problems.

CO3: Develop the concepts needed for further study and research.

CO4: Develop the ability in the applicability of Mathematics to real life problems.

SEMESTER – V

MATH CC512 :   Group Theory II

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Describe automorphism of finite and infinite cyclic groups, applications of factor groups to automorphism groups, and characteristic subgroups.

CO2: Acquire knowledge about Internal and external direct products, fundamental theorem of finite abelian groups.

CO3: Learn Group actions, stabilizers, orbits, generalized Cayley's theorem, Index theorem and their applications.

CO4: Solve problems on Class equation, p-groups, Sylow 's theorems with applications, Cauchy theorem, Simplicity and non-simplicity tests.

SEMESTER – VI

MATH CC613 :   Metric Spaces and Complex Analysis

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Develop analytical study of complex analysis along with problem solving techniques.

CO2: Develop concept of Metric spaces as it is an important part of pure mathematics.

CO3: Analyze problem related to the metric space and its generalization over different spaces.

CO4: Develop the ideas how pure mathematics can be applied and generalized.

SEMESTER – VI

MATH CC614 : Ring Theory and Linear Algebra II

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Gain knowledge about the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields.

CO2: Learn in detail about different kinds of rings like polynomial ring, unique factorization domain, Euclidean domain etc.

CO3: Understand and compute dual spaces, dual basis, transPOe of a linear transformation and its matrix in the dual basis.

CO4: Deal with the inner product spaces, operators on them, implications and their existence, orthogonal complements, Bessel's inequality with applications.

SEMESTER – I

MATH GE101 : Calculus, Set theory, Algebra and Geometry

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Gain knowledge about Successive differentiation, Leibniz's theorem and Euler's theorem on homogeneous functions with some of its mathematical applications.

CO2: Develop the skills to estimate the change in the value of a function when the independent variable undergoes a change.

CO3: Compute dot product and cross product and gain   knowledge about the Fundamental Theorem of Line Integrals, Green's Theorem, Stoke's Theorem, or Divergence Theorem to evaluate integrals

CO4: Learn about two and three Dimensional geometry with applications and gain knowledge related to fundamental concepts of Set theory and Group theory.

SEMESTER – II

MATH GE202 : Analysis, Linear Programming, Differential Equations

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Grasp an overall concept of Infinite series and its convergence.

CO2: Understand composition of a system of coplanar forces acting on a rigid body and establish the conditions for their equilibrium.

CO3: Comprehend the concept of works and virtual works done by forces acting on a particle or a body and able to solve the practical problems.

CO4: Solve linear programming problems, transportation problems, assignment problems, game theory problems and second order ordinary differential equations with constant coefficients

SEMESTER – III

MATH GE303 : Partial Differential Equation, Fourier series, Graph

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Solve linear partial differential equations and partial differential equations of second order with constant coefficients.

CO2: Find Fourier series of odd and even functions, half range Fourier series and sum of series using Parseval's identity.

CO3: Understand and apply the basic concepts of Graph Theory including Eulerian trails, Bipartite and Planar graphs.

CO4: Know effectively about the theory of Numbers, primes, Diophantine equations etc.

SEMESTER – IV

MATH GE404 : Fuzzy Sets, Dynamics, Theory of Equations and

After completion of the course, the student will be able to:

CO1: Learn about various notions related to fuzzy sets.

CO2: Solve systems of homogeneous and non-homogeneous linear equations, problems of Eigen values, Eigen vectors and Cayley Hamilton theorem.

CO3: Solve higher order Algebraic equations through theory of equations.

CO4: Understand the dynamic changes in the body under the action of forces and gain knowledge about Projectiles.

Semester – I

ENG AEC101 : English Communication

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Communicate effectively using the techniques in the area of spoken as well as written communication.

CO2: Hone their LSRW skills within their communication.

CO3: Design and answer job interview questions

CO4: Demonstrate the ability to craft professional messages that are clear yet courteous

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HINAECC101– हिंदी-व्याकरण और सम्प्रेषण

परिणाम - 1. विभिन्न प्रतियोगी परीक्षाओं के लिए तैयार करना |

२. सम्प्रेषण-क्षमता की वृद्धि करना |

३. कार्यालयी-पत्र लेखन की क्षमता विकसित करना |

४. हिंदी के व्याकरणिक एवं सैद्धांतिक स्वरुप की जानकारी हासिल करना ||

SEMESTER-II

EVS AEC 202 : Environmental Science

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Understand multidisciplinary nature of environmental studies.

CO2: Understand the concept and types of natural resources and environmental pollution.

CO3: Evaluate the anomalies created due to haphazard population growth and its impact on environment.

CO4: Understand about the organizations, conventions and legislations working on mitigation of environmental issues.

SEMESTER – V

MATH DSE501 : Number Theory

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Acquire the basic knowledge about theory of numbers.

CO2: Gain the knowledge of Number Theoretic Problems in practical situations.

CO3: Acquire knowledge about encryption and decryptions and their applications.

CO4: Gain knowledge about unsolved problems in the field of Number theory.

SEMESTER – V

MATH DSE501 :   Analytic Geometry

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Acquire knowledge about sketching Parabola, Ellipse and Hyperbola.

CO2: Gain knowledge about reflection properties of Parabola, ellipse and Hyperbola.

CO3: Gain knowledge about classifications of Quadratic equations.

CO4: Understand illustrations of graphing, spheres and cylindrical surfaces.

SEMESTER – V

MATH DSE502 : Probability and Statistics

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Gain knowledge of Statistics and its scope and importance in various areas such as Mathematics, Medical, Engineering, Economics, Commerce and Social Sciences etc.

CO2: Apply Knowledge of various types of data, their organisation and evaluation of summary measures such as measures of central tendency and dispersion etc.

CO3: Develop knowledge to conceptualize the probabilities of events including classical, empirical and axiomatic approach of probability. Simultaneously, they will learn the notion of conditional probability including the concept of Baye's Theorem.

CO4: Analysis the concept of discrete and continuous random variables, their probability distributions and to apply standard discrete and continuous probability distributions to different situations.

SEMESTER – V

MATH DSE502 : Industrial Mathematics

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Analyze and solve medical imaging and inverse problems.

CO2: Employ Math and algebraic theories, concepts and skills to applications found in Machine tool technology.

CO3: Apply Fourier and inverse Fourier transforms to image reconstruction and CT scan.

CO4: Learn about various applications of Mathematics in X-ray, CT scan and Medical imaging.

SEMESTER – VI

MATH DSE603 : Linear Programming

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Solve linear programming problems by using simplex, big M- and two-phase methods.

CO2: Form dual problem and establish primal-dual relationship.

CO3: Solve transportation problems by using north west, least cost and Vogel approximation methods and assignment problems by using Hungarian method.

CO4: Model the decision-making problems by using linear programming techniques.

SEMESTER – VI

MATH DSE603 : Theory of Equations

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Solve various Polynomial equations, find relation between the roots and coefficient of equations.

CO2: Provide and explain general properties of equations and Polynomials.

CO3: Transform equations and solve reciprocal and binomial equations.

CO4: Apply Symmetric function of roots and Strum's theorem to different equations.

SEMESTER – VI

MATH DSE604 : Differential Geometry

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Understand the theory of surfaces and curves in three dimensions.

CO2: Acquire knowledge about method of the moving frame and overdetermined systems in Surface theory.

CO3: Provide examples of Manifolds and investigate their properties.

CO4: Understand the different concepts related to Tensors.

SEMESTER – VI

MATH_DSE604 : Mechanics

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Describe and articulate relative motion, inertial and non-inertial reference frames.

CO2: Apply laws of coulomb friction, Conservative force field to practical problems.

CO3: Introduce Analytical mechanics as a systematic tool for problem solving.

CO4: Apply the vector theorems, moment theorems of Mechanics and interpretation of their results.

SEMESTER – III

IRS_SEC301 : Inter-Religious Studies

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Develop Inter-religious harmony & better understanding of other religions.
CO2: Interpret the different religions of the world.
CO3: Identify the common elements that bind different religions together.

CO4: Acquaint with the salient features of different religions**.**

SEMESTER – IV

MATH_SEC402 : Logic and Sets

Course Outcomes:

After the completion of this course, student will be able to:

CO1: Understand foundations of mathematics and symbolic techniques in the context of problem solving.

CO2: Develop understanding of basic principles of sets, logic sets and operations in sets.

CO3: Apply formal methods of symbolic propositional and predicate logic and write an argument using logical notation.

CO4: Understand mathematical reasoning by understanding and exercising several proof techniques, such as direct proofs, proof by counterexample, proof by contraposition, proof by contradiction, mathematical induction, and strong induction.