DEPARTMENT OF MATHEMATICS
PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE & POST GRADUATE PROGRAMME (2024 ONWARDS)

NAME OF THE PROGRAMME: BACHELOR OF MATHEMATICS– PROGRAMME OUTCOME	
PO1	**Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study
PO2	**Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	**Problem solving:** Capacity to extra polite from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	**Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	**Research-related skills:** sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO7	**Cooperation/Teamwork:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
PO8	**Scientific reasoning**: Ability to analyze interprets and draws conclusions from quantitative/qualitative data; and critically evaluates ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO10	**Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	**Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO13	**Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life, formulate apposition/argument about ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating

	the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO14	**Leadership readiness/qualities:** Capability form aping out that asks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in as efficient way.
PO15	**Lifelong learning:** Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of workplace through knowledge/skill development/reskilling.

NAME OF THE PROGRAMME: B.Sc Mathematics – COURSE OUTCOMES	
SEMESTER I	
CORE COURSE -1 ALGEBRA AND TRIGONOMETRY	1. To Classify and solve Reciprocal equations 2. To Find the sum of Binomial, Exponential, Logarithmic series 3. To Find Eigen values, Eigen vectors, verify Cayley – Hamilton theorem 4. To Expand the powers and multiples of trigonometric functions in terms of sine and cosine 5. To Determine relationship between circular and hyperbolic functions and the summation of trigonometric series
CORE COURSE -2- DIFFERENTIAL CALCULUS	1. To find the nth derivative, form equations involving derivatives and apply Leibnitz formula 2. To find the partial derivative and total derivative coefficient 3. To Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers 4. To Find the envelope of a given family of curves 5. To Find the evolutes and involutes and radius of curvature using polar coordinates

ELECTIVE COURSE -1 - NUMERICALMETHODS-I	1. After studied unit -1, the student will be able to solve Iteration method- Regula-falsi method- Newton-Raphson method. 2. After studied unit -2, the student will be able to calculate interpolation values by applying Gauss-Elimination method, Gauss-Jordan method. 3. After studied unit -3, the student will be able to calculate Differences of a polynomial, Factorial polynomials. 4. After studied unit -4, the student will be able to estimate Central Differences Formulae. 5. After studied unit -5, the student will be able to estimate the interpolation value for unequal intervals based on Divided Difference formula and Lagrange's formula of interpolation.
SKILL ENHANCEMENT COURSE – 1 (NON-MAJOR ELECTIVE) - MATHEMATICS FOR COMPETITIVE EXAMINATIONS	1. To Solve Mathematical Problems using Mathematical formulae. 2. To Understand the knowledge of application of Mathematics 3. To Understand the concepts of simplification 4. To Calculate the square root and cube root. 5. To Solve the problems on age
FOUNDATION COURSE – I - BRIDGEMATHEMATICS	1. To Prove the binomial theorem and apply it to find the expansions of any $(XX + Y)$ n and also, solve the related problem 2. To Find the various sequences and series and solve the problems related to them. Explain the principle of counting. 3. To Find the number of permutations and combinations indifferent cases. Apply the principle of counting to solve the problems on permutations and combinations 4. To Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and sub multiple angles, etc. Also, they can solve the problems using the transformations. 5. To Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.

NAME OF THE PROGRAMME: MASTER OF MATHEMATICS– PROGRAMME OUTCOME	
PO1	**Problem Solving Skill:** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.

PO2	**Decision Making Skill:** Foster analytical and critical thinking abilities for data-based decision- making.
PO3	**Ethical Value:** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
PO4	**Communication Skill:** Ability to develop communication, managerial and interpersonal skills
PO5	**Individual and Team Leadership Skill :** Capability to lead themselves and the team to achieve organizational goals
PO6	**Employability Skill:** Inculcate contemporary business practices to enhance employability skills in the competitive environment.
PO7	**Entrepreneurial Skill:** Equip with skills and competencies to become an entrepreneur.
PO8	**Contribution to Society :** Succeed in career endeavors and contribute significantly to society.
PO9	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
PO10	**Moral and ethical awareness/ reasoning:** Ability to embrace moral/ethical values in conducting one's life

NAME OF THE PROGRAMME: MASTERS IN MATHEMATICS – COURSE OUTCOMES	
SEMESTER –I	
CORE COURSE -1 – ALGEBRAIC STRUCTURES	1. To Recall basic counting principle, define class equations to solve problems, explain Sylow 's theorems and apply the theorem to find number of Sylow subgroups 2. To Define Solvable groups, define direct products, examine the properties of finite abelian groups, define modules 3. To Define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces 4. To Define Jordan, canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomial of linear transformation 5. To Define trace, define transpose of a matrix, explain the properties of trace and transpose, to find trace, to find transpose of matrix, to prove Jacobson lemma

	using the triangular form
CORE COURSE -2 REAL ANALYSIS I	1. To Analyze and evaluate functions of bounded variation and Rectifiable Curves. 2. To Describe the concept of Riemann-Stieltjes integral and its properties. 3. To Demonstrate the concept of step function, upper function, Lebesgue function and their integrals 4. To Construct various mathematical proofs using the properties of Lebesgue integrals and establish the Levi monotone convergence theorem. 5. To Formulate the concept and properties of inner products, norms and measurable functions.
CORE COURSE -3 ORDINARY DIFFERENTIAL EQUATIONS	1. To Establish the qualitative behavior of solutions of systems of differential equations 2. To Develop analytical skills necessary for understanding and manipulating differential equations 3. To Analyse solutions using appropriate methods for linear equation with variable coefficient 4. To Analyse solutions using appropriate methods and give examples 5. To Learn techniques for solving linear ODEs with Bessel's Function.
ELECTIVE COURSE -1 - GRAPH THEORY AND APPLICATIONS	1. Grasp features and properties of various types of graphs. 2. Demonstrate capacity of illustration for mathematical reasoning through analyzing, providing and explaining concepts of Eulerian circuits and Hamiltonicity in graphs. 3. Understand the definitions and properties of matching and independent sets. 4. Apply the concepts of graphs to model them in real life situations. 5. Explicate the applications of planarity and colorability.
ELECTIVE COURSE -2 DISCRETEMATHEMATICS	1. To Know the algebraic structures of lattices and Boolean algebra, and sketch the minimization of Boolean polynomials. 2. To Model the switching circuits with applications. 3. To Understand the finite fields and its mathematics properties.

	4. To Acquire the notions of the polynomials over finite fields, Irreducibility and factorization of polynomials 5. To Apply the coding theory with the linear and cyclic codes in cryptography
ALLIED ELECTIVE CORE COURSE -1 MATHEMATICAL DOCUMENTATION USING LATEX	1. After studying this course the students will be able to create and typeset a LaTeX document. 2. After studying this course the students will be able to create and typeset mathematical document. 3. After studying this course the students will be able to learn about pictures and graphics in LaTeX 4. After studying this course the students will be able to automatic generation of a table of contents, bibliographies and indexes 5. After studying this course the students will be able to use tabular and array environments within LaTex