Internal Quality Assurance Cell
Behali Degree College
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PROGRAMME OUTCOME

B.Sc. (Hon.) courses

- To develop a strong foundation of both pure and applied mathematics and to apply that fundamental knowledge for further study of mathematics.
- To develop programming and other computer skills to enhance the confidence level of the students in both academic and industrial fields.
- To develop a working culture in groups as well as individually to build up a research attitude to tackle the burning issues at global and local level.
- Communicate mathematics effectively by oral, written, computational and graphic means.
- Create mathematical ideas from basic axioms.
- Gauge the hypothesis, theories, techniques and proofs provisionally.
- Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.
- Identify applications of mathematics in other disciplines and in the real world, leading to enhancement of career prospects in a plethora of fields.
- Appreciate the requirement of lifelong learning through continued education and research.
- To think in a critical mathematical manner such as logical, computational and graphical manner.
- To give the opportunity to the students to explore the mathematical tools, hypothesis, theorems of mathematical analysis to handle real life problems in mathematics and daily life sciences.
- To introduce good knowledge, give the ideas from basic axioms and understanding to explore specific theoretical and applied mathematics problems in brief areas of mathematics.
- To give the sufficient knowledge and skills enabling the students to undertake further studies, research world of mathematics and its allied areas such as Bio-maths, Fuzzy Logic etc concerned with mathematics.
- To encourage the students to develop curiosity to explore the concepts and a range of mathematical skills helpful in other disciplines and in the real world, leading to enhancement of career prospects in a broad area of field
- Create mathematical ideas independently from basic axioms of mathematics to deal with mathematical or real life problems.
- Gauge the hypothesis, theories, techniques and proofs provisionally.

- ➢ Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis which will enhance the knowledge and experience of the students.
- ➢ To find applications of mathematics in other disciplines and in the real world, leading to employment or useful to become entrepreneurs.
- ➢ Appreciate the requirement of lifelong learning through continued education and research.

PROGRAM SPECIFIC OUTCOMES (PSOs)

B.Sc in Mathematics is the course to explore the various branches of Mathematics such as *Abstract Algebra, Linear Algebra, Real Analysis, Number Theory, Numerical Analysis, Graph Theory, Complex Analysis, Mathematical Methods, Modelling* and several other branches of Mathematics. This course also follows the study of allied areas like Engineering, Computer Science, Bio-Maths, Financial Mathematics, Cryptography, Economics, Statistics etc. Thus, this programme enhances the students in constructing a solid foundation for higher studies/research in Mathematics. The skills, logical thinking and conceptual knowledge acquired in this course also leads to help in career building in other additional areas like banking, finance etc. Mathematics can be applied in modeling and solving real life problems with the help of various tools. Students enrolled in this programme learn to construct mathematical problems, assertions, to recognize patterns such as symmetry and to indicate essential and irrelevant aspects of problems, eventually which leads to better understanding of the situation and solution.

The students also measure the concepts and insights of the situation while learning and benefitting from knowledge, experience and ideas of other students. This leads to learning the situation and to behave accordingly in a modern society. Students completing this programme will be able to understand Mathematics clearly and precisely, make vague ideas about Mathematical problems by formulating them in the language of Mathematics, explain Mathematical ideas from multiple insights and explain fundamental concepts of Mathematics to general people. Completion of this programme will also enable the learners to join teaching professions. This programme will also help students to enhance their employability for government jobs, banking sector, data analyst jobs, cryptologist and jobs in various other public and private sectors.

Course Outcome
B.Sc. Mathematics (Honours)

Semester I	
Paper Code (Subject)	**Discussion Topics**
MAT-HC-1016 Calculus (Including practical)	The primary objective of this course is to introduce the basic tools of calculus and geometric properties of different conic sections which are helpful in understanding their applications in planetary motion, design of telescope and to the real-world problems. Also, to carry out the hands- on sessions in the computer lab to have a deep conceptual understanding of the above tools to widen the horizon of students' self-experience.
MAT-HC-1026: Algebra	This course will enable the students to: ● The foundational ideas of Mathematics such as complex numbers & number theory are taught. ● Basic ideas about set theory, induction principle and logic statements are introduced. ● Apply De Moivre's theorem to solve complex number problems. ● Learn about various properties of set theory such as equivalent classes and the cardinality of a set. ● Have basics of number theory such as use of modular arithmetic and basic properties of congruences. ● Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix. ● Solve the system of linear equations with the basics of matrices and determinants, which are required in many real life problems using the matrix method and Cramer's rule.
Semester-II	
MAT-HC-2016: Real Analysis	The course will develop a deep and rigorous understanding of real line R and of defining terms to prove the results about convergence and divergence of sequences and series of real numbers. These concepts have a wide range of applications in real life scenarios.
MAT-HC-2026: Differential Equations (including practical)	The main objective of this course is to introduce the students to the exciting world of differential equations, mathematical modeling and their applications.
Semester-III	

MAT-HC-3016: Theory of Real Functions	It is a basic course on the study of real valued functions that would develop an analytical ability to have a more matured perspective of the key concepts of calculus, namely; limits, continuity, differentiability and their applications
MAT-HC-3026: Group Theory-I	The course will enable the students to: ● Have a brief idea about the mathematical objects called groups and their classification. ● Link the fundamental concepts of groups and symmetries of geometrical objects such as Dihedral Group and its geometrical representation. ● Understand the significance of definitions of cosets, normal subgroups, and factor groups. ● Analyze the consequences of Lagrange's theorem, Fermat's Little theorem and Cauchy's theorem for finite Abelian groups. ● Learn about structure preserving maps such as homomorphism and isomorphism between groups and their consequences. ● Analyze the consequences of the homomorphism theorems and Cayley's theorem.
MAT-HC-3036: Analytical Geometry	The primary objective of this course is to introduce the basic tools of two-dimensional coordinates systems, general conics, and three-dimensional coordinate systems.
MAT-SE-3024: Combinatorics and Graph Theory	This course aims to provide the basic tools of counting principles, pigeonhole principle. Also introduce the basic concepts of graphs, Eulerian and Hamiltonian graphs, and applications to dominoes, Diagram tracing puzzles, Knight's tour problem and Gray codes.
Semester-IV	
MAT-HC-4016: Multivariate Calculus	To understand the extension of the studies of single variable differential and integral calculus to functions of two or more independent variables. Also, the emphasis will be on the use of Computer Algebra Systems by which these concepts may be analyzed and visualized to have a better understanding. This course will facilitate becoming aware of applications of multivariable calculus tools in physics, economics, optimization, and understanding the architecture of curves and surfaces in plane and space etc.
MAT-HC-4026: Numerical Methods (including practical)	To comprehend various computational techniques to find approximate value for possible root(s) of non-algebraic equations, to find the approximate solutions of system of linear equations and ordinary differential equations. 27 Also, the use of Computer Algebra System (CAS) by which the numerical problems can be solved both numerically and analytically, and to enhance the problem solving skills.
MAT-HC-4036:	This course will enable the students to:

Ring Theory	● Know the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains,and fields. ● Appreciate the significance of unique factorization in rings and integral domains. ● Learn about the fundamental concept of rings, integral domains and fields. ● Know about ring homomorphisms and isomorphisms theorems of rings. ● Learn about the polynomial rings over commutative rings, integral domains, Euclidean domains, PID and UFD. ● Learn about factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, and unique factorization in the polynomial ring. ● Divisibility in integral domains, irreducibles. ● Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields. ● Learn about fundamental properties of finite field extensions, and construction of finite fields.
MAT-SE-4024: LaTeX and HTML (including practical)	: After studying this course the student will be able to: ● Create and typeset a LaTeX document and various programs and packages of LaTex for mathematical documentation. ● Typeset various mathematical documents using LaTex such as reports, books, thesis etc. ● Learn about inclusion of pictures, figures, tables and graphics in LaTex. ● Create beamer documents for mathematical seminars or presentations. ● Construct a web page using HTML.

Co-ordinator
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