



RANAGHAT COLLEGE

DEPARTMENT OF MATHEMATICS

ACADEMIC YEAR : 2018 – 2023

COURSE OUTCOMES PROGRAMME OUTCOMES (COPO)

SYLLABUS DISTRIBUTION & COURSE OUTCOMES

SEMESTER-I			
COURSE CODE	COURSE TITLE	TEACHERS	COURSE OUTCOMES
<i>MATH-H-CC-T-01</i>	Calculus	P.B S.G	Students will understand differential and integral calculus .Differential calculus is a subfield of calculus that studies the rates at which quantities change. Integral is the continuous analogue of a sum, which is used to calculate areas, volumes, and their generalizations.
	Geometry	M.S	Students can learn the geometrical concept of paraboloids, ellipsoid.
	Differential Equations	D.S	Student can learn that differential equation relates one or more unknown functions and their derivatives. In applications, the functions generally represent physical quantities, the derivatives represent their rates of change, and the differential equation defines a relationship between the two.
<i>MATH-H-CC-T-02</i>	Algebra	M.S B.B	In classical algebra, De moivre's theorem helps students to find the power of any complex number in the polar form. Students can also solve algebraic equation with the help of this theorem and able to find easily complex roots and special roots of equation. Using linear algebra students can find the rank of a matrix A is the dimension of the vector space generated by its columns.

<i>MATH-H-GE-T-01</i>	Differential Calculus	T.G S.K	Students will understand that differential calculus is a subfield of calculus that studies the rates at which quantities change.
SEMESTER-II			
COURSE CODE	COURSE TITLE	TEACHERS	COURSE OUTCOMES
<i>MATH-H-CC-T-03</i>	Real Analysis	B.B	Students can study the behaviour of real numbers, sequences and series of real numbers, and real functions.
<i>MATH-H-CC-T-04</i>	Differential Equations	D.S S.G	Students can understand the method of series solution of differential equation. Power series method is used to seek a power series solution to certain differential equations. In this section students will take a look at the first method that can be used to find a particular solution to a nonhomogeneous differential equation.
	Vector Calculus	M.S	Students can understand vector calculus or vector analysis is a branch of mathematics concerned with the differentiation and integration of vector fields, primarily in three-dimensional Euclidean space.
<i>MATH-H-GE-T-02</i>	Differential Equations	P.B T.G S.K	Students can learn that differential equation relates one or more unknown functions and their derivatives.
SEMESTER-III			
COURSE CODE	COURSE TITLE	TEACHERS	COURSE OUTCOMES
<i>MATH-H-CC-T-05</i>	Theory of Real Functions	B.B	Students can understand the mean value theorem that states, roughly, that for a given planar arc between two endpoints, there is at least one point at which the tangent to the arc is parallel to the secant through its endpoints. It is one of the most important results in real analysis.
	Introduction to Metric Spaces	B.B	Student will learn metric space is a set together with a notion of distance between its elements, usually called points. Metric spaces are the most general setting for studying many of the concepts of mathematical analysis and geometry.
<i>MATH-H-CC-T-06</i>	Group Theory I	B.B	In group theory students will study the algebraic structures known as groups.

<i>MATH-H-CC-T-07</i>	Numerical Methods	S.G	Numerical analysis students study the algorithms that use numerical approximation for the problems of mathematical analysis.
	Numerical Methods Lab	M.S	Students can learn C-programming which is a general-purpose programming language to solve the mathematical problems.
<i>MATH-H-GE-T-03</i>	Real Analysis	T.G	Students can study the behaviour of real numbers, sequences and series of real numbers, and real functions.
<i>MATH-H-SEC-T-01</i>	A. Logic and Sets	D.S	In Logic students can study the correct reasoning.
	B. Computer Graphics (Choose any one)	P.B	In Computer graphics students deal with generating images and art with the aid of computers. Computer graphics is a core technology in digital photography, film, video games, digital art, cell phone and computer display, and many specialized applications.

SEMESTER-IV

COURSE CODE	COURSE TITLE	TEACHERS	COURSE OUTCOMES
<i>MATH-H-CC-T-08</i>	Riemann Integration and Series of Functions	B.B	Students can understand the Riemann integral, created by Bernhard Riemann, was the first rigorous definition of the integral of a function on an interval.
<i>MATH-H-CC-T-09</i>	Multivariate Calculus	D.S	In Multivariate calculus students can learn that it is the extension of calculus in one variable to calculus with functions of several variables. The differentiation and integration of functions involving multiple variables (multivariate), rather than just one. Multivariable calculus may be thought of as an elementary part of advanced calculus. The special case of calculus in three dimensional space is often called vector calculus.
<i>MATH-H-CC-T-10</i>	Ring Theory	B.B	Ring theory students can study of rings - algebraic structures in which addition and multiplication are defined and have similar properties to those operations defined for the integers.
	Linear Algebra I	B.B	In Linear algebra students basically study the vectors and linear functions. It is a key concept for almost all areas of mathematics.

<i>MATH-H-GE-T-04</i>	Algebra	P.B	In group theory students will study the algebraic structures known as groups. The concept of a group is central to abstract algebra: other well-known algebraic structures, such as rings, fields, and vector spaces, can all be seen as groups endowed with additional operations and axioms.
<i>MATH-H-SEC-T-02</i>	A. Graph Theory	M.S	In Graph theory students can study graphs, which are mathematical structures used to model pairwise relations between objects. A graph in this context is made up of vertices which are connected by edges.
	B. Operating System (Linux) (Choose any one)	S.G	Students can learn Linux. It is both an open-source Unix-like kernel and a generic name for a family of open-source Unix-like operating systems based on the Linux kernel, an operating system kernel first released on September 17, 1991, by Linus Torvalds.

SEMESTER-V

COURSE CODE	COURSE TITLE	TEACHERS	COURSE OUTCOMES
<i>MATH-H-CC-T-11</i>	Partial Differential Equations and Applications	M.S	In partial differential equation students can compute a function between various partial derivatives of a multivariable function.
<i>MATH-H-CC-T-12</i>	Group Theory-II	B.B	Students will understand that the concept of a group is central to abstract algebra: other well-known algebraic structures, such as rings, fields, and vector spaces, can all be seen as groups endowed with additional operations and axioms.
<i>MATH-H-DSE-T-01</i>	A. Linear Programming	S.G	Linear programming, also called linear optimization. In this method students achieve the best outcome in a mathematical model whose requirements and objective are represented by linear relationships. Game theory is the study of mathematical models of strategic interactions. Students can apply this in many fields of social science, used extensively in economics as well as in logic, systems science and computer science.
	B. Point Set Topology (Choose any one)	B.B	In general topology students deal with the basic set-theoretic definitions and constructions used in topology. It is the foundation of most other branches of topology, including differential topology, geometric topology, and algebraic topology.

<i>MATH-H-DSE-T-02</i>	A. Probability & Statistics	M.S	In "Probability & Statistics" students can study the two important concepts in math. Probability is all about chance. Whereas statistics is more about how we handle various data using different techniques. It helps to represent complicated data in a very easy and understandable way.
	B. Differential Geometry (Choose any one)	T.G S.K P.B	Differential geometry is a mathematical discipline where students can study the geometry of smooth shapes and smooth spaces, otherwise known as smooth manifolds. It uses the techniques of differential calculus, integral calculus, linear algebra and multilinear algebra.

SEMESTER-VI

COURSE CODE	COURSE TITLE	TEACHERS	COURSE OUTCOMES
<i>MATH-H-CC-T-13</i>	Metric Spaces and Complex Analysis	B.B	Complex analysis is known as one of the classical branches of mathematics. Students can analyse complex numbers concurrently with their functions, limits, derivatives, manipulation, and other mathematical properties.
<i>MATH-H-CC-T-14</i>	Ring Theory and Linear Algebra II	B.B	Using Linear algebra students will understand how linear algebra make an important role in the basic concept of modern presentation of geometry. Students also learn advanced Ring Theory
<i>MATH-H-DSE-T-03</i>	A. Fuzzy Set Theory	D.S	Students can learn fuzzy sets are sets whose elements have degrees of membership. A fuzzy set is a pair where is a set (often required to be non-empty) and a membership function.
	B. Number Theory (Choose any one)	P.B T.G	Number theory is a branch of pure mathematics. Here students can study the integers and arithmetic functions.
<i>MATH-H-DSE-T-04</i>	A. Mechanics	M.S S.G	In Mechanics students can learn the relationships between force, matter, and motion among physical objects. Forces applied to objects result in displacements, which are changes of an object's position relative to its environment.
	B. Bio Mathematics (Choose any one)	M.S	Biomathematics use the mathematical models and help the students to understand phenomena in biology.

PROGRAMME OUTCOMES

MATHEMATICS (HONOURS & GENERAL)

After completing “Mathematics” (HONOURS & GENERAL) students will enhance their knowledge, skill and generic abilities.

KNOWLEDGE OUTCOMES:

1. Students will learn “C programming Language”. All modern operating systems, such as Windows, Linux, and macOS have a significant portion of their codebase written in C. Devices like washing machines, smart TVs, and medical equipment often run on embedded systems programmed using C. Some parts of mobile applications, including high-performance tasks and system-level operations, may be implemented in C for efficiency.
2. Mathematics equips students with problem-solving skills that are invaluable in various aspects of life. Whether calculating expenses, planning a budget or solving complex real-world issues, the ability to approach problems logically and methodically directly results from mathematical training.
3. The study of mathematics encourages critical thinking and enhances analytical abilities. Students learn to dissect problems, identify patterns, and make informed decisions—a skill set that transcends mathematical equations and proves crucial in navigating the challenges of daily life.

SKILL OUTCOMES:

1. In the professional realm, mathematical proficiency opens doors to a plethora of career opportunities. Industries such as finance, engineering, technology and even arts increasingly demand individuals with a strong mathematical foundation. From data analysis to computer programming, mathematical skills are a cornerstone for success in many fields.
2. Time is valuable, and mathematical skills contribute significantly to effective time management. From scheduling daily tasks to planning long-term projects, the ability to calculate and allocate time efficiently stems directly from mathematical reasoning. Students who develop these skills are better prepared for academic and professional life demands.

GENERIC OUTCOMES:

1. For students, the benefits of mastering mathematical concepts extend beyond the classroom, influencing their cognitive development, career readiness, and overall success in a rapidly evolving world.
2. As students recognize the integral role of mathematics, they can embrace the beauty and significance of this universal language.

PROGRAMME SPECIFIC OUTCOMES

MATHEMATICS (HONOURS & GENERAL)

After completing “Mathematics” (HONOURS & GENERAL) students will create many opportunities in finance, engineering, technology and management . From data analysis to computer programming, mathematical skills are a cornerstone for success in many fields.

