

<b>Programme Outcomes</b>	
At the end of the programme, student will be able to	
1	Disciplinary Knowledge: B.A./B.Sc. in Mathematics is the zenith of in-depth knowledge of Algebra, Analysis, Geometry, Calculus and several other branches of Mathematics. This also leads to study interdisciplinary areas such as computer science and other allied subjects.
2	Communication Skills: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualizations. Skill and knowledge attained during program will increase the ability to solve real world problems.
3	Digital Proficiency: The completion of this program will enable the learner to use appropriate software's to solve mathematical problems
4	Ability to work independently: The learner completing this program will grow the capacity to work independently.
5	Critical thinking and logical reasoning: Student will acquire ability of critical thinking and logical reasoning.
6	Mathematical Principles: Students will understand mathematical principles and their applications
7	Confidence of learning: The B.Sc. Program will develop learner's mathematical knowledge and oral, written and practical skills in a way which will encourage confidence, satisfaction and learning enjoyment
8	Ability to peruse advanced studies and research: Students will be motivated high for doing higher education and research in academically strong institution
9	Skill/vocational Courses: Students will have to study skill/vocational courses related to pure and apply Mathematics.
10	Generic/open elective: As an interdisciplinary approach student will study GE/OE Course in Mathematics

<b>Course Outcomes</b>		
<b>Subject: Mathematics</b>		
<b>B.Sc.: SEMESTER- I, III, V</b>		
<b>Class &amp; Paper</b>	<b>Course code &amp; course title</b>	At the end of the course
B.Sc I Paper - I	SMATCT1101 Topics in Algebra	<p>1Students can sort one-one, onto functions and can compute equivalence relation.</p> <p>2. Students can compute composite of functions.</p> <p>3. Student can compute REF, RREF and rank of any order matrix.</p> <p>4. Student can solve linear system of equations and apply Cayley Hamilton theorem.</p>
B.Sc. I Paper II	SMATCP1102 Lab Course (Calculus using SAGE)	<p>1.Student will be able to do basic programming on SAGE</p> <p>2. Students will be able to do practical on calculus.</p> <p>3. Students will know programming and data structure.</p> <p>4. Students will be able to plot 2-D,3-D curve and display solution of differential equation.</p>
B.Sc. I GE	<u>SMATGE</u> <u>1101</u> <u>Foundation of</u> <u>Mathematics</u>	<p>1students will be able to find distance formula, mid-point formula, and equation of line, parallel lines and perpendicular lines.</p> <p>2. Students can find symmetry of graphs.</p> <p>3. Students will discuss limits and continuity of given function.</p> <p>4.students can apply derivative to compute maxima and minima.</p>
B.Sc. I SEC	<u>SMATSC1101</u> <u>Basics of</u> <u>MATLAB/SCI</u> <u>LAB</u>	<p>1.Students will perform basic MATLAB/SCILAB commands and will apply MATLAB/SCILAB for elementary number theory problems.</p> <p>2.Students will be able to do arithmetic operations of arrays.</p> <p>3.students can solve elementary linear algebra examples using MATLAB/SCILAB</p> <p>4.students can compute row reduced Echelon form.</p>
B.Sc. II Paper III	SMATCT1201 <u>Real Analysis I</u>	<p>1.Students will be able to understand the basic concepts of sets and their properties.</p> <p>2Students can apply the concept of a neighborhood of a point, interior points of set, open set.</p> <p>3.students will discuss concept of limit points of a set, closed sets, closure of set, dense set.</p> <p>4.Students will study the basic concepts of sequences, sub-sequences, bounds of sequences, limit points of sequences, general principle of convergence, different types of sequences.</p>
B.Sc. II Paper IV	SMATCT1202 <u>Group Theory</u>	<p>1.Students will categorize group structures</p> <p>2.Students can compute subgroups of a given cyclic group</p> <p>3.Students can solve examples based on permutation groups.</p> <p>4.Students can compute normal subgroup, factor group and apply first fundamental isomorphism theorem.</p>
B.Sc. II Paper V	SMATCP 1201	<p>1.Students will understand the concept bounded and unbounded sets, supremum, infimum.</p>

	Lab course III based on Real analysis	2, Students can apply the concepts of open sets, closed sets and countable sets. 3. Students can identify whether sequences are bounded, monotonic and convergent or divergent. 4. Students can investigate the conditions under which a sequence oscillates and does not have a limit.
<b>Class &amp; Paper</b>		
<b>Class &amp; Paper</b>	<b>Course code &amp; course title</b>	<b>At the end of the course, student will be able to</b>
B.Sc. II Paper VI	SMATCP 1202 Lab Course IV based on Group Theory	1. Students will apply Sage Math for elementary concepts on Group Theory. 2. Students can visualize group using Sage Math /likewise Software 3. Students will solve examples on homomorphism, isomorphisms and automorphisms of groups. 4. Students can prepare quotient group and apply fundamental theorem on homomorphism.
B.Sc. II Paper VII	<u>SMATMT</u> <u>1201</u> <u>Fundamentals of Sequence and Group theory</u>	1. Students will understand the basic concepts of sets and their properties. 2. Students can apply the concept of a neighborhood of a point, interior points of set, open set. 3. Students will study the basic concepts of sequences, sub-sequences, bounds of sequences, limit points of sequences, general principle of convergence, different types of sequences 4. Students will categorize group structures
		5. Students can compute subgroups of a given cyclic group
		6. Students can solve examples based on permutation groups.
		7. Students can compute normal subgroup, factor group and apply first fundamental isomorphism theorem
B.Sc. II Paper VIII G.E.	<u>SMATGE1201</u> <u>Quotative Aptitude and Logical Reasoning</u>	1. Students will compute HCF and LCM of given numbers. 2. Students can describe how to compute fractions and how to interpret data. 3. Students will perform calculations & predictions based on given datasets. 4. Students can attempt test of different multinational companies/Banking examinations.
B.Sc. II Paper IX	<u>SMATVC</u> <u>1201</u> <u>Essential Mathematics for data science</u>	1. Students will use the mathematical concepts in the field of data science. 2. Students will apply the techniques and methods related to the area of data science in variety of applications. 3. Students can handle concepts of regression and correlation analysis. 4. Students can apply logical thinking to understand and solve the problem in context.
B.Sc. III Paper XII	<u>Metric Spaces</u>	1. Students will understand concepts of open and closed sets. 2. Students will understand concepts of convergence and completeness. 3. Students will understand concepts of fixed point and Banach spaces. 4. Students will understand concepts of continuity and uniform continuity
B.Sc. III Paper XIII	Linear Algebra	1. Students will be able to determine basis and dimension of finite dimensional space.

		2. Students can determine Eigen values and Eigen vectors.
		3. Students will understand and prove statements about linear transformation
		4. Students will find kernel, rank and nullity of linear transformation.

<b>Class &amp; Paper</b>	<b>Course code &amp; course title</b>	<b>At the end of the course, student will be able to</b>
B.Sc. III Paper XIV	Mechanics I	1. Students will understand concepts of motion, force and its importance in physical science 2. Students will develop research-oriented skills in applied Mathematics. 3. Students will analyze the equilibrium state of a particle and rigid body. 4. Students will know the principles of equilibrium of two forces.

**Course Outcomes**  
**Subject: Mathematics**  
**B.Sc.: SEMESTER- II, IV, VI**

<b>Class &amp; Paper</b>	<b>Course code &amp; course title</b>	<b>At the end of the course, student will be able to</b>
B.Sc. I Paper VI	SMATCT 1151 Analytical Geometry	1. Students can able to study and analyze Geometry of two dimensions. 2. Learners can compute angle between two planes and lines. 3. Learners can compute tangent to given sphere. 4. Students can study various forms of sphere.
B.Sc. I Paper VII	SMATCP 1152 Lab Coursey Integral Calculus	1. Students can able to discuss integral as a limit of sum and apply fundamental theorem of integral calculus 2. Students will study Beta and Gamma function. 3. Students will do multiple integrals. 4. Students will study application of multiple integral.
B.Sc. I Paper VIII GE	SMATGE 1151 Basic Algebra	1. Students will understand matrices and determinants. 2. Students will solve system of linear equations. 3. Students will calculate rate of interest. 4. Students will solve LPP and apply it in real life problems.
B.Sc. I Paper IX SEC.	SMATSC 1151 Programming using MATLAB	1. Students will do programming using MATLAB. 2. Students will define function and function files. 3. Students will be able to plot two dimensional graphs. 4. Students will be able to plot two dimensional graphs.
B.Sc. II Paper X	SMATCT1251 Real Analysis II	1. Students will define and identify infinite series distinguishing convergent and divergent series. 2. Students will understand the sum and behavior of an infinite series as the member of terms approaches infinity. 3. Students will analyze the conditions under which a series converges or diverges. 4. Students will apply various convergence tests to determine the behavior of an infinite series.
B.Sc. II Paper XI	SMATCT1252 Ring Theory	1. Students will grasp the definitions and properties of rings, fields, integral domain, subrings, etc. 2. Students will construct composition tables for finite quotient rings and understand the relationship between ideals and quotient rings. 3. Students will study the properties of homeomorphisms and isomorphisms and apply them to solve problems. 4. Students will understand the division algorithm for polynomials over fields and its applications.

B. Sc II Paper XII	<u>SMATCP</u> <u>1251</u> <u>Lab Course V</u> <u>Based on Real</u> <u>Analysis II</u>	1. Students will understand the role of partial sums in determining the behavior of an infinite series 2. Students will identify when a series converges or diverges. 3. Students will apply tests for convergence such as the comparison test, Cauchy's root test, D'Alembert's root test. 4. Students will differentiate between absolute and conditional convergence.
B.Sc. II Paper XIII	<u>SMATCP</u> <u>1252</u> <u>Lab Course,</u>	1. Students will study ring theory using Sage Math 2. Students will create ideals and check ideal membership 3. Students will define and verify ring homomorphisms between two rings 4. Students will apply Einstein's criterion in sage to test irreducibility of polynomials.
B.Sc. II Paper XIV	<u>SMATMT</u> <u>1251</u>	1. Students will define and identify infinite series distinguishing convergent and divergent series. 2. Students will understand the sum and behavior of an infinite series as the member of terms approaches infinity 3. Students will analyze the conditions under which a series converges or diverges. 4. Students will grasp the definitions and properties of rings, fields, integral domain, etc. 5. Students will construct composition tables for finite quotient rings and understand the relationship between ideals and quotient rings.
B.Sc. II Paper XV	<u>SMATMP</u> <u>1251</u> <u>DSM Lab</u> <u>course II</u>	1. Students will understand the sum and behavior of an infinite series as the member of terms approaches infinity. 2. Students will identify when a series converges or diverges. 3. Students will apply tests for convergence such as the comparison test, Cauchy's root test, D'Alembert's root test 4. Students will study ring theory using Sage Math
B.Sc. II Paper XVI	<u>SMATGE</u> <u>1251</u> <u>GE</u>	1. Students will solve examples of various competitive examinations. 2. Students will compute simple and compound interest. 3. Students will perform calculations based on permutations and combinations. 4. Students will attempt aptitude test of different multinational companies/banking examinations
B.Sc. II Paper XVII	<u>SMATVC</u> <u>1251</u> <u>Introduction to</u> <u>R</u> <u>Programming</u>	1. Students will learn the syntax and semantics of R including data types, variables and control structures. 2. Students will perform basic statistical analysis, including descriptive statistics and inferential statistics. 3. Students will import, manipulate and visualize data in R. 4. Students will create informative and attractive data visualizations using R.

B.Sc. III Paper XV	Complex Analysis	1. Students will demonstrate the ability of limit, continuity, analyticity of function. 2. Students will use Cauchy integral theorem and Liouville's theorem. 3. Students will find derivative and integral of complex valued function. 4. Students will use Taylor's series and Laurent's series
B.Sc. III Paper XVI	Integral Transforms	1. Students will understand the concepts of integral transforms. 2. Students will be able to find integral transform of various functions. 3. Students will apply integral transforms to evaluate integral of functions. 4. Students will solve differential equations by applying integral transforms.
B.Sc. III Paper XVI	Mechanics II	1. Students will understand Newton's laws of motion and its importance in physical science 2. Students will develop research-oriented skills in applied Mathematics. 3. Students will understand the expressions for velocity and acceleration 4. Students will find the motion of projectile and derivation of equation of its trajectory.