

### Programme Outcomes

At the end of the programme, student will be able to

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| 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   |

## Course Outcomes

**Subject: Mathematics**

**B.Sc.: SEMESTER- I, III, V**

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

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|                          | Lab course III based on Real analysis                                  | 2, Students can apply the concepts of open sets, closed sets and countable sets.<br>3.Students can identify whether sequences are bounded, monotonic and convergent or divergent.<br>4.Students can investigate the conditions under which a sequence oscillates and does not have a limit.   |
| <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<br>Lab Course IV based on Group Theory                     | 1.Students will apply Sage Math for elementary concepts on Group Theory.<br>2.Students can visualize group using Sage Math /likewise Software<br>3.Students will solve examples on homomorphism, isomorphisms and automorphisms of groups.<br>4.Students can prepare quotient group and apply fundamental theorem on homomorphism.  |
| B.Sc. II Paper VII       | <u>SMATMT 1201</u><br><u>Fundamentals of Sequence and Group theory</u> | 1.Students will understand the basic concepts of sets and their properties.<br>2. Students can apply the concept of a neighborhood of a point, interior points of set, open set.<br>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<br>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><br><u>Quotative Aptitude and Logical Reasoning</u>   | 1.Students will compute HCF and LCM of given numbers.<br>2.Students can describe how to compute fractions and how to interpret data.<br>3.Students will perform calculations & predictions based on given datasets.<br>4.Students can attempt test of different multinational companies/Banking examinations.   |
| B.Sc. II Paper IX        | <u>SMATVC 1201</u><br><u>Essential Mathematics for data science</u>    | 1.Students will use the mathematical concepts in the field of data science.<br>2.Students will apply the techniques and methods related to the area of data science in variety of applications.<br>3.Students can handle concepts of regression and correlation analysis.<br>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.<br>2. Students will understand concepts of convergence and completeness.<br>3. Students will understand concepts of fixed point and Banach spaces.<br>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.   |

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|  |  | 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.     |
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| <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>                                    |
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| B.Sc. III<br>Paper<br>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**

| Class & Paper               | Course code & course title   | At the end of the course, student will be able to  |
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| B.Sc. I<br>Paper VI         | SMATCT<br>1151<br>Analytical<br>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<br>Paper VII        | <u>SMATCP</u><br><u>1152</u><br><u>Lab Coursey</u><br><u>Integral</u><br><u>Calculus</u> | 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<br>Paper VIII<br>GE | <u>SMATGE</u><br><u>1151</u><br><u>Basic Algebra</u>                                     | 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<br>Paper IX<br>SEC. | <u>SMATSC</u><br><u>1151</u><br><u>Programming</u><br><u>using</u><br><u>MATLAB</u>      | 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<br>Paper X         | <u>SMATCT1251</u><br><u>Real Analysis</u><br><u>II</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 apply various convergence tests to determine the behavior of an infinite series.   |
| B.Sc. II<br>Paper XI        | <u>SMATCT1252</u><br><u>Ring Theory</u>  | 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.  |

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

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| B.Sc. III<br>Paper XV     | Complex<br>Analysis    | <ol style="list-style-type: none"> <li>1. Students will demonstrate the ability of limit, continuity, analyticity of function.</li> <li>2. Students will use Cauchy integral theorem and Liouville's theorem.</li> <li>3. Students will find derivative and integral of complex valued function.</li> <li>4. Students will use Taylor's series and Laurent's series</li> </ol>   |
| B.Sc. III<br>Paper<br>XVI | Integral<br>Transforms | <ol style="list-style-type: none"> <li>1. Students will understand the concepts of integral transforms.</li> <li>2. Students will be able to find integral transform of various functions.</li> <li>3. Students will apply integral transforms to evaluate integral of functions.</li> <li>4. Students will solve differential equations by applying integral transforms.</li> </ol>                                     |
| B.Sc. III<br>Paper<br>XVI | Mechanics II           | <ol style="list-style-type: none"> <li>1. Students will understand Newton's laws of motion and its importance in physical science</li> <li>2. Students will develop research-oriented skills in applied Mathematics.</li> <li>3. Students will understand the expressions for velocity and acceleration</li> <li>4. Students will find the motion of projectile and derivation of equation of its trajectory.</li> </ol> |