Department of mathematics

1**. Paper I: Calculus-I (Diff erential Calculus)**

Objectives: A primary objective of the course is to learn elementary knowledge of Differential Calculus

Course Outcome: After successful completion of the course student will be able to

1. Understanding concept of Limit, Continuity of Single and two variable Functions.

2. Find the Higher order derivatives of Product of Functions

3. Expand functions in terms of infinite series.

4. Find Equation of Tangent, Normal and Length of Tangent, Normal, Sub-tangent, Sub-normal.

5. Understanding of Mean Value Theorem concepts.

6. Understand the concept of Partial diff erentiation.

7. Use the results to solve problems.

8. Diff erentiate diff erence between derivative of single variable and two variables.

Paper II: Algebra and Trigonometry

Objectives: A primary objective of the course is to learn elementary knowledge of Matrices, Complex Numbers, and Trigonometry.

Course Outcomes: After successful completion of the course student will be able to

1. Add, Subtract and Multiply two Matrices.

2. Recognize the diff erent types of Matrices.

3. Find the Inverse of invertible Matrices.

4. Determine the Rank of a Matrix.

5. Transform matrix to Row Echelon form

6. Solve the System of Linear Equations.

7. Find the Characteristic Roots and Characteristic Vectors of a Square Matrix.

8. Check that every square matrix satisfies its own Characteristic Polynomial.

Paper III: Calculus-II (Integral Calculus)

. **Objectives:** The main objective of the course is to study methods of finding Integration of Algebraic Rational Functions, Irrational Algebraic Functions, Transcendental Functions, Study Gamma and Beta Functions, Multiple Integral and Applications of integration to find Area and Volume.

Course Outcome: After successful completion of the course student will be able to

1. Apply method of integration to find the integral of function.

2. Solve examples of definite integrals using Properties definite integrals.

3. Find the area and volume of given shape.

4. Understanding concept of Gamma and Beta Functions.

5. Solve problems on Multiple Integrals.

Paper IV: (Geometry)

Objectives: A primary objective of the course is to learn elementary knowledge of Three Dimensional Geometry.

Course Outcome: After successful completion of the course student will be able to

1. Understanding concepts on Three Dimensional Geometry.

2. Find equations of Right lines, Planes, Spheres, Cones and Cylinders.

3. Find the Direction cosines of any line under the diff erent given conditions.

4. Understand the intersection of any two or three, three dimensional geometrical figures.

5. Transform the equation of a plane to the normal form.

6. Transform equation of line from the unsymmetrical to the symmetrical form.

7. Find the length of perpendicular from a point to a plane.

8. Find the angle of intersection of two spheres.

9. Understanding concepts of plane of contact.

Paper V: (PRACTICAL PAPER)

. **Objectives:** The main objective of the course is to study MATLAB software and its application to solve problems in matrices and to plot the graphs of diff erent functions.

Course Outcome: After successful completion of the course student will be able to

1. Verify associatively of matrix addition, left distributive law and right distributive law of matrices.

2. Find determinant, eigen values, eigen vectors, inverse, powers and characteristics polynomial of a square matrix.

3. To draw the graph of diff erent functions with the help of MATLAB software and related Freeware.

Paper - VI (MT 201) : Real Analysis - I

On successful completion of the course students should be able to :

1. define and recognize basic properties of the field of real numbers that lead to then formal development of real analysis;

2. explain the sets of real numbers, their properties, operations on them ;

3. identify real valued functions, their domain, range, inverse etc.

4. improve and outline the logical thinking;

5. define and recognize the sequence of real numbers and its convergence;

6. define and recognize Cauchy sequence and its Properties;

7. define and recognize series of real numbers and its convergence;

8. use Leibnitz rule for convergence of alternating series;

9. apply different tests for convergence of series of real numbers;

10. make use of series in real life instances.

Paper - IX (MT 204) : Real Analysis – II

On successful completion of the course students should be able to :

1. define Reimann sums and Reimann inegrable functions;

2. construct Reimann integral and all its properties;

3. state and prove conditions of integrability, Darboux's Theorem;

4. express the integral as a limit of sums;

5. understand the Fundamental Theorem of Calculus and use it in examples;

6. distinguish the proper and improper improper integrals;

7. to apply tests for convergence of improper integral of any kind;

8. understand the underlying concept of representing a function as a sum of harmonics;

9. know that any periodic function can be expressed as a Fourier series;

10. know how to obtain Fourier series of given periodic function by evaluating Fourier coefficients; expand even or odd function as half range cosine or sine Fourier series

11. find wide range of applications of Fourier series.

Paper – X (MT 205) : Ring Theory

On successful completion of the course students should be able to demonstrate knowledge of the syllabus material;

1. write precise and accurate mathematical definitions of objects in ring theory;

2. use mathematical definitions to identify and construct examples and to distinguish examples from non-examples;

3. validate and critically assess a mathematical proof;

4. use a combination of theoretical knowledge and independent mathematical thinking to investigate questions in ring theory and to construct proofs;

5. write about ring theory in a coherent, grammatically correct and technically accurate manner;

6. develop a good background for studying more advanced topics in Algebra and Number Theory**.**

Paper – XII (MT 301) : Metric Spaces

On successful completion of the course students should be able to : deal with various examples of metric spaces;

1. to construct examples and counterexamples related to topics in the course;

2. have some familiarity with continuous maps;

3. work with completeness;

4. work with connectedness

5. work with compact sets in Euclidean space;

6. apply the ideas of metric spaces to other areas of mathematics.

Paper – XV(B) (MT 303B) : Mechanics – I

On successful completion of the course students should be able to :

1. describe force systems and to compute geometrical properties;

2. find magnitude and direction of resultant of system forces acting on a particle;

3. apply Triangle law of forces and Law of parallelogram of forces;

4. understand and apply Lami's Theorem;

5. know equilibrium of forces acting on a particle;

6. find moment of force or couple acting on a rigid body;

7. know the effect of couple on a rigid body;

8. apply maths and physics to solve real – world problems.

Paper – XVIII(A) (MT 306A) : Topology

On successful completion of the course students should be able to :

1. know the definitions of standard terms in Topology;

2. know how to read and write proofs in Topology;

3. generate new Topologies from a given set with basis;

4. distinguish among open and closed sets on different topological spaces;

5. know the two fundamental topologies i.e. Discrete and Indiscrete topology.

6. provide variety of examples and counter-examples in Topology;

7. identify connectedness, compactness etc.

8. gain mathematical maturity;

9. apply special imagination to theory;

10. Know the importance of Topology in Mathematics and it's applications in Physics, Biology and other branches of Science.

Paper-XIII Linear Algebra

Course Outcome :Students will able to

1. Define Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product.

2. Discuss the linear transformations, rank, nullity.

3. Find the characteristic equation, eigen values and eigen vectors of a matrix.

4. Prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process.

5. Solve the system of simultaneous linear equations.

Numerical Analysis

Course Outcome : Students will able to

1. Define Basic concepts of operators Δ,E, ∇

2. Find the difference of polynomial

3. Solve problems using Newton forward formula and Newton backward formula.

4. Derive Gauss's formula and Stirling formula using Newton forward formula and Newton backward formula.

5. Find maxima and minima for differencial difference equation

6. Derive Simpson's 1/3 ,3/8 rules using trapezoidal rule

7. Find the solution of the first order and second order equation with constant coefficient

8. Find the summation of series finite difference techniques

9. Find the solution of ordinary differential equation of first by Euler,Taylor and Runge-Kutta methods

Programme Outcomes for B. Sc. Mathematics

It is expected that each mathematics graduate will be able to :

1. Reason mathematically;

2. Develop abstract mathematical thinking;

3. Solve complex problems using mathematics;

4. Communicate mathematical ideas;

5. Evaluate mathematical work;

6. Demonstrate mathematical knowledge commensurate with national norms;

7. To get wide range of mathematical skills to crack various competitive examinations.

Programme Specific Outcome of B.Sc., Mathematics

• Think in a critical manner.

• Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

• Formulate and develop mathematical arguments in a logical manner.

• Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.

• Understand, formulate and use quantitative models arising in social science, business and other contexts.