



SEMESTER – I

BRANCH	Subject Title	Subject Code
B.Sc. (Mathematic – Major)	ALGEBRA, VECTOR ANALYSIS AND GEOMETRY	MAM1

Learning outcomes:-

The course will enable the students to:

1. Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using the rank of matrix.
2. To find the Eigen values and corresponding Eigen vectors for a square matrix.
3. Using the knowledge of vector calculus in geometry
4. Enhance the knowledge of three dimensional geometrical figures (eg, cone and cylinder).

Unit - 1

Historical background:

- 1.1.1 Development of Indian Mathematics: Later Classical Period (500-1250)
- 1.1.2 A brief biography of Varahamihira and Aryabhata
- 1.2 Rank of a Matrix
- 1.3 Echelon and Normal form of a matrix
- 1.4 Characteristic equations of a matrix
 - 1.4.1 Eigen-values
 - 1.4.2 Eigen-vectors

Unit - 2

- 2.1 Cayley Hamilton theorem



2.2 Application of Cayley Hamilton theorem to find the inverse of a matrix.

2:3 Application of matrix to solve a system of linear equations

2.4 Theorems on consistency and inconsistency of a system of linear equations

2.5 Solving linear equations up to three unknowns

Unit - 3

3.1 Scalar and Vector products of three and four vectors

3.2 Reciprocal vectors

3.3 Vector differentiation

3.3.1 Rules of differentiation

3.3.2 Derivatives of Triple Products

3.4 Gradient, Divergence and Curl

3.5 Directional derivatives

3.6 Vector Identities.

3.7 Vector Equations

Unit - 4

4.1 Vector Integration

4.2 Gauss theorem (without proof) and problems based on it

4.3 Green theorem (without proof) and problems based on it

4.4 Stoke theorem (without proof) and problems based on it

Unit -5

5.1 General equation of second degree



5.2 Tracing of conics

5.3 System of conics

5.4. Cone

5.4.1 Equation of cone with given base

5.4.2 Generators of cone

5.4.3 Condition for three mutually perpendicular generators

5.4.4 Right circular cone

5.5 Cylinder

5.5.1 Equation of cylinder and its properties

5.5.2 Right Circular Cylinder

5.5.3 Enveloping Cylinder



SEMESTER - 2

BRANCH	Subject Title	Subject Code
B.Sc. (Mathematic – Major)	CALCULAS AND DIFFERENTIAL EQUATIONS	

Course learning outcomes:-

The course will enable the students to:

1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference.
2. Using the derivatives in Optimization, Social sciences. Physics and Life sciences etc.
3. Formulate the Differential equations for various Mathematical models.
4. Using techniques to solve and analyze various Mathematical models.

Unit -1

1.1 Historical background:

1.1.1 Development of Indian Mathematics: Ancient and Early Classical Period (till 500 CE)

1.1.2 A brief biography of Bhaskaracharya (with special reference to Lilavati) and Madhava

1.2 Successive differentiation

1.2.1 Leibnitz theorem

1.2.2 Maclaurin's series expansion

1.2.3 Taylor's series expansion

1.3 Partial Differentiation

1.3.1 Partial derivatives of higher order



1.3.2 Euler's theorem on homogeneous functions

1.4 Asymptotes

1.4.1 Asymptotes of algebraic curves

1.4.2 Condition for Existence of Asymptotes

1.4.3 Parallel Asymptotes

1.4.4 Asymptotes of polar curves

Unit - 2

2.1 Curvature

2.1.1 Formula for radius of Curvature

2.1.2 Curvature at origin

2.1.3 Centre of Curvature

2.2 Concavity and Convexity

2.2.1 Concavity and Convexity of curves

2.2.2 Point of Inflexion

2.2.3 Singular point

2.2.4 Multiple points

2.3 Tracing of curves

2.3.1 Curves represented by Cartesian equation

2.3.2 Curves represented by Polar equation

Unit - 3

3.1 Integration of transcendental functions

3.2 Introduction to Double and Triple Integral

3.3 Reduction formulae



3.4 Quadrature

3.4.1 For Cartesian coordinates

3.4.2 For Polar coordinates

3.5 Rectification

3.5.1 For Cartesian coordinates

3.5.2 For Polar coordinates

Unit - 4

4.1 Linear differential equations

4.1.1 Linear equation

4.1.2 Equations reducible to the linear form

4.1.3 Change of variables

4.2 Exact differential equations

4.3 First order and higher degree differential equations 4.3.1 Equations solvable for x, y and p

4.3.2 Equations homogenous in x and y

4.3.3 Clairaut's equation

4.3.4 Singular solutions

4.3.5 Geometrical meaning of differential equations

4.3.6 Orthogonal trajectories

Unit -5

5.1 Linear differential equation with constant coefficients

5.2 Homogeneous linear ordinary differential equations.

5.3 Linear differential equations of second order

5.4 Transformation of equations by changing the dependent/ independent variable

5.5 Method of variation of parameters.