Dr. A.P.J. Abdul Kalam University, Indore

SEMESTER – I

COURSE	Subject Title	Subject Code
B.Sc. (Major)	Mathematics -I	BSMT-101T

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:

Development of Indian Mathematics: Later Classical Period (500-1250)

A brief biography of Varahamihira and Aryabhatta

Rank of a Matrix

Echelon and Normal form of a matrix

Characteristic equations of a matrix

Eigen-values

Eigen-vectors

Unit - 2

Cayley Hamilton theorem

Application of Cayley Hamilton theorem to find the inverse of a matrix.2:3

Application of matrix to solve a system of linear equations

Theorems on consistency and inconsistency of a system of linear equations

Solving linear equations up to three unknowns

Unit - 3

Scalar and Vector products of three and four vectors

Reciprocal vectors

Vector differentiation

Rules of differentiation

Derivatives of Triple Products

Gradient, Divergence and Curl

Directional derivatives

Vector Identities.

Vector Equations

Unit - 4

Vector Integration

Gauss theorem (without proof) and problems based on it

Green theorem (without proof) and problems based on it

Stoke theorem (without proof) and problems based on it

Unit -5

General equation of second degree

Tracing of conics

System of conics

Cone

Equation of cone with given base

Generators of cone

Condition for three mutually perpendicular generators

Right circular cone

Cylinder

Equation of cylinder and its properties

Right Circular Cylinder

Enveloping Cylinder

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SEMESTER - I

COURSE	Subject Title	Subject Code
B.Sc. (Minor)	**Mathematics (Calculus and Differential Equations)- II**	BSMT102T

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

Historical background:

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

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

Successive differentiation

Leibnitz theorem

Maclaurin's series expansion

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

Asymptotes

Asymptotes of algebraic curves

Condition for Existence of Asymptotes

Parallel Asymptotes

Asymptotes of polar curves

Unit - 2

Curvature

Formula for radius of Curvature

Curvature at origin

Centre of Curvature

Concavity and Convexity

Concavity and Convexity of curves

Point of Inflexion

Singular point

Multiple points

Tracing of curves

Curves represented by Cartesian equation

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

Quadrature

For Cartesian coordinates

For Polar coordinates

Rectification

For Cartesian coordinates

For Polar coordinates

Unit - 4

Linear differential equations

Linear equation

Equations reducible to the linear form

Change of variables

Exact differential equations

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

Equations homogenous in x and y

Clairaut's equation

Singular solutions

Geometrical meaning of differential equations

Orthogonal trajectories

Unit -5

Linear differential equation with constant coefficients

Homogeneous linear ordinary differential equations.

Linear differential equations of second order

Transformation of equations by changing the dependent/ independent variable

Method of variation of parameters.