JIS College of Engineering
(An Autonomous, NAAC 'A' Grade Institution)

Paper Name: Mathematics
Contact: 4L+1T
Credits: 5

Course contents

Unit 1 **ALGEBRA**

1.1 Logarithm **3L**

1.1.1 Definition of natural and common Logarithm
1.1.2 Laws of Logarithm. Simple Problems.

1.2 Complex Numbers 6L

1.2.1 Definition of Complex numbers, Cartesian and polar. Exponential forms of complex numbers.
1.2.2 Modulus, amplitude & conjugate of a complex number
1.2.3 Algebra of Complex numbers (Equality, Addition, Subtraction, Multiplication).
1.2.4 Cube roots of unity & its properties.
1.2.5 De Moivre's theorem (statement only) and simple problems.

1.3 Quadratic Equations **4L**

1.3.1 Definition of Quadratic Equations
1.3.2 Analysing the nature of roots using discriminant
1.3.3 Relation between roots & coefficients
1.3.4 Conjugate roots

1.4 Binomial Theorem **4L**

1.4.1 Definition of factorial notation, definition of permutation and combination with formula
1.4.2 Binomial theorem for positive index (statement only)
1.4.3 General term and middle term.
1.4.4 Binomial theorem for negative index (statement only).

1.5 Partial Fraction **4L**

1.5.1 Definition of polynomial fraction, proper & improper fractions and definition of partial fractions
1.5.2 Resolving proper fractions into partial fractions with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors.

Unit 2 Vector Algebra **10L**

2.1 Definition of a vector quantity.
2.2 Concept of Position vector and Ratio formula.
2.3 Rectangular resolution of a vector.
2.4 Algebra of vectors – equality, addition, subtraction & scalar multiplication.
2.5 Scalar (Dot) product of two vectors with properties.
2.6 Vector (cross) product of two vectors with properties.
2.7 Applications
2.7.1 Application of dot product in work done by a force and projection of one vector upon another.
2.7.2 Application of cross product in finding vector area and moment of a force.

Group - B

Unit 3 **TRIGONOMETRY** **10L**
3.1 Trigonometric Ratios of associated, compound, multiple and sub-multiple angles.
3.2 Inverse trigonometric functions – Definition, formulae and simple problems.
3.3 Properties of Triangle – sine, cosine and tangent formulae -Simple Problems.

Unit 4 **COORDINATE GEOMETRY & MENSURATION**
4.1 Co-ordinate System **2L**
4.1.1 Cartesian & Polar co-ordinate system
4.1.2 Distance formula and section formula
4.1.3 Area of a triangle and condition for collinearity.

4.2 Straight Line **3L**
4.2.1 Equation of straight line in slope point form, intercept form, two-point form, two-intercept form, normal form.
4.2.2 General equation of a straight line.
4.2.3 Angle between two straight lines – Condition for parallelism and perpendicularity.
4.2.4 Length of perpendicular from a point on a line. Perpendicular distance between two parallel lines.

4.3 CIRCLE **3L**
4.3.1 Equation of circle in standard form, centre-radius form, diameter form, two-intercept form.
4.3.2 General equation of circle with a given centre and radius. Simple Problems.

4.4 Conic Section **2L**
4.4.1 Standard equations of parabola, ellipse & hyperbola.
4.4.2 Definition of focus, vertex, directrix, axes, eccentricity. Simple problems.

4.5 MENSURATION **3L**
4.5.1 Regular Polygon of n sides – Formula for area and perimeter.
4.5.2 Prism and Pyramid – Formula for volume & Surface area. Simple Problems.

Group - C

Unit 5 **FUNCTION, LIMIT & CONTINUITY**
5.1 Function 3L
5.1.1 Definitions of variables, constants, open & closed intervals.
5.1.2 Definition & types of functions – Simple Examples
5.2 Limits 4L

5.2.1 Concept & definition of Limit.
5.2.2 Standard limits of algebraic, trigonometric, exponential and logarithmic functions.
5.2.3 Evaluation of limits.

5.3 Continuity 2L

5.3.1 Definition and simple problems of continuity.

Unit 6 **DERIVATIVE** **12L**

6.1 Definition of Derivatives, notations.
6.2 Derivative of standard functions.
6.3 Rules for differentiation in case of sum, difference, product and quotient of functions.
6.4 Derivative of composite functions (Chain rule).
6.5 Derivatives of inverse trigonometric functions.
6.6 Derivatives of implicit functions.
6.7 Logarithmic derivatives.
6.8 Derivatives of parametric functions.
6.9 Derivative of one function with respect to another function
6.10 Second order derivatives.
6.11 Applications of Derivatives.
6.11.1 Geometric meaning of derivative.
6.11.2 Rate measurement
6.11.3 Maxima & Minima (one variable)

Text Books:

1. B.K. Paul Diploma Engineering Mathematics (Vol-1) U.N. Dhar & Sons
2. A. Sarkar Mathematics (First Semester) Naba Prakashani
3. G.P. Samanta A Text Book of Diploma Engineering Mathematics, Volume-1 Learning Press
4. Dr. S. Bose & S. Saha A Complete Text Book of Mathematics Lakhsmi Prakasan

Reference Books:

1. H.S. Hall & S.R. Knight Higher Algebra Book Palace, New Delhi
2. S.L. Loney Trigonometry S. Chand & Co.
3. H.K. Dass Engineering Mathematics S. Chand & Co.
4. T.M. Apostol Calculus, Volume-1 John Wiley & Sons
5. B.K.Pal, K.Das Engineering Mathematics, Volume-1 U.N. Dhar & Sons
6. B.C. Das & B.N.Mukherjee Differential Calculus U.N. Dhar & Sons
7. KAR Engineering Mathematics Tata McGraw- Hill
8. SINGH Engineering Mathematics Tata McGraw- Hill