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

Paper Name: Mathematics
Contact: 3L+1T
Credits: 4

Course contents

GROUP - A

Unit 1
DETERMINANTS & MATRICES 12L
1.1 Determinant
1.1.1 Definition & expansion of determinants of order 2 and 3.
1.1.2 Properties of determinants (statement only)
1.1.3 Minors and cofactors.
1.1.4 Evaluation of determinants of order 4 by Chio's method.

1.2 Matrix Algebra
1.2.1 Definition of a matrix of order mxn, leading element, principal diagonal.
1.2.2 Types of matrices – null matrix, square matrix, diagonal matrix, identity matrix etc.
1.2.3 Symmetric and Skew symmetric matrices.
1.2.4 Matrix algebra – addition, subtraction, scalar multiplication and multiplication of matrices.
1.2.5 Matrix inversion by adjoint method.

Unit 2
NUMERICAL METHODS 7L

2.1 Concept of Interpolation with Newton forward Interpolation formula (Statement only). Simple Problems.
2.2 Numerical solution of simultaneous linear equations by Gaussian elimination method only (without proof).
2.3 Numerical Solutions of non-linear equations by Newton- Raphson method (without proof).

2.4 Numerical integration by trapezoidal rule & Simpson's 1/3 rule (without proof).

GROUP - B

Unit 3
INTEGRATION 17L

3.1 Definition of Integration as inverse process of differentiation.
3.2 Integration of standard functions.
3.3 Rules for integration (sum, difference, scalar multiple).
3.4 Methods for Integration
3.4.1 Integration by substitution.
3.4.2. Integration by trigonometric substitution.
3.4.3 Integration by parts.
3.4.4 Integration by partial fraction.
3.5 Definite Integral
3.5.1 Definition of Definite Integral.
3.5.2 Properties of definite integrals with simple problems.
3.6 Applications of Definite Integral
3.6.1 Area under plain curves.
3.6.2 Area bounded by two curves.
3.6.3 Volume of revolution. Simple examples.

GROUP - C
Unit 4
ORDINARY DIFFERENTIAL EQUATIONS 10L

4.1 Definition of ordinary differential equation, order & degree.
4.2 Solution of differential equations of 1^{st} order & 1^{st} degree of
4.2.1 variable separable type
4.2.2 Homogeneous type
4.2.3 Reducible to homogeneous type
4.2.4 Exact type
4.2.5 Linear type
4.2.6 Reducible to linear type (Bernoulli's Equation).
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4.3 Solution of 2^{nd} order linear ordinary differential equations with constant coefficients –
4.3.1 Evaluation of Complementary functions (C.F.)
4.3.2 Evaluation of Particular Integral (P.I.)

GROUP - D

Unit 5
PARTIAL DIFFERENTIATION 4L

5.1 Definition & meaning of partial derivative.
5.2 Evaluation of partial derivatives.
5.3 Definition & examples of homogeneous functions.
5.3 Euler's theorem (1st order) on Homogeneous functions for 2 & 3 variables (without proof). Simple problems.

Unit 6
STATISTICS & PROBABILITY 10L

6.1 Statistics
6.1.1 Definition & examples of frequency distribution.
6.1.2 Measures of central tendency (mean, median, mode) for ungrouped and grouped frequency distribution.
6.1.3 Measures of dispersion – Standard deviation, Simple problems.
6.2 Probability
6.2.1 Definition of random experiment, sample space, event, occurrence of events & types of events (eg. Impossible, mutually exclusive, exhaustive, equally likely)