

JIS College of Engineering
(NAAC 'A' Accredited Autonomous Institution)

Syllabus for all B.Tech Streams
1ST YEAR 1ST SEM

Paper Name: Mathematics-I
Paper Code: M 101
Contact: 3L+1T
Credits: 4

Course contents

MODULE I

Matrix Algebra: Elementary row and column operations on a matrix, Rank of matrix, Normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using elementary operations, Linear dependence and independence of vectors, Concept of different matrices (unitary, orthogonal, symmetric, skew-symmetric, hermitian, skew-hermitian), Eigenvalues and eigenvectors, Characteristic polynomials, Caley-Hamilton theorem and its applications, Reduction to diagonal form (upto 3rd order). **10L**

MODULE II

Calculus-I (Functions of single variable): Rolle's theorem, Mean value theorem- Lagrange & Cauchy, Taylor's and Maclaurin's theorems, Expansions, Fundamental theorem of integral calculus, Evaluation of plane areas, volume and surface area of a solid of revolution and lengths, Convergence of Improper integrals, Beta and Gamma integrals– Elementary properties. **10L**

MODULE III

Calculus-II (Functions of several variables): Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives, Total Differentiation, Derivatives of composite and implicit functions, Euler's theorem on homogeneous functions,

Chainrule, Maxima and minima of functions of two variables – Lagrange’s method of Multipliers, Double and triple integrals. **12L**

MODULE IV

Vector Calculus: Scalar and vector triple products, Scalar and Vector fields, Vector Differentiation, Level surfaces, Directional derivative, Gradient of scalar field, Divergence and Curl of a vector field and their physical significance, Line, surface and volume integrals, Green’s theorem in plane, Gauss Divergence theorem, Stokes’ theorem, related applications.

8L

Text / Reference Books:

1. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley, 1999.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 2009.
3. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Pub. House, 2008.
4. H. Anton, Elementary linear algebra with applications (8th Edition), John Wiley, 1995.
5. G. Strang, Linear algebra and its applications (4th Edition), Thomson, 2006.
6. S. Kumaresan, Linear algebra - A Geometric approach, Prentice Hall of India, 2000.
7. M. Apostol, Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern, 1980.
8. TG. B. Thomas and R. L. Finney, Calculus and Analytic Geometry (9th Edition), ISE Reprint, Addison-Wesley, 1998.
9. Hughes-Hallett et al., Calculus - Single and Multivariable (3rd Edition), John-Wiley and Sons, 2003.
10. J. Stewart, Calculus (5th Edition), Thomson, 2003.
11. J. Bird, Higher Engineering Mathematics (4th Edition, 1st India Reprint), Elsevier, 2006.
12. L. Rade and B. Westergen, Mathematics Handbook: for Science and Engineering (5th edition, 1st Indian Edition), Springer, 2009.