

**ENGINEERING MATHEMATICS I & II**  
**(B.E. FIRST YEAR - COMMON FOR ALL BRANCHES)**  
**(For students admitted from 2009-10)**

**UNIT I**  
**(SOLID GEOMETRY)**

Equation of a plane – Equation of a St. line – conditions for a line to lie in a plane – Conditions for the two lines to intersect – S.D. between two lines – intersection of three planes – sphere – equation of the tangent plane – cone - cylinder – right circular cylinder - surfaces of revolution.

**UNIT II**  
**(MATRIX THEORY)**

Rank of a matrix – Elementary transformation of a matrix - Gauss Jordan method of finding inverse – Consistency of linear system of equations - Linear and orthogonal transformations — Eigenvalues and eigenvectors – Properties of eigenvalues – Cayley Hamilton theorem (without proof) – Reduction to diagonal form – Reduction of quadratic form to canonical form.

**UNIT III**  
**(LINEAR DIFFERENTIAL EQUATIONS)**

Definitions – Complete solution – operator D – Complementary function – Inverse operator – Particular Integral - Method of variation of parameters - Method of undetermined coefficients – Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation - Legendre's linear equation - Linear dependence of solutions - Simultaneous linear equations with constant coefficients.

**UNIT IV**  
**(MULTIPLE INTEGRALS)**

Double integrals - Change of order of integration - Double integrals in polar coordinates - Areas enclosed by plane curves - Triple integrals - Volume of solids - Volume as triple integral - Beta function - Gamma function - Relation between Beta and Gamma functions.

**UNIT V**  
**(VECTOR CALCULUS)**

Differentiation of vectors - Velocity and acceleration - Scalar and vector point functions -  $\nabla$  applied to scalar point functions : Gradient -  $\nabla$  applied to vector point functions : Divergence and curl - Physical interpretation of divergence and curl -  $\nabla$  applied twice to point functions -  $\nabla$  applied to products of point functions - Integration of vectors - Line integral - Surfaces - Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Volume integral - Gauss divergence theorem (without proof) .

**Remark:** Each Unit has to be covered in 12 hours (each of 50 minutes duration). Questions may be set to test the problem solving ability of the students in the above topics.

**PRESCRIBED TEXT BOOK:**

B.S.Grewal, Higher Engineering Mathematics, 40<sup>th</sup> Edition, Khanna Publishers, New Delhi, 2007.

**REFERENCES**

1. Erwin Kreyszig, Advanced Engineering Mathematics, Eighth Edition, John Wiley & Sons, 1999.
2. Veerarajan, T., Engineering Mathematics Vol. I, 5<sup>th</sup> Edition, Tata McGraw Hill, New Delhi, 2008.
3. Kandasamy et al., Engineering Mathematics Vol. I, 5<sup>th</sup> Edition, S. Chand & Co., New Delhi, 2002
4. Richard Bronson, Differential Equations, (Schaum's Outline Series), McGraw Hill Company, 1975.
5. Murry R. Spiegel, Vector Analysis, (Schaums Outline Series) McGraw Hill Company, 1974.