Vidyalankar

S.E. Sem. IV [BIOM]

Engineering Mathematics – IV

SYLLABUS

Time : 5 Hrs. **Theory :** 100 Marks

1. **Vector Analysis:**
   Scalar and vector point functions, curl, gradient and divergence, conservative, irrotational and Solenoidal fields.
   (a) Line Integral, Greens theorem for plane regions and properties of the integral, Stoke's theorem, Gauss's Divergence theorem (without proof) related identities and deductions.

2. **Matrices**
   (a) Types of matrices, adjoint of a matrix, inverse of a matrix, rank of a matrix, linear dependence and independence of rows and columns of a matrix over a real field, reduction to normal form and partitioning of a matrix.
   (b) Systems of homogeneous and non–homogeneous equations, their consistency and solutions.
   (c) Brief revision of vectors over real fields, inner product, norm, linear independence and orthogonality of vectors.
   (d) Characteristics Polynomial, characteristic equation, characteristic roots, and characteristic vectors of square matrix, properties of characteristic roots and vectors of different types of matrices such as orthogonal matrix, Hermitian matrix, skew–Hermitian matrix, Diagonal matrix, Cayley–Hamilton theorem (without proof), functions of square matrix, minimal polynomial and derogatory matrix.
   (e) Quadratic forms, Congruent and orthogonal reduction of quadratic form, rank, index, signature and class value of quadratic form.

3. **Probability and Statistics:**
   Concept of probability, conditional probability. Baye's theorem (without proof).
   (a) Random variable : Probability distribution for discrete and continuous random variables. Density function and distribution function. Expected value, variance, moments, moment generating function, binomial, Poisson, normal distributions for detailed study with proof,
   (b) Curve fitting : Correlation, Karl Pearson coefficient and Spearman's rank correlation coefficient (without proof), regression, lines of regression.

References :

1. Textbook of Applied Mathematics *(Wartikar P.N./Wartikar J.N.)* Pune Vidyarthi Griha Prakashan, 1981
2. Advanced Engineering Mathematics *(Kreyszig Erwin)* 8th Edition, Wiley Student Edition, New Delhi, 2006
4. Engineering Mathematics *(Shastri S.S.)* Prentice Hall
5. Matrices *(Shantinarayan)* S. Chand & Co.
6. Mathematical Statistics *(Gupta Kapoor)*
7. Advanced Modern Engineering Mathematics *(Glyn James)* 3rd edition, Pearson Education Ltd., 2004.
8. *(Potter Merle C.,Goldberg J.L., Aboufadel Edward F.,)* 3rd edition, Oxford University Press, New Delhi, 2005.

❑ ❑ ❑ ❑ ❑ ❑