

B.Sc. DEGREE PROGRAMME
MATHEMATICS (COMPLEMENTARY COURSE TO STATISTICS)
THIRD SEMESTER

MS3C01: Vector Calculus, Differential equations , Laplace Transform

5 hours/week

4 credits

Textbook:

1. Erwin Kreyszig- Advanced Engineering Mathematics, Eighth Edition, Wiley, India.
2. Murray : Differential Equations (Macmillan)
3. N.P.Bali, Dr.N.Ch.Narayana Iyengar-Engineering mathematics - Laxmi Publications

Module I

Vector Differential Calculus

(20hrs)

A quick Review of vector algebra, Inner product and vector product in R^2 and R^3 . Vector and scalar functions and Fields, Derivatives, Curves, Tangents, Arc Length, Velocity and acceleration, Gradient of a scalar field; Directional Derivative, Divergence of a vector field, Curl of a Vector Field.

(Sections 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.9, 8.10, 8.11 of Text 1).

Module II

Vector Integral Calculus

(25 hrs)

Line Integrals, Independence of path, Green's Theorem in the Plane (without proof), surfaces for Surface Integrals, Surface Integrals, Triple Integrals, Divergence theorem of Gauss and Stoke's theorem (without proofs).

(Sections 9.1, 9.2, 9.4, 9.5, 9.6, 9.7, 9.9, 9.10 of Text 1)

Module III

Ordinary differential equations

(35 Hrs)

First order Equations (a quick review)

Exact equations, Clairaut's equation, second order linear equations with constant coefficients R.H.S being one of the forms e^{ax} , $\cos ax$, $\sin ax$, x^n or product of any two of them. Simultaneous equations with constant coefficients

(Chapter 11, 13 of text 3)

Module IV

Laplace Transform**(10 Hrs)**

Laplace Transforms .Inverse Laplace Transform, Linearity of Laplace Transform.

(chapter 18 of text 3, relevant portions)

Reference Books:

1. Shanti Narayan , P .K . Mittal :Vector Calculus (S. Chand & Company)
2. Harry F. Davis & Arthur David Snider: Introduction to Vector Analysis, 6th ed., Universal Book Stall, New Delhi.
3. Murray R. Spiegel: Vector Analysis, Schaum's Outline Series, Asian Student edition.
4. A. M Siddique, P Manchanada : A first Course in Differential Equations
5. Zill Dennis G.&Michael R Cullen,-- Advanced Engineering Mathematics,Narosa Publishers,third edition

QUESTON PAPER PATTERN

Module	Part A	Part B	Part C	Part D
I	4	3	2	...
II	4	2	2	1
III	4	2	1	1
IV	4	1	1	1
Total	16	8	6	3

B.Sc. DEGREE PROGRAMME
MATHEMATICS (COMPLEMENTARY COURSE TO STATISTICS)
FOURTH SEMESTER
MS4C01: Abstract algebra, Linear Algebra, Theory of Equations, Special functions

5 hours/week

4 credits

Text Books:

1. John B Fraleigh - A first course in Abstract Algebra(7th Edition)Pearson Education
2. Erwin Kreyszig - Advanced Engineering Mathematics, 8th Edition, Wiley, India
3. N.P.Bali, Dr.N.Ch.Narayana Iyengar.-Text book on Engineering mathematics,Laxmi publications

Module I

Abstract algebra

(20hrs)

Groups, definitions and examples. Elementary properties, finite groups and sub groups. Cyclic groups elementary properties.. Rings and fields definitions.
(Section 1.4, 1.5, 1.6, 2.8, 3.13, 4.18, 6.30 of text 1)

Module II

Linear Algebra

(35 hrs)

A quick review of the fundamental concepts of matrices, Hermitian,Skew- Hermitian and unitary matrices, Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of an elementary Transformations, Row Canonical form, Normal form. Systems of Linear equations: Homogeneous and Non Homogeneous Equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors. Cayley-Hamilton theorem (statement only) and simple applications. Vector space, Definitions and elementary properties. Linear independence and dependence, base, dimension. Linear combination of vectors. Spanning set. Subspace.
(relevant sections of Text 2)

Module III**Theory of Equations****(20 hrs)**

Statement of Fundamental theorem of Algebra. Relation between roots and coefficients, Transformation of equations. Reciprocal equations. Cardon's method. Descarte's method. (chapter 2 of text 3)

Module IV**Special functions****(15 hrs)**

Beta and Gamma functions, Reduction formula for gamma .Relation between beta and gamma functions. Problems related to these functions

(Chapter 15 of text 3)

Reference Books:

1. I.N.Herstien-Topics in Algebra
2. K.V.Mittal-Optimisation methods in operations research and system analysis
3. Kenneth Hoffman, Ray Kunze-Linear Algebra (second edition) prentice-Hall India
4. Thunter – An elementary treatise on the Theory of Equations with examples

QUESTON PAPER PATTERN

Module	Part A	Part B	Part C	Part D
I	4	2	1	1
II	4	3	3	1
III	4	2	1	...
IV	4	1	1	1
Total	16	8	6	3