B.Sc. DEGREE PROGRAMME

MATHEMATICS (COMPLEMENTARY COURSE)

THIRD SEMESTER

MM3C03 : MATHEMATICS

5 hours/week **3 credits** **30 weightage**

Text :

1. Erwin Kreyszig : Advanced Engineering Mathematics, Eighth Edition, Wiley, India.
2. Frank Ayres JR : Matrices, Schaum's Outline Series, TMH Edition.

Module I : Ordinary Differential Equations (20 hrs)

Basic concepts and ideas, Geometrical meaning of y' = f(x,y). Direction Fields, Separable Differential Equations. Exact Differential Equations; Integrating Factors, Linear Differential Equations; Bernoulli Equation, Orthogonal Trajectories of Curves.

(Sections 1.1, 1.2, 1.3, 1.5, 1.6, 1.8 of Text 1).

Module II : Matrices (20 hrs)

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 Homogenoeus Equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors. Cayley-Hamilton theorem (statement only) and simple applications (relevant sections of Text 2).

Module III : Vector Differential Calculus (25 hrs)

A quick Review of vector algebra, Inner product and vector product in $\mathbf{R}^2$ and $\mathbf{R}^3$. 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 IV : 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)

References

1. S.S. Sastry, Engineering Mathematics, Volume II, 4^{th} ed., PHI.

2. Shanthi Narayanan & P.K. Mittal, A Text Book of Matrices, S. Chand.

3. Harry F. Davis & Arthur David Snider, Introduction to Vector Analysis, 6th ed., Universal Book Stall, New Delhi.

4. Murray R. Spiegel, Vector Analysis, Schaum's Outline Series, Asian Student edition.