B.Sc. THIRD YEAR MATHEMATICS SYLLABUS

**SEMESTER – V, PAPER -5**

**RING THEORY & VECTOR CALCULUS**

***UNIT – 1: RINGS-I : -***

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

***UNIT – 2 : RINGS-II : -***

 Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism –Kernel of a Homomorphism – Fundamental theorem of Homomorhphism –

Maximal Ideals – Prime Ideals.

***UNIT –3 : VECTOR DIFFERENTIATION : -***

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

***UNIT – 4 : VECTOR INTEGRATION : -***

Line Integral, Surface Integral, Volume integral with examples.

***UNIT – 5 : VECTOR INTEGRATION APPLICATIONS : -***

Theorems of Gauss and Stokes, Green’s theorem in plane and applications of these theorems

**Outcomes:**

* They can perform vector operations using Geometry in Space.
* They can easily solve the ordinary derivatives of the vectors.
* Perform calculus on vector valued functions.
* They go through important topics such as Gauss theorem, stoke’s theorem,Green’s Theorem etc., ,
* This type of functions and operations are useful in P.G, NET & SET.

B.Sc. THIRD YEAR MATHEMATICS SYLLABUS

**SEMESTER – V, PAPER -6**

**LINEAR ALGEBRA**

***UNIT – I : Vector Spaces-I :***

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

***UNIT –II : Vector Spaces-II :***

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotientspace.

***UNIT –III : Linear Transformations :***

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

***UNIT –IV : Matrix :***

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Values & Vectors of square Matrix, Cayley – Hamilton Theorem.

***UNIT –V : Inner product space :***

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle in Inequality, Parallelogram law, Orthogonality, Orthonormal set, complete orthonormal set, Gram – Schmidt orthogonalisation process. Bessel’s inequality and Parseval’s Identity.

**Outcomes:**

* They have a view on Linear Transformations, Inner Product Spaces.
* They go through the concepts of the Matrices, Types of Matrices , Rank of the Matrices, Nullity of the Matrices.
* They are able to perform different types of operations in matrices in order to solve it.
* Orthogonalisation process is very useful topic
* These topics are also useful in their further studies.