

# **SYLLABUS & PROGRAMME STRUCTURE**

## **Mathematics**

**(General)**

**(Choice Based Credit System)**

(Effective from the Academic Session 2017-2018)

**Fifth Semester**

**MAHARAJA BIR BIKRAM UNIVERSITY**  
**AGARTALA, TRIPURA: 799004**

**PROGRAMME STRUCTURE**

**Structure of Proposed CBCS Syllabus for B.Sc. (General)**

Semester	Core Course (12)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (4)	Discipline Specific Elective (DSE) (6)
1	DSC- 1 A (Paper-I of choice of subject-I)	AECC-1 Environmental Science		
	DSC- 2 A(Paper-I of choice of subject-II)			
	DSC- 3 A(Paper-I of choice of subject-III)			
2	DSC- 1 B(Paper-II of choice of subject-I)	AECC2 ((English/MIL (Communication)		
	DSC- 2 B(Paper-II of choice of subject-II)			
	DSC- 3 B(Paper-II of choice of subject-II)			
3	DSC- 1 C(Paper-III of choice of subject-I)		SEC1 (From Subject-1)	
	DSC- 2 C(Paper-III of choice of subject- II)			
	DSC- 3 C(Paper-III of choice of subject- III)			
4	DSC- 1 D(Paper-IV of choice of subject-I)		SEC2 (From Subject-1I)	
	DSC- 2 D(Paper-IV of choice of subject-II)			
	DSC- 3 D(Paper-IV of choice of subject-III)			
5			SEC3 (From Subject-1II)	DSE1A (From Subject-1)
				DSE2A (From Subject-1I)
				DSE3A (From Subject-1II)
6			SEC4 (From any one of Subject-1, II & III) or from the computer course prescribed for BSc (General)	DSE1B (From Subject-1)
				DSE2B (From Subject-1I)
				DSE3B (From Subject-1II)

**Semester - V**  
**DSE - Paper – I (A)**  
**( General )**  
**5.1 LINEAR ALGEBRA AND DYNAMICS**

**TOTAL MARKS – 100**  
**(End Semester – 80, Internal - 20)**

**Unit – I. Linear Algebra-I**

Vector / Linear space. Definition, examples and properties of vector space. Linear combination, linear independence and dependence. Linear span. Basis of vector space Dimension of a vector space. Results of basis and dimensions of vector space. Vector subspace, necessary and sufficient condition of a non-empty subset of a vector space to be a subspace. Union and intersection of subspaces. Linear sum of two subspaces. Existence theorem, invariance and extension theorems. Quotient space.

**Unit – II. Linear Algebra-II**

Row and column spaces of matrix. Row rank and column rank of a matrix. Equality of row rank, column rank and rank of a matrix. Nullity. Linear transformations and their representation as matrices. The algebra of linear transformations, rank and nullity theorem.

**Unit - III (Dynamics of a particle - I)**

Expression for velocity and acceleration of a particle moving in along a straight line and along a plane curve. Rectilinear motion of a particle under attractive forces. Simple Harmonic Motion – velocity and acceleration in Cartesian coordinates, angular velocity and angular acceleration, relation between angular and linear velocity, tangential and normal accelerations, normal acceleration for circular motion, velocity and acceleration along radial and transverse directions. Simple problems.

**Unit - IV (Dynamics of a particle - II)**

Central orbits – Central force, motion of a particle under central force, velocity under central force. Differential equations of central orbit in polar and pedal forms, examples. Motion in resisting medium – vertical motion when resistance varies with velocity, examples. Motion of varying mass – Equation of motion, examples. Planetary motion – Kepler’s laws of planetary motion, Geo stationary satellites. Simple problems.

***Suggested Readings:***

1. *Advanced Higher Algebra : J. G. Chakraborty and P. R. Ghosh, U.N.Dhur.*
2. *Algebra : R.M.Khan, Central.*
3. *Higher Algebra : Mapa, Ashok Pub.*
4. *Dynamics of a Particle and of Rigid Bodies - S. L. Loney, Radha Publishing House.*
5. *Dynamics of Particle and Rigid Bodies - Chakraborty and Ghosh - U.N.Dhur and Sons.*
6. *A Text Book on Dynamics – M. Ray and G. C. Sharma, S. Chand.*

**Semester – V**  
**GE (G) – Paper – I**  
**( General )**  
**LOGIC AND SETS**

**TOTAL MARKS – 100**  
**( End Semester – 80, Internal – 20 )**

**Unit – I**

Conditional and biconditional propositions, converse, inverse, contrapositive propositions, truth tables, tautology and contradiction, duality law and theorems.

**Unit – II**

Propositional equivalences, logical equivalences, normal form, disjunctive and conjunctive normal form. Inference theory and predicate calculus. Predicts and quantifiers, existential quantifiers.

**Unit – III**

Relation, composition of relation, equivalence relation, partition of a set induced by an equivalence relation, matrix representation of a relation, representation of relation by graphs.

**Unit – IV**

Partial ordering of a set (poset). Hasse diagram for partial ordering. Lattices, lattice as an algebraic system.

***Suggested Readings:***

1. *Discrete Mathematics and Combinatorial Mathematics* : R. P. Grinaldi, Pearson Education : 1998.
  2. *Discrete Mathematical Structures with Application to Computer Science* : J. P. Trembly, R. Manohar, Tata Mcgrawhill Education : 1997.
  3. *Set Theory and Logic* : Robert R. Stoll, W. H. Freeman and Company.
  4. *Theory and Problem of Set Theory and related topics* : Lipschutz Seymom, Schaum Publishing Company, N. Y. : 1964.
  5. *Text Book of Discrete Mathematics* : Swapan Kumar Sarkar, S. Chand & Co. Ltd., Ramnagar, New Delhi-110055 : 2012.
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