

## **B.A./B.Sc. Mathematics COURSE STRUCTURE**

<b>SECOND YEAR</b>							
SEMESTER III	Paper-III	Abstract Algebra & Abstract Algebra Problem Solving Sessions	6	5	25	75	100
SEMESTER IV	Paper-IV	Real Analysis & Real Analysis Problem Solving Sessions	6	5	25	75	100

**B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS PAPER - II**  
**(SEMESTER – II)**  
**SOLID GEOMETRY**

**UNIT – I (12 hrs) : The Plane :**

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

**UNIT – II (12 hrs) : The Line :**

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line; Intersection of three planes; Triangular Prism.

**UNIT – III (12 hrs) : Sphere :**

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes; Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified form of the equation of two spheres.

**UNIT – IV (12 hrs) : Cones :**

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Enveloping cone of a sphere; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; Condition that a cone may have three mutually perpendicular generators; Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle.

**UNIT – V (12 hrs) Cylinders :**

Definition of a cylinder; Equation to the cylinder whose generators intersect a given conic and are parallel to a given line; Enveloping cylinder of a sphere; The right circular cylinder; Equation of the right circular cylinder with a given axis and radius.

**Prescribed Text Book :** Scope as in Analytical Solid Geometry by Shanti Narayan and P.K. Mittal Published by S. Chand & Company Ltd. Seventeenth Edition.

Sections :- 2.4, 2.7, 2.9, 3.1 to 3.8, 6.1 to 6.9, 7.1 to 7.8.

**Reference Books :**

1. V Krishna Murthy & Others “A text book of Mathematics for BA/B.Sc Vol 1, Published by S. Chand & Company, New Delhi.
2. P.K. Jain and Khaleel Ahmed, “A text Book of Analytical Geometry of Three Dimensions”, Wiley Eastern Ltd., 1999.
3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

**Note :** Concentrate on Problematic parts in all above units.

**B.A./B.Sc. SECOND YEAR MATHEMATICS SYLLABUS PAPER - III**  
**SEMESTER – III**  
**ABSTRACT ALGEBRA**

**UNIT – 1 : (10 Hrs) GROUPS :-**

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

**UNIT – 2 : (14 Hrs) SUBGROUPS :-**

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition – examples-criterion for a complex to be a subgroups.

Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

**Co-sets and Lagrange's Theorem :-**

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

**UNIT –3 : (12 Hrs) NORMAL SUBGROUPS :-**

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group – simple group – quotient group – criteria for the existence of a quotient group.

**UNIT – 4 : (10 Hrs) HOMOMORPHISM :-**

Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

**UNIT – 5 : (14 Hrs) PERMUTATIONS AND CYCLIC GROUPS :-**

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

**Cyclic Groups :-**

Definition of cyclic group – elementary properties – classification of cyclic groups.

**Prescribed Text Book :**

A. First course in Abstract Algebra, by J.B. Fraleigh Published by Narosa Publishing house.

**Chapters :** 1 to 7 and 11 to 13.

**Reference Books :**

1. A text book of Mathematics for B.A. / B.S. by B.V.S.S. SARMA and others Published by S.Chand & Company New Delhi.
2. Modern Algebra by M.L. Khanna.

**B.A./B.Sc. SECOND YEAR MATHEMATICS SYLLABUS PAPER-IV**  
**(SEMESTER – IV)**  
**REAL ANALYSIS**

**UNIT – I (12 hrs) : REAL NUMBERS :**

The algebraic and order properties of  $\mathbb{R}$ , Absolute value and Real line, Completeness property of  $\mathbb{R}$ , Applications of supreme property; intervals. No. Question is to be set from this portion.

**Real Sequences :** Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence.

The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence theorem.

**UNIT –II (12 hrs) : INFINITIE SERIES :**

**Series :** Introduction to series, convergence of series. Ceanchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test

2. Canchy's  $n^{\text{th}}$  root test or Root Test.

3. D'Alemberts' Test or Ratio Test.

4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence, semi convergence.

**UNIT – III (12 hrs) : CONTINUITY :**

**Limits :** Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. No. Question is to be set from this portion.

**Continuous functions :** Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

**UNIT – IV (12 hrs) : DIFFERENTIATION AND MEAN VALUE THEORMS :**

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Role's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem - Generalized Mean value Theorems - Taylor's Theorem, Maclaurin's Theorem, Expansion of functions with different forms of remainders, Taylor's Maclaurins Series, power series representation of functions.

**UNIT – V (12 hrs) : RIEMANN INTEGRATION :**

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for  $\mathbb{R}$  – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

**TEXT BOOK :-**

**REAL NUMBERS**

“Introduction to Real Analysis” by RABERT g BARTELY and .D.R. SHERBART Published by John Wiley. (Chapters 3.1 to 3.7, 5.1 to 5.4, 6.1 to 6.4, 7.1 to 7.3, 9.1 to 9.3)

**REFERENCE TEXT BOOKS :**

1. A Text Book of B.Sc mathematics by B.V.S.S. Sarma and Published by . S. Chand & Company Pvt. Ltd., New Delhi.

2. Elements of Real Analysis on per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi.

Table-8: B.Sc., SEMESTER – II

Sno	Course	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	First Language (Tel/Hin/Urdu/Sans...)	100	25	75	4	3
2	Second Language English	100	25	75	4	3
3	<i>Foundation course - 3</i> Environmental Sci	50	0	50	2	2
4	<i>Foundation course – 4A</i> ICT – 1 (Information & Communication Technol)	50	0	50	2	2
5	DSC* 1 B (Group Sub- 1)	100	25	75	4	3
6	DSC 1 B Lab Practical	50	0	50	2	2
7	DSC 2 B (Group Sub- 2)	100	25	75	4	3
8	DSC 2 B Lab Practical	50	0	50	2	2
9	DSC 3 B (Group Sub- 3)	100	25	75	4	3
10	DSC 3 B Lab Practical	50	0	50	2	2
	Total	750	-	-	30	25

B.Sc. Table-9: B.Sc., SEMESTER – III

Sno	Course	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	First Language (Tel/Hin/Urdu/Sans...)	100	25	75	4	3
2	Second Language English	100	25	75	4	3
3	<i>Foundation Course - 5</i> Entrepreneurship	50	0	50	2	2
4	<i>Foundation course -2B</i> Communication & Soft Skills -2	50	0	50	2	2
5	DSC 1 C (Group Sub- 1)	100	25	75	4	3
6	DSC 1 C Practical	50	0	50	2	2
7	DSC 2 C (Group Sub- 2)	100	25	75	4	3
8	DSC 2 C Practical	50	0	50	2	2
9	DSC 3 C (Group Sub- 3)	100	25	75	4	3
10	DSC 3 C Practical	50	0	50	2	2
	Total	750	-	-	30	25

Table-10: B.Sc., SEMESTER – IV

Sno	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours**	Credits
1	<i>Foundation Course – 2C*</i> Communication & Soft Skills -3	50	0	50	2	2
2	<i>Foundation Course – 6*</i> Analytical Skills	50	0	50	2	2
3	<i>Foundation Course - 7 **</i> CE (Citizenship Education)	50	0	50	2	2
4	<i>Foundation course – 4B</i> ICT – 2 (Information & Communication Technol)	50	0	50	2	2
5	DSC 1 D (Group Sub- 1)	100	25	75	4	3
6	DSC 1 D Lab Practical	50	0	50	2	2
7	DSC 2 D (Group Sub- 2)	100	25	75	4	3
8	DSC 2 D Lab Practical	50	0	50	2	2
9	DSC 3 D (Group Sub- 3)	100	25	75	4	3
10	DSC 3 D Lab Practical	50	0	50	2	2
	Total	750	-	-	30	25

\*To be taught by English Teachers (and partly by Maths/Stat Teachers)

\*\* To be taught by Telugu Teachers

