

Andhra Pradesh State Council of Higher Education  
CBCS B.A./B.Sc. Mathematics Course Structure w.e.f. 2015-16  
(Revised in April, 2016)

Semester	Paper	Subject	Hrs.	Credits	IA	ES	Total
<b>FIRST YEAR</b>							
SEMESTER I	Paper-I	Differential Equations & Differential Equations Problem Solving Sessions	6	5	25	75	100
SEMESTER II	Paper-II	Solid Geometry & Solid Geometry Problem Solving Sessions	6	5	25	75	100
<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>THIRD YEAR</b>							
SEMESTER V	Paper-V	Ring Theory & Vector Calculus & Ring Theory & Vector Calculus Problem Solving Sessions	5	5	25	75	100
	Paper-VI	Linear Algebra & Linear Algebra Problem Solving Sessions	5	5	25	75	100
SEMESTER VI	Paper-VII	<b>Elective:</b> 1or 2 or 3 & Elective Problem Solving Sessions	5	5	25	75	100
	Paper-VIII	<b>Elective:</b> Cluster -1 or Cluster -2 or Cluster -3	5	5	25	75	100

\*Third year syllabi will be sent shortly

Andhra Pradesh State Council of Higher Education  
**B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS PAPER - I**  
(w.e.f. 2015-16, Revised in April, 2016)  
**SEMESTER –I**  
**DIFFERENTIAL EQUATIONS**

**60 Hrs**

**UNIT – I (12 Hours), Differential Equations of first order and first degree :**

Linear Differential Equations; Differential Equations Reducible to Linear Form; Exact Differential Equations; Integrating Factors; Change of Variables.

**UNIT – II (12 Hours), Orthogonal Trajectories.**

**Differential Equations of first order but not of the first degree :**

Equations solvable for  $p$ ; Equations solvable for  $y$ ; Equations solvable for  $x$ ; Equations that do not contain  $x$  (or  $y$ ); Equations of the first degree in  $x$  and  $y$  – Clairaut's Equation.

**UNIT – III (12 Hours), Higher order linear differential equations-I :**

Solution of homogeneous linear differential equations of order  $n$  with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.

General Solution of  $f(D)y=0$

General Solution of  $f(D)y=Q$  when  $Q$  is a function of  $x$ .

$\frac{1}{f(D)}$  is Expressed as partial fractions.

P.I. of  $f(D)y = Q$  when  $Q = be^{ax}$

P.I. of  $f(D)y = Q$  when  $Q$  is  $b \sin ax$  or  $b \cos ax$ .

**UNIT – IV (12 Hours), Higher order linear differential equations-II :**

Solution of the non-homogeneous linear differential equations with constant coefficients.

P.I. of  $f(D)y = Q$  when  $Q = bx^k$

P.I. of  $f(D)y = Q$  when  $Q = e^{ax}V$

P.I. of  $f(D)y = Q$  when  $Q = xV$

P.I. of  $f(D)y = Q$  when  $Q = x^mV$

**UNIT – V (12 Hours), Higher order linear differential equations-III :**

Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation.

**Reference Books :**

1. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-Second edition.
2. A text book of mathematics for BA/BSc Vol 1 by N. Krishna Murthy & others, published by S. Chand & Company, New Delhi.
3. Ordinary and Partial Differential Equations Raisinghanian, published by S. Chand & Company, New Delhi.
4. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha-universities press.

**Suggested Student Activities:**



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

**60 Hrs**

**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;

**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;

**UNIT – IV (12 hrs) : Sphere & Cones :**

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.

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;

**UNIT – V (12 hrs) Cones & Cylinders :**

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.

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.

**Reference Books :**

1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.
2. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.
3. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.
4. 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.

**Suggested Activities:**

Seminar/ Quiz/ Assignments/ Project on Application of Solid Geometry in Engineering

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

**60 Hrs**

**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.

**Reference Books :**

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house.
2. A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published by S.Chand & Company, New Delhi.
3. Modern Algebra by M.L. Khanna.

**Suggested Activities:**

Seminar/ Quiz/ Assignments/ Project on Group theory and its applications in Graphics and Medical image Analysis

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

**60 Hrs**

**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. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Cauchy'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

**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.

**Reference Books :**

1. Real Analysis by Rabert & Bartely and .D.R. Sherbart, Published by John Wiley.
2. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi.

**Suggested Activities:**

Seminar/ Quiz/ Assignments/ Project on Real Analysis and its applications

A.P. State Council of Higher Education  
Revised Common Framework of CBCS for Colleges in Andhra Pradesh  
w.e.f. 2015-16, Revised in April, 2016

Table-7: B.Sc., SEMESTER – I

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 - 1</i> Human Values & Professional Ethics	50	0	50	2	2
4	<i>Foundation course -2</i> Environmental Studies	50	0	50	2	2
5	DSC-1 Paper-1 (Core)	100	25	75	4	3
6	DSC 1 Lab Practical	50	0	50	2	2
7	DSC 2 Paper-1 (Core)	100	25	75	4	3
8	DSC 2 Lab Practical	50	0	50	2	2
9	DSC 3 Paper-1 (Core)	100	25	75	4	3
10	DSC 3 A Lab Practical	50	0	50	2	2
	Total	750	-	-	30	25

#DSC: Domain (Subject) Specific Course (Paper)

Foundation Course: value or skill based

Note: For Science Domain Subjects which had no lab practical component earlier (eg. Mathematics) the following format is applicable. They, however, will have co-curricular activities (eg. Problem solving sessions etc.). The total marks will change accordingly for such combinations. For example for Maths, Physics and Chemistry the total marks will be 700.

	DSC (without Lab Practical)	100	25	75	6	5
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\*Mid sem exam at the college (The marks split between Formal Test and Co-curricular activities may be decided by the University concerned). End Sem Exam by the Univ.

\*Practical component will not be applicable to those science subjects which had no such component earlier (ex. Mathematics)

\*\*Syllabus size shall be in accordance with the number of teaching hours

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> ICT – I	50	0	50	2	2
4	<i>Foundation course – 4</i> CSS – I	50	0	50	2	2
5	DSC 1 Paper-2 (Core)	100	25	75	4	3
6	DSC 1 Lab Practical	50	0	50	2	2
7	DSC 2 Paper-2 (Core)	100	25	75	4	3
8	DSC 2 Lab Practical	50	0	50	2	2
9	DSC 3 Paper-2 (Core)	100	25	75	4	3
10	DSC 3 Lab Practical	50	0	50	2	2
	Total	750	-	-	30	25



B.Sc. Table-9: B.Sc., SEMESTER – III

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> ICT – II	50	0	50	2	2
4	<i>Foundation course – 6</i> CSS – II	50	0	50	2	2
5	DSC 1 Paper-3 (Core)	100	25	75	4	3
6	DSC 1 Practical	50	0	50	2	2
7	DSC 2 Paper-3 (Core)	100	25	75	4	3
8	DSC 2 Practical	50	0	50	2	2
9	DSC 3 Paper-3 (Core)	100	25	75	4	3
10	DSC 3 Practical	50	0	50	2	2
	Total	750	-	-	30	25

Table-10: B.Sc., SEMESTER – IV

**SEMESTER – IV**

Sno	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours**	Credits
1	<i>Foundation Course – 7</i> CSS – 2	50	0	50	2	2
2	<i>Foundation Course – 8</i> Analytical Skills	50	0	50	2	2
3	<i>Foundation Course - 9</i> Entrepreneurship	50	0	50	2	2
4	<i>Foundation course – 10</i> Leadership Education	50	0	50	2	2
5	DSC 1 Paper-4 (Core)	100	25	75	4	3
6	DSC 1 Lab Practical	50	0	50	2	2
7	DSC 2 Paper-4 (Core)	100	25	75	4	3
8	DSC 2 Lab Practical	50	0	50	2	2
9	DSC 3 Paper-4 (Core)	100	25	75	4	3
10	DSC 3 Lab Practical	50	0	50	2	2
	Total	750	-	-	30	23

\*Analytical Skills: To be taught by Maths/Stat Teachers (may be partly by English Teachers)

Entrepreneurship: To be taught by Commerce Teachers

Leadership Education: To be taught by Telugu Teachers

Table-11: B.Sc., SEMESTER – V

Sno	Course	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	DSC 1 Paper-5 (Core)	100	25	75	3	3
2	DSC 1 Lab Practical	50	0	50	2	2
3	DSC 2 Paper-5 (Core)	100	25	75	3	3
4	DSC 2 Lab Practical	50	0	50	2	2
5	DSC 3 Paper-5 (Core)	100	25	75	3	3
6	DSC 3 Lab Practical	50	0	50	2	2
7	DSC 1 Paper-6 (Core)	100	25	75	3	3
8	DSC 1 Lab Practical	50	0	50	2	2
9	DSC 2 Paper -6 (Core)	100	25	75	3	3
10	DSC 2 Lab Practical	50	0	50	2	2
11	DSC 3 Paper-6 (Core)	100	25	75	3	3
12	DSC 3 Lab Practical	50	0	50	2	2
	Total	900	-	-	30	30

**Table-12: B.Sc., SEMESTER – VI**

Sno	Course	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Elective 1: DSC 1, Paper -7 (applied/adv)	100	25	75	3	3
2	Elective-1 Lab Practical	50	0	50	2	2
3	Elective-1: DSC 2, Paper -7 (applied/adv)	100	25	75	3	3
4	Elective-2 Lab Practical	50	0	50	2	2
5	Elective-1: DSC 3, Paper -7 (applied/adv)	100	25	75	3	3
6	Elective-3 Lab Practical	50	0	50	2	2
7	Elective -2: DSC 1, Paper -8 App/Inter-domain/Gen EI	100	25	75	3	3
8	Elective-2 Lab Practical	50	0	50	2	2
9	Elective -2: DSC 2, Paper -8 App/Inter-domain/Gen EI	100	25	75	3	3
10	Elective-2 Lab Practical	50	0	50	2	2
11	Elective -2: DSC 3, Paper -8 App/Inter-domain/Gen EI	100	25	75	3	3
12	Elective-2 Lab Practical	50	0	50	2	2
	<b>Total</b>	<b>900</b>	<b>-</b>	<b>-</b>	<b>30</b>	<b>30</b>

\*7<sup>th</sup> paper of each of the domain specific subjects (1<sup>st</sup> paper of semester VI) will be a domain related Elective. More than one Elective may be offered giving choice to students. The Electives may be of Domain specific applied or advanced (specialization) in nature. The number of Electives may be decided (along with the syllabus) by the University concerned keeping the feasibility of conduct of University examinations in view.

\*\* Applied Elective: It is desirable that around 25% of syllabus is taught by field experts. The college has to make such an arrangement.

\*8<sup>th</sup> paper of each of the domain specific subjects (2<sup>nd</sup> paper of semester VI) will also be an Elective. The Electives may be of Inter-domain Clusters\*\*- each Cluster having three papers with or without project work. or General in nature. The number of Clusters may be decided (along with the syllabus) by the University concerned keeping the feasibility of conduct of University examinations in view. It is desirable that around 25% of syllabus is taught by field experts.

*\*\*Cluster: In the last semester, for paper-8, each domain subject has one elective totaling three papers for each student. Electives may be given as Clusters of three papers each for each subject. A student can opt for all the three papers of the same subject (cluster or stream) including or excluding project*

*work for a wider learning experience. The student will not study the other two domain subjects for paper-8.*

**Total Credits for a B.Sc. Course: 158**