

**MATHEMATICS-I (ADVANCE CALCULUS)**  
**BE 1<sup>st</sup> SEMESTER (ALL BRANCHES) SUB CODE: -CC101A**

**Teaching Scheme (Credits and Hours)**

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	02	00	05	05	03	70	30	50	00	150

**LEARNING OBJECTIVES:**

The objective of this course is

- To present the foundations of many basic Mathematical tools and concepts related Engineering.
- To provide a coherent development to the students for the courses of various branches of Engineering like Control Theory, Circuits and Networks, Digital Logic design, Fluid Mechanics, Machine Design etc
- To enhance the student's ability to think logically and mathematically.
- To give an experience in the implementation of Mathematical concepts which are applied in various field of Engineering.

**Outline of the Course:**

Unit No	Topics
1	Review of Calculus
2	Applications of Differentiation and Integration for the Function of One Variable
3	Partial differentiation and its applications
4	Multiple Integrals and its applications
5	Infinite Series
6	Curve Tracing
7	Reduction Formulae

**Total hours (Theory): 45**

**Total hours (Tutorial): 30**

**Total hours: 75**

**Detailed Syllabus**

Unit No	Topics	Lectures (Hours)	Weight age
1	<b>Review of Calculus:</b> limit, continuity, differentiability, Sandwich theorem, Indeterminate forms, Taylor's & Maclaurin's expansions.	7	10%
2	<b>Applications of Differentiation and Integration for the Function of One Variable:</b> linearization, Area, Volume by slicing, by rotation about an axis	4	10%
3	<b>Partial differentiation and its applications:</b> Limit and Continuity for the several variables, Definition and Geometrical interpretation of partial derivatives, homogeneous function, Euler's theorem, Chain rule, Partial and total differential coefficient, partial differentiation of composite function and implicit function, Transformations. <b>Applications:</b> Tangent plane and Normal line, Jacobians, Linear Approximation, Taylors expansion for two variables, Errors and approximations, Maxima and Minima of functions of two variables, Lagranges method of undetermined multipliers to determine stationary values.	9	20%
4	<b>Multiple Integrals and its applications:</b> Double integral, Change of Order, Polar form, Transformation of Variables by Jacobian, Triple Integral, Area, Volume.	9	20%
5	<b>Infinite Series:</b> Limit of Sequence, Definition of Infinite Series, Convergence and divergence, Comparison test, Cauchy's integral test, ratio test, Cauchy's Root test, Raabe's test, Leibnitz rule for alternating series, power series, radius of convergence.	8	20%
6	<b>Curve Tracing:</b> Asymptotes, Cartesian and Polar Curve Tracing, Parameterization of Curves and Parameterization of surfaces.	6	15%
7	<b>Reduction Formulae:</b> Reduction formulae of the type $\int \sin^n x dx$ , $\int \cos^n x dx$ & $\int \sin^n x \cos^m x dx$	3	5%
<b>Total</b>		<b>46</b>	<b>100%</b>

**Instructional Method and Pedagogy** (Continuous Internal Assessment (CIA) Scheme)

- Two Faculties will be covering the syllabus in each branch for 3 hours in a week. In Tutorial, class must be divided into two subclasses & faculties will be solving or assigning the problem of the subject in each subclass.
- Attendance is compulsory in lectures and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 30 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 10 Marks.
- One internal exam of 30 marks is conducted as a part of internal theory evaluation.

**Students Learning Outcomes:**

At the end of the course

- The students will be able to think logically and mathematically in any field of engineering.
- The students will gain an experience in the implementation of Mathematical concepts which are applied in various field of Engineering.

**Text Books:**

- (1) **Thomas Calculus** by M D Weir, Joel Hass and F R Giordano, 11<sup>th</sup> Edition, Pearson Education.
- (2) **Calculus** by G. B. Thomas and R. L. Finney, 9<sup>th</sup> Edition, Pearson Education.
- (3) **Advance Engineering Mathematics** by Erwin Kreyszig, 8<sup>th</sup> edition, Wiley India.
- (4) **Engineering Mathematics** by Sahani, Vol. 8, Elite Publication, Pune.

**Reference Books:**

- (1) **Calculus** by T M apostol, Vol. I, 2<sup>nd</sup> Edition, Willey India.
- (2) **Single and Multivariable Calculus** by Hughes-Hallett, Gleason, Mccallum, 3<sup>rd</sup> Edition, John Willey and Son.

**List of Tutorials**

Sr. No.	Tutorial Content
1	Problem solving on “ <b>Review of Calculus</b> ”.
2	Problem solving on “ <b>Applications of Differentiation and Integration for the Function of One Variable</b> ”
3	Assignment on “ <b>Partial differentiation and its applications</b> ”.
4	Assignment on “ <b>Multiple Integrals and its applications</b> ”.
5	Problem solving on “ <b>Infinite Series</b> ”
6	Assignment on “ <b>Curve Tracing</b> ”.
7	Problem solving on “ <b>Reduction Formulae</b> ”.