



# **C. U. SHAH UNIVERSITY**

## **Wadhwancity**



**FACULTY OF:-** Technology and Engineering  
**DEPARTMENT OF:-** CE/IT/EC/MECH/EEE/AUTO/IC/EE/CIVIL  
**SEMESTER:-** II  
**CODE:-** 4TE02EMT3  
**NAME:-** Engineering Mathematics - 2

### **Teaching and Evaluation Scheme:-**

Subject code	Subject name	Teaching Scheme(Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical/Tutorial			Total
							Sessional Exam		University Exam		Internal		Total	
							Marks	Hours	Marks	Hours	Pr/Viva	Tw		
4TE02EMT3	Engineering Mathematics - 2	3	2	0	5	4	30	1.5	70	3	30	20	50	150

### **Objectives:-**

- To learn basic concepts of integral calculus
- To trace the Cartesian and polar curves
- To study the applications of Integration to find length, area and volume.
- To solve ordinary Differential Equations of first order and first degree.
- To understand the behaviour (Convergence & Divergence) of infinite Series

### **Prerequisites:-**

Students should have a firm grasp of algebra, trigonometry, sequence and series. They should be able to graph elementary functions. They must have the knowledge of integration.

### **Course Outline:-**

Sr. No.	Course contents
1	<b>Infinite Series:</b> Convergent and Divergent sequences, Convergence of infinite Series by definition, Zero Test, Comparison Test, Ratio Test, Root Test, Alternating Series, Leibnitz's test, Power Series and radius of convergence.
2	<b>Reduction formulae:</b> Reduction formulae for $\int \sin^n x \, dx$ , $\int \cos^n x \, dx$ , $\int \sin^m x \cos^n x \, dx$ , $\int \tan^n x \, dx$ , $\int \cot^n x \, dx$ where m and n are positive integers with $m \geq 2$ and $n \geq 2$ .
3	<b>Improper Integral:</b> Convergence and Divergence of Improper integrals, Types of Improper integral, Comparison test, Limit Comparison test, Integral test, p- test
4	<b>Gamma and Beta functions:</b> Gamma function and its properties, Beta function and its properties, Relation between Beta and Gamma functions.
5	<b>Curve Tracing:</b> Cartesian and Polar curves.
6	<b>Application of Integration:</b> Length of plane curves, Area under a curve, Volume of a solid of revolution

7	<b>Multiple Integration:</b> Double integrals and its evaluation, Change of order of integration, Change of variables from Cartesian to polar coordinates, Triple integrals and its evaluation, Area by double integration, Volume of solids.
8	<b>Differential Equations &amp; their Applications:</b> ODE of first order & first degree, formation of differential equation, types of equation & methods for solving the differential equation-variable separable method, exact differential equation, integrating factors, linear equation and equation reducible to the linear form (Bernoulli equation). Applications: Electric circuits, orthogonal trajectories.

### Learning Outcomes:-

After the successful completion of the course, students will be able to

- Apply the knowledge of integral calculus in finding length, area, volume, centre of gravity, moment of inertia.
- To solve ODE of first order and first degree
- The course will help students to apply the basic concepts to the problems related to models in work, circulation and flux Problems, hydrodynamics and fluid dynamics, electrical circuits, networking, linear programming, graph theory, computer graphics, construction of curves and surfaces through specified points etc.

### Teaching & Learning Methodology:

- Lecture method using standard teaching aids.
- Solving term assignments in tutorials
- Quiz/Seminar/Expert lectures

### Books Recommended:-

1. Advanced Engineering Mathematics (8<sup>th</sup> Edition), **E. Kreyszig**, Wiley-India (1999)
2. Higher Engineering Mathematics – Vol. 1, **Dr. K. R. Kachot**, Mahajan Publ. house
3. Higher Engineering Mathematics, Thirty-fifth edition, **B. S. Grewal**, Khanna Publication.
4. Thomas' Calculus, **Maurice D. Weir, Joel Hass, Frank R. Giordano**, Person Education.
5. Calculus – Single and Multivariable (3<sup>rd</sup> Edition), **Hughes – Hallett et al**, JohnWiley and Sons (2003).

### E-Recourses:-

1. [www.maths.nuigalway.ie/~rquinlan/](http://www.maths.nuigalway.ie/~rquinlan/)
2. [www.wiley.com/college/anton](http://www.wiley.com/college/anton)
3. [www.wiley.com/college/egrade](http://www.wiley.com/college/egrade)