



## **C.U.SHAH UNIVERSITY – WADHWANCITY**

**FACULTY OF:** - Technology & Engineering

**DEPARTMENT OF:** - CE/IT/EC/MECH/EEE/AUTO/IC/EE/CIVIL

**SEMESTER:** - II

**CODE:** - 4TE02EMT2

**NAME – Engineering Mathematics-2**

**Teaching & Evaluation Scheme:-**

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)		Total	
							Internal		University					
							Sessional Exam		University Exam		Pr	TW		Pr
Marks	Hours	Marks	Hours											
4TE02EMT2	Engineering Mathematics-2	4	0	0	4	4	30	1.5	70	3	-	-	-	100

**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 behavior (Convergence & Divergence) of infinite Series

**Prerequisite:-**

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 Content	Hours
1	<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 $n \geq 2$ .	6
2	<b>Gamma and Beta functions:</b> Gamma function and its properties, Beta function and its properties, Relation between Beta and Gamma functions.	6



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<b>3</b>	<b>Elliptic integrals and Error functions:</b> Definitions and evaluation of the complete Elliptic integrals, Definitions and properties of Error functions.	<b>6</b>
<b>4</b>	<b>Curve Tracing:</b> Cartesian and Polar curves.	<b>6</b>
<b>5</b>	<b>Applications of Integration:</b> Length of plane curves, Area under a curve, Volume of a solid of revolution.	<b>8</b>
<b>6</b>	<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.	<b>10</b>
<b>7</b>	<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.	<b>10</b>
<b>8</b>	<b>Infinite Series</b> 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.	<b>8</b>

### **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. E. Kreyszig, Advanced Engineering Mathematics (8<sup>th</sup> Edition), 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.



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4. Thomas' Calculus, Maurice D. Weir, Joel Hass, Frank R. Giordano, Person Education.
5. Hughes – Hallett et al., Calculus – Single and Multivariable (3<sup>rd</sup> Edition), JohnWiley and Sons (2003).

### **E-Resources:**

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)