

Branch Name:	Computer Engineering / Information Technology / Artificial Intelligence and Data Science / Information and Communication Technology / Mechanical Engineering / Civil Engineering/ Electrical Engineering / Artificial Intelligence and Machine Learning / Electronics and Communication Engineering
Program Code:	ET103 / ET105 / ET108/ET107 / ET101 / ET106 / ET109 / ET114 / ET116
Course Title:	Engineering Mathematics-I with Computing tools
Course Code:	2ET1000101T
Pre-requisite Course:	Limit of a function, Continuity and Differentiability of a function, Differentiation and Integration.

Course Objectives: After successful completion of the course, student will be able to

1. Understand mathematical basic preliminaries.
2. Express physical phenomenon in mathematical formulation.
3. Apply Differential and Integral Calculus in formal representation of various computing constructs.
4. Recognize the importance of Calculus for analysis in engineering problems.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Differential Calculus: Successive differentiation, Leibniz's theorem (without proof), Taylor's & McLaurin's series for a function of one variable, Evaluation of indeterminate forms by L'Hospital's rule.	07	15
2	Partial Differentiation: Functions of two variables, Limit and Continuity of function of several variables, Partial derivative, Total derivative, Chain rule, Euler's theorem for homogeneous functions and examples based on it.	08	20
3	Applications of Partial Differentiation: Taylor's formula for functions of several variables, Tangent plane, Normal line, Linear approximation, Extreme values of functions of two variables, Lagrange multipliers, Jacobians.	07	15
4	Integral Calculus: Reduction formula for $\sin^n x$, $\cos^n x$, $\sin^n x \cos^n x$, $\tan^n x$, $\cot^n x$ (without proof), Beta and Gamma functions and their properties (without proof) and problems. Evaluation of improper integrals of type-I and type-II, Applications of definite integrals to evaluate surface areas and volumes of revolutions.	08	20
5	Multiple Integrals: Double integrals, Evaluation of double integrals, change the order of integration, change of variables by Jacobian, change into polar co-ordinates, Triple integrals, Application of multiple integrals to find areas and volumes.	08	20
6	Introduction to Complex numbers : Complex numbers, geometric representation, Complex numbers in polar and exponential forms, De Moivre's theorem and its applications, exponential, trigonometric, hyperbolic functions, logarithm of complex number.	07	10

Text Books:

1. B.S. Grewal, Elementary Engineering Mathematics, 15th Edition, 2004
2. James Stewart, Calculus early transcendental, sixth edition.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002

Reference Books:

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2000.
- Erwin Kreyszig; Advanced Engineering Mathematics, 9th Edition, 2012.
- B V Ramana; Higher Engineering Mathematics, 12th Reprint Edition, 2018.
- Thomas' Calculus, Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education, Eleventh Edition.
- Calculus–Single and Multivariable, Hughes – Hallett et al., John-Wiley and Sons, Fourth Edition.

List of Open-Source Software/learning website:

- <http://calculus.org/>
- <http://www.math.com/homeworkhelp/Calculus.html>
- <https://www.khanacademy.org/math/calculus-1>
- <https://www.youtube.com/watch?v=XJOIJDp69FU> 2
- https://www.youtube.com/watch?v=LT_10p_eu88 3
- <https://www.youtube.com/watch?v=5xif7SUyiz4> 4

Course Learning Outcomes (CLO):

Course Outcomes	Description	Bloom's Taxonomy Level
COL1	Explain the concepts of calculus. Use the concepts of calculus to determine the power series expansion of functions and evaluation of limits.	Understanding (2) Applying (3)
COL2	Use the concepts partial derivatives to solve the differential equations appearing in Engineering fields.	Applying (3)
COL3	Use the concept of Reduction formula to find surface areas and volumes of revolution.	Applying (3)
COL4	Solve improper integrals with the help of beta and gamma functions	Applying (3)
COL5	Use the concept of double integration to solve area and volume of surfaces.	Applying (3)

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	M	M		M											
CLO2	H	M			M							L				
CLO3	H	M	M		M											
CLO4	M	M	M		M							L				
CLO5	M	M										L				

H: High, M: Medium, L: Low