FACULTY OF ENGINEERING AND TECHNOLOGY
First Year Bachelor of Technology
In Effect from Academic Year 2020-21

Subject Code:1ET1000101	**Subject Title: CALCULUS**
Pre-requisite Subject	**Limit of a function, Continuity and Differentiability of a function, Differentiation and Integration.**

Course Objective:
To understand the applications of differentiation and integration to area and volume. To determine maximum and minimum values of a single variable and two variable functions. To apply mathematical formulas in various subjects of relevant branch.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory		Practical		
Lecture (L)	Tutorial (T)	Practical (P)	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total (T+P)
3	2	-	5	70	30	-	-	100

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1.	**Introduction to Complex Numbers:** Revision, De-moivre's Theorem and examples based on it. Roots of complex numbers. Circular functions and Hyperbolic functions, Exponential functions, Logarithmic functions. Relation between circular and hyperbolic functions.	4	9
2.	**Successive Differentiation:** Successive Derivatives, n^{th} derivative of some standard functions, Leibnitz's Theorem and its examples, Taylor's Theorem (without proof), Maclaurian's series (without proof) and their examples. Expansions of $\sin x$, $\cos x$, e^x etc.	5	12
3.	**Indeterminate forms:** L' Hospital Rule(without proof) Indeterminate forms $0/0$, ∞/∞, $\infty * 0$, $\infty - \infty$ Indeterminate forms 0^0, ∞^0,1^∞	3	7
4.	**Partial Differentiation:** Functions of 2-variables, Limit, Continuity of function of several variables, Partial derivative, Total derivative, Chain rule, Implicit differentiation, Euler's theorem for homogeneous functions and examples based on it. Taylor's formula for functions two variables.	7	17
5.	**Applications of Partial Differentiation:** Tangent plane, Normal line, Linear approximation, Extreme values of functions of two variables, Lagrange multipliers, Jacobians.	5	12
6.	**Improper Integrals:** Improper integrals of Type- I and Type – II, Convergence and divergence of improper integrals.	3	7
7.	**Applications of Definite Integrals:** Volume by Rotation about axes, Volume by Slicing, Volume by Cylindrical shells, Length of Cartesian and Polar curves.	4	9

8.	**Multiple Integrals:** Double integrals, Evaluation of Double Integrals, Change of order of Integration, Double integrals in polar co-ordinates, Transformation of variables by Jacobian only for double integration, Triple Integrals.	7	17
9.	**Applications of Multiple Integrals:** Areas, Volumes, Centre of Gravity, Moment of Inertia.	4	10

Course Outcome:

- Students will be able to apply mathematics to engineering problems of their relevant branches after studying this course.

List of References:

1. Calculus, Volumes 1 and 2, T. M. Apostol, Wiley Eastern, Second Edition.
2. Calculus with Early Transcendental Functions, James Stewart, Cengage Learning, Fifth Edition.
3. Thomas' Calculus, Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education, Eleventh Edition.
4. Calculus – Single and Multivariable, Hughes – Hallett et al., John-Wiley and Sons, Fourth Edition.