16MA 101T MATHEMATICS I										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	**1**	**--**	**4**	**4**	**25**	**50**	**25**	**--**	**--**	**100**

Prerequisite: 11th and 12th Std Mathematics

OBJECTIVES

1. Students should be able to work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal.
2. Students should understand the meaning of the derivative in terms of a rate of change and local linear approximation and should be able to use derivatives to solve a variety of problems.
3. Students should understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of a rate of change and should be able to use integrals to solve a variety of problems.
4. Students should understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
5. Students should be able to communicate mathematics both orally and in well-written sentences and should be able to explain solutions to problems.
6. Students should be able to model a written description of a physical situation with a function, a differential equation, or an integral.
7. Students should develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.
8. Students should able to know the physical significance of gradient, divergence and curl.

SYLLABUS

UNIT- I **[8]**

Calculus for single variable: Successive differentiation, Leibnitz theorem (without proof), Taylor's and Maclaurin's expansion of functions of single variable. Fundamental theorem of Integral calculus, Application of integrals to length, area, volume and surface area of revolution.

Curve Tracing: Asymptotes, Cartesian, polar and parametric forms.

UNIT -II **[11]**

Calculus for of Several variable: Partial derivatives, Euler's theorem, directional derivative and gradient, Taylor's and Maclaurin's expansion of functions of several variables, Maxima and minima of functions of several variables, Lagrange's method of undetermined multipliers, Multiple Integrals – double and triple**,** Jacobian, Change of order of integration, change of coordinates, evaluation of area, volumes of solids, Mass, center of gravity and moment of inertia.

UNIT- III **[11]**

Infinite Series & Improper Integrals: Convergence and divergence of Infinite series. Comparison test, D' Alembert's ratio test, Raabe's test, logarithmic test, Cauchy's root test. Alternating series; Leibnitz test, power series. Convergence of improper integrals, Beta and Gamma functions and its properties.

UNIT -IV **[9]**

Vector Calculus: Scalar and vector fields, Line and surface Integrals, Gradient divergent curl, Green's Theorem and Stoke's theorem (without proof) with application and physical significance.

APPROXIMATE TOTAL **39 Hours**

OUTCOMES:

1. Be able to recognize odd, even, periodic, increasing, decreasing functions
2. know higher order derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions.
3. know the chain rule and use it to find derivatives of composite functions
4. be able to use derivatives to find intervals on which the given function is increasing or decreasing
5. Find maxima and minima, critical points and inflection points of functions of two or more variables.
6. Be able to sketch graphs of rational functions including finding asymptotes
7. Be able to find tangents and normals to graphs of functions given in explicit, implicit and parametric forms
8. Be able to evaluate line and surface integrals using green's, stokes and gauss divergence theorems.
9. Understand the concept of definite integral and know the basic properties of definite integrals
10. Know the fundamental theorem of calculus and be able to use it for evaluating definite integrals and derivativesof integrals with variable limits of integration
11. Understand the concept of area of regions with curvilinear boundaries, be able to find area between curves.
12. Be able to convert cartesian coordinates in polar coordinates and vice-versa.

Mapping :- An ability to identify, critically analyze, formulate and solve engineering problems through differential and integral calculus

TEXT AND REFERENCES

1. Higher Engineering Mathematics, B. S Grewal, Khanna Pub., Delhi.
2. Calculus (5th Edition), James Stewart, Thomson (2003).
3. Higher Engineering Mathematics, R. K. Jain & S. R. K. Iyernagar
4. Thomas' Calculus, eleventh edition, Pearson.
5. E.Kreyszig, Advanced engineering mathematics (8th Ed.), John Wiley (1999)
6. Advanced Engineering Mathematics, Michael D. Greenberg
7. Calculus, Ravish Singh, Mukul Bhatt