Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 1			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
AMR1C1:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Applied Mathematics-I	**3**	**1**	**-**	**3**	**1**	**-**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Todevelop the concepts of calculus, useful to create mathematical models in order to arrive into an optimal solution in various disciplines like physics, engineering, economics, and statistics.
- Provide the fundamentals of formal techniques likedifferentiation to find the slope of a curve, find approximation to the original function by Taylor's series, determine the stationary points of functions in order to sketch their graphs, optimization of functions and so on; Integration to find areas, volumes, central points and many useful things; Vector fields torepresent many physical quantities like velocities, forces (useful in fluid mechanics), particle displacements (useful in solid mechanics), and electric and magnetic fields (electromagnetism).

Prerequisites: Knowledge of basics of functions, limits, derivatives, and integrals.

COURSE OF CONTENTS

UNIT-I

Differential Calculus: Review of Successive differentiation, Leibnitz theorem and problems; Expansion of functions by Taylor's and Maclaurin's Theorem; Asymptotes; Curvature in Cartesian and Polar Coordinates; Envelopes; Evolutes and Involutes.

UNIT-II

Advanced Differential Calculus: Function of Several Variables; Partial Differentiation; Approximations and errors; Jacobians; Taylor's Series of Two Variables; Maxima and Minima of Function of Two and More Variables; Lagrange's Method of Undetermined Multipliers.

UNIT-III

Integral Calculus: Beta and Gamma functions; detailed study of tracing of curves-Cartesian, polar and parametric curves; Area; Length of Curve; Volume; Surface of Revolution; Theorems of Pappus and Guldin and problems.

UNIT-IV

Advanced Integral Calculus: Multiple integrals: Double and Triple Integration; Change of Order of Integration; Area; Volume; Centre of Gravity; Moment of Inertia.

UNIT-V

Vector Calculus: Differentiation of a Vector; Gradient; Divergence; Curl; Integration of a Vector Function; Gauss's, Green's and Stoke's Theorems.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply the concept of function derivatives to study the behaviour and rate of how different quantities change, how the graph of a function can actually be computed, analysed, and predicted and use integrals to find the summation of infinitely many small factors to determine whole.
- Learn the applicability of calculus in various fields like, in physics, it is used in the study of motion, electricity, heat, light, harmonics, acoustics, astronomy, dynamics and advanced physics concepts including electromagnetism and Einstein's theory of relativity use calculus. In the field of chemistry, calculus can be used to predict functions such as reaction rates and radioactive decay. In addition, it is used to check answers for different mathematical disciplines such as statistics, analytical geometry, and algebra.
- Find a way to construct relatively simple quantitative models of change, and deduce their consequences.

BOOKS RECOMMENDED

[1] B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
[2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
[3] Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
[4] C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
[5] H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
[6] E Mendelson, G J Hademenos, F Ayres, Schaum's Easy Outline: Calculus, McGraw-Hill, 2000.
[7] R C Wrede, M Spiegel,Schaum's Outline of Advanced Calculus, 2/e, McGraw-Hill, 2002.