UMA003 Mathematics - I

L	**T**	**P**	**Cr**
3	**1**	**0**	**3.5**

Course Objectives: To provide students with skills and knowledge in sequence and series, advanced calculus and calculus of several variables which would enable them to devise solutions for given situations they may encounter in their engineering profession.

Applications of Derivatives: Mean value theorems and their geometrical interpretation, Cartesian graphing using first and second order derivatives, Asymptotes and dominant terms, Graphing of polar curves, Applied minimum and maximum problems.

Sequences and Series: Introduction to sequences and Infinite series, Tests for convergence/divergence, Limit comparison test, Ratio test, Root test, Cauchy integral test, Alternating series, Absolute convergence and conditional convergence.

Series Expansions: Power series, Taylor series, Convergence of Taylor series, Error estimates, Term by term differentiation and integration.

Partial Differentiation: Functions of several variables, Limits and continuity, Chain rule, Change of variables, Partial differentiation of implicit functions, Directional derivatives and its properties, Maxima and minima by using second order derivatives.

Multiple Integrals: Change of order of integration, Change of variables, Applications of multiple integrals.

Course Learning Outcomes: Upon completion of this course, the students will be able to

1) apply the knowledge of calculus to plot graphs of functions and solve the problem of maxima and minima.
2) determine the convergence/divergence of infinite series, approximation of functions using power and Taylor's series expansion and error estimation.
3) evaluate multiple integrals and their applications to engineering problems.
4) examine functions of several variables, define and compute partial derivatives, directional derivatives and their use in finding maxima and minima.
5) analyze some mathematical problems encountered in engineering applications.

Text Books:

1) Thomas, G.B. and Finney, R.L., Calculus and Analytic Geometry, Pearson Education (2007), 9th ed.
2) Stewart James, Essential Calculus; Thomson Publishers (2007), 6th ed.

Reference Books:

1) Wider David V, Advanced Calculus: Early Transcendentals, Cengage Learning (2007).
2) Apostol Tom M, Calculus, Vol I and II, John Wiley (2003).

Evaluation Scheme:

Sr.No.	Evaluation Elements	Weight age (%)
1.	MST	30
2.	EST	45
3.	Sessionals (May include assignments/quizzes)	25