2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80B06	Engineering Mathematics - II (Common to All)	L	T	P
Credits: 4		3	1	-

Pre-requisites: Basics of Calculus

Course Objectives: To learn
• Methods of solving the differential equations of first and higher order.
• Evaluation of multiple integrals and their applications
• The physical quantities involved in engineering field related to vector valued functions
• The basic properties of vector valued functions and their applications to line, surface and volume integrals
Partial differentiation, concept of total derivative
• Finding maxima and minima of function of two and three variables

Module - I: First Order ODE (12 Lectures)
Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module - II: Ordinary Differential Equations of Higher Order (12 Lectures)
Rules for finding Complementary function-Particular integral (Non-homogeneous term of the type e^{ax}, Sin bx / Cos bx, x^n, $e^{ax}V(x)$, $x^nV(x)$only), Method of variation of parameters. Equations reducible to constant coefficients - Cauchy - Euler and Legendre's equations.

Module - III: Multivariable Calculus (12 Lectures)
Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using Lagrange's method of undetermined multipliers.

Module - IV: Multiple Integrals (12 Lectures)
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Module - V: Vector Calculus (12 Lectures)
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Scalar potential functions. Solenoidal and Irrotational vectors. Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Course Outcomes: After learning the contents of this paper the student must be able to
• Identify whether the given differential equation of first order is exact or not
• Solve higher differential equation and apply the concept of differential equation to real world problems

• Evaluate the multiple integrals and apply the concept to find areas, volumes.
• Evaluate the line, surface and volume integrals and converting them from one to another

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edit ion, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.