ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)
SEMESTER - I/II

Subject Code	15MAT11	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- n^{th} derivatives of product of two functions and polar curves.
- Partial derivatives
- Vector calculus
- Reduction formulae of integration; To solve First order differential equations.
- Solution of system of linear equations , quadratic forms.

Module - 1	**Hours – 10**
Differential Calculus -1: determination of n^{th} order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems. **Polar Curves** - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) -problems	
Module -2	

Differential Calculus -2 Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms. **Partial derivatives** – Definition and simple problems, Euler's theorem(without proof) – problems, total derivatives, partial differentiation of composite functions-problems. Definition and evaluation of Jacobians	**Hours - 10**
Module – 3	
Vector Calculus: Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient, Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - div(ϕA), curl (ϕA), curl(grad ϕ), div(curl A).	**Hours - 10**
Module-4	
Integral Calculus: Reduction formulae - $\int Sin^n x\,dx, \int Cos^n x\,dx, \int Sin^m x\,Cos^n x\,dx,$ (m and n are positive integers), evaluation of these integrals with standard limits (0 to π/2) and problems. **Differential Equations** ; **Solution of first order and first degree differential equations** – Exact, reducible to exact and Bernoulli's differential equations .Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.	**Hours - 10**
Module-5	

Linear Algebra	**Hours - 10**
Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonalisation of a square matrix . Reduction of Quadratic form to Canonical form	

Course outcomes:

On completion of this course, students are able to

- Use partial derivatives to calculate rates of change of multivariate functions.
- Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.
- Recognize and solve first-order ordinary differential equations, Newton's law of cooling
- Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books:

1. B.S. Grewal, "**Higher Engineering Mathematics**", Khanna publishers, 42nd edition, 2013.

2. Erwin Kreyszig, "**Advanced Engineering Mathematics**I, Wiley, 2013

Reference Books:

1. B.V. Ramana, "**Higher Engineering M athematics**", Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, "**A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, "**Higher Engineerig Mathematics**", S.Chand publishing, 1st edition, 2011.