

ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Subject Code	17MAT11	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
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

<p>Differential Calculus -2</p> <p>Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms.</p> <p>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</p>	<p>Hours - 10</p>
<p>Module – 3</p>	
<p>Vector Calculus:</p> <p>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 - $\text{div}(\phi A)$, $\text{curl}(\phi A)$, $\text{curl}(\text{grad } \phi)$, $\text{div}(\text{curl } A)$.</p>	<p>Hours - 10</p>
<p>Module-4</p>	
<p>Integral Calculus:</p> <p>Reduction formulae - $\int \text{Sin}^n x dx$, $\int \text{Cos}^n x dx$, $\int \text{Sin}^m x \text{Cos}^n x dx$, (m and n are positive integers), evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.</p> <p>Differential Equations ;</p> <p>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.</p>	<p>Hours - 10</p>
<p>Module-5</p>	

<p>Linear Algebra</p> <p>Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and Gauss-Seidel method</p> <p>Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector.</p> <p>Linear transformation, diagonalisation of a square matrix .</p> <p>Reduction of Quadratic form to Canonical form</p>	<p>Hours - 10</p>
<p>Course outcomes:</p> <p>On completion of this course, students are able to</p> <ul style="list-style-type: none"> • 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. 	
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 20 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. 	
<p>Text Books:</p> <ol style="list-style-type: none"> 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 Mathematics**", 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.