ENGINEERING MATHEMATICS - I

ject Code :	14MAT11	IA Marks :	25
urs/Week :	04	Exam. Hours :	03
al Hours :	50	Exam. Marks :	100

urse Objectives :

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

n^{th} derivatives of product of two functions and polar curves.

Partial derivatives, indeterminate form and jacobian.

Vectors and Curve tracing.

Reduction formulae; First order differential equations.

Solution of system of equations and quadratic forms.

Module – 1

ferential Calculus - 1 :

ermination of n^{th} order derivatives of Standard functions - Problems. bnitz's theorem (without proof) - problems.

ar Curves - angle between the radius vector and tangent, angle between curves, Pedal equation for polar curves. Derivative of arc length - tesian, Parametric and Polar forms (without proof) - problems. Curvature Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms problems. **10 Hours**

Module – 2

ferential Calculus - 2 :

lor's and Maclaurin's theorems for function of one variable(statement y)- problems. Evaluation of Indeterminate forms.

tial derivatives – Definition and simple problems, Euler's theorem – blems, total derivatives, partial differentiation of composite functions, obians-definition and problems, extreme values of functions of two iables. **10 Hours**

Module – 3

tor Calculus :

ivative of vector valued functions, Velocity, Acceleration and related

problems, Scalar and Vector point functions, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields. Vector identities - div (ϕA), curl (ϕA), curl (grad ϕ), div (curl A).

Differentiation under integral sign using Leibnitz rule with constant and variable limits.

Curve Tracing - General rules to trace Cartesian, polar and parametric curves. **10 Hours**

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 $\pi/2$) and problems.

Differential Equations :

Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations.

Applications – orthogonal trajectories, Newton's law of cooling, flow of electricity, laws of decay and growth. **10 Hours**

Module – 5

Linear Algebra :

Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss-Seidel method and L-U decomposition method.

Linear transformation, diagonalisation of a square matrix, Quadratic forms, reduction to Canonical form by orthogonal transformation, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. **10 Hours**

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.
- Trace the curves which are useful in applications of integration in finding the length, area and volume.
- Recognize and solve first-order ordinary differential equations, model simple electrical circuits, projectile motion and Newton's law of cooling and laws of decay and growth, and

Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra.

ıeme of examination :

Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each question should cover all contents of the respective module.

Students have to answer five full questions choosing one full question from each module.

t Books :

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

Erwin Kreyszig, **"Advanced Engineering Mathematics"**-Vol-I & II, Wiley, 2013

'erence Books :

B.V. Ramana, **"Higher Engineering Mathematics"**, Tata Mc Graw-Hill, 2006

N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.

H.K.Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.

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ENGINEERING PHYSICS

Subject Code :	**14PHY12/14PHY22**	**IA Marks**	**:25**
Hours/Week :	**04**	**Exam. Hours**	**:03**
Total Hours :	**50**	**Exam. Marks**	**: 100**

Course Objectives :

The Objective of this course is to make students learn and understand basic concepts and principles of physics to analyze practical engineering problems and apply its solutions effectively and meaningfully. To understand building up of models, design issues, practical oriented skills and problem solving challenges are the great task of the course. Knowledge about shock waves and practical applications is the prime motto to introduce new technology at the initial stage of Engineering.

Module – 1

Modern Physics and Quantum Mechanics :

Black body radiation spectrum, Assumptions of quantum theory of radiation, Plank's law, Weins law and Rayleigh Jeans law, for shorter and longer wavelength limits.Wave Particle dualism, deBroglie hypothesis. Compton Effect and its Physical significance. Matter waves and their Characteristic properties, Phase velocity and group velocity. Relation between phase velocity and group velocity, Relation between group velocity and particle velocity.

Heisenberg's uncertainty principle and its application, (Non-existence of electron in nucleus).Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrodinger wave equation. Eigen values and Eigen functions. Application of Schrodinger wave equation. Energy Eigen values and Eigen functions for a particle in a potential well of infinite depth and for free particle. **10 Hours**

Module – 2

Electrical Properties of Materials :

Free–electron concept (Drift velocity, Thermal velocity, Mean collision time, Mean free path, relaxation time). Failure of classical free electron theory. Quantum free electron theory, Assumptions, Fermi factor, density of states (qualitative only), Fermi–Dirac Statistics. Expression for electrical conductivity based on quantum free electron theory, Merits of quantum free electron theory.