

**ENGINEERING MATHEMATICS-II**

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

SEMESTER - I/II

Subject Code	17MAT21	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 students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following'

- Ordinary differential equations
- Partial differential equations
- Double and triple integration
- Laplace transform

**Module - I****Teaching Hours**

**Linear differential equations with constant coefficients:** Solutions of second and higher order differential equations - inverse differential operator method, method of undetermined coefficients and method of variation of parameters.

**10 Hours****Module -2****Differential equations-2:****10 Hours**

**Linear differential equations with variable coefficients:** Solution of Cauchy's and Legendre's linear differential equations.

**Nonlinear differential equations** - Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairaut's equations and equations reducible to Clairaut's form.

<b>Module – 3</b>	
<p><b>Partial Differential equations:</b></p> <p>Formulation of Partial differential equations by elimination of arbitrary constants/functions, solution of non-homogeneous Partial differential equations by direct integration, solution of homogeneous Partial differential equations involving derivative with respect to one independent variable only.</p> <p>Derivation of one dimensional heat and wave equations and their solutions by variable separable method.</p>	<b>10 Hours</b>
<b>Module-4</b>	
<p><b>Integral Calculus:</b></p> <p><b>Double and triple integrals:</b> Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Application of double and triple integrals to find area and volume. . <b>Beta and Gamma functions:</b> definitions, Relation between beta and gamma functions and simple problems.</p>	<b>10 Hours</b>
<b>Module-5</b>	
<p><b>Laplace Transform</b></p> <p>Definition and Laplace transforms of elementary functions. Laplace transforms of <math>e^{at}f(t)</math>, <math>t^n f(t)</math> and <math>\frac{f(t)}{t}</math> (without proof) , periodic functions and unit-step function- problems</p> <p><b>Inverse Laplace Transform</b></p> <p>Inverse Laplace Transform - problems, Convolution theorem to find the inverse Laplace transforms(without proof) and problems, solution of linear differential equations using Laplace Transforms.</p>	<b>10 Hours</b>

**Course outcomes:**

On completion of this course, students are able to,

- solve differential equations of electrical circuits, forced oscillation of mass spring and elementary heat transfer.
- solve partial differential equations fluid mechanics, electromagnetic theory and heat transfer.
- Evaluate double and triple integrals to find area , volume, mass and moment of inertia of plane and solid region.
- Use curl and divergence of a vector valued functions in various applications of electricity, magnetism and fluid flows.
- Use Laplace transforms to determine general or complete solutions to linear ODE

**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:**

- B. S. Grewal," Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
- Kreyszig, "Advanced Engineering Mathematics " - Wiley, 2013

**Reference 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. Rajnish Verma ,"Higher Engineerig Mathematics", S. Chand publishing,1st edition, 2011.