ENGINEERING MATHEMATICS-II

(Common to all branches)

|As per Choice Based Credit System (CBCS) scheme|

(Effective from the academic year 2018-19)

Course Code : 18MAT21
Contact Hours/Week : 04
Total Hours:50
Semester : II

CIE Marks : 50
SEE Marks: 50
Exam Hours:03
Credits: 04

Course Learning Objectives:

This course viz., Advanced Calculus and Numerical Methods (18MAT21) aims to prepare the students:

- To familiarize the important tools of vector calculus, ordinary/partial differential equations and power series required to analyze the engineering problems.
- To apply the knowledge of interpolation/extrapolation and numerical integration technique whenever analytical methods fail or very complicated, to offer solutions.

MODULE-I

Differential Equation-1:-

Solution of non-linear differential equation of first order : Solvable for p, x , y and Clairaut's equation. Solution of second and higher order Ordinary linear differential equation with constant co-efficients, Inverse Differential operator method.

10 - Hours

MODULE-II

Differential Equations-2:- Method of variation of parameters. Solution of second & higher order Ordinary linear differential equation with variable co-efficients: Cauchy Differential Equation and Legendre's Differential equation. Solution of homogeneous LDE by Power series solution Method.

10 - Hours

MODULE-III

Partial Differential Equations(PDE's):- Solution of Non-homogeneous PDE by direct integration, solution of homogeneous PDE with respect to one independent variable only. Derivation of one dimensional wave equation and heat equation and solution by methods of separation of variables.

10 - Hours

MODULE-IV

Complex valued function, limit, continuity, differentiability, analytic functions. Cauchy-Riemann Equation in Cartesian, Polar form. Harmonic and orthogonal property and problems.

Vector Differentiation: Scalar and Vector point functions, Gradient, Divergence, Curl, Laplacian operator and problems. Solenoidal, Irrotational vectors.

10 - Hours

MODULE-V

Vector line integral, Vector Surface integral: Greens theorem, Stokes theorem. Volume Integral: Gauss divergence theorem.

Improper Integrals: Beta and gamma functions and its properties and examples.

10 – Hours

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.

2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition.

2. McGraw-Hill Book Co., New York, 1995. 2. James Stewart : "Calculus –Early Transcendentals", Cengage Learning India Private Ltd., 2017.

3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.

4. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics",Oxford University Press,3rd Reprint,2016.

5. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt.Ltd., 2015.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/

Course Outcomes:

On completion of this course, students are able to:

1: Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.

2: Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.

3: Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.

4: Explain the applications of infinite series and obtain series solution of ordinary differential equations.

5: Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

Question Paper Pattern:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two 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 five full questions, selecting one full question from each module.

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