SHARNBASVA UNIVERSITY, KALABURAGI

ENGINEERING MATHEMATICS – II			
Course Code	21MAT21	CIE Marks	50
Contact Hours/Week	03	SEE Marks	50
Total Hours	40	Exam Hours	03
Semester	II	Credits	03

Course Learning Objectives:

This course viz., Engineering mathematics-II (21MAT21) aims to prepare the students:

- To familiarize the importance of linear and non linear ordinary differential equations, partial differential equations and finding the general, singular and complete solution.
- To familiarize the importance of series solution for solving differential equations.
- To apply the knowledge of vector calculus to find surface area and volume.
- To familiarize the concept of complex valued function and properties and operations of vector and scalar valued functions.

MODULE-1: DIFFERENTIAL EQUATIONS - 1

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

Self Study : Singular solution

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-2: DIFFERENTIAL EQUATIONS - 2

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

Self Study : Application of second order ordinary differential equation, Initial conditions(IC's) and Initial value problems(IVP's).

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-3: PARTIAL DIFFERENTIAL EQUATIONS (PDE's)

Solution of Non-homogeneous PDE by direct integration, solution of homogeneous PDE with respect to one independent variable only, PDE of First order : Lagrange's Method and Charpits Method. Derivation of one dimensional wave equation and heat equation and solution by methods of separation of variables.

Self Study : Formation of PDE by eliminating arbitrary constant and functions, Classification of PDE

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-4: COMPLEX VARIABLES

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

Self Study : Complex Trigonometry.

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-5: VECTOR CALCULUS

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

Vector integration, Vector Surface integral: Greens theorem, Stokes theorem. Volume Integral: Gauss divergence theorem (Without proof), examples.

Self Study : Geometrical and Physical meaning of vector differential operator.

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

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 Power 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.

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.