SHARNBASVA UNIVERSITY, KALABURAGI

ENGINEERING MATHEMATICS - I			
Course Code	21MAT11	CIE Marks	50
Contact Hours/Week	03	SEE Marks	50
Total Hours	40	Exam Hours	03
Semester	I	Credits	03

Course Learning Objectives:

This course Engineering Mathematics-I (18MAT11) will enable students:

- To familiarize the important tools of calculus and differential equations that are essential in all branches of engineering.
- Applications of first order differential equations.
- To enable students to apply the knowledge of mathematics in ECE, EEE,CIVIL and Mechanical Engineering branches.
- To familiarize the importance of improper Integrals and its properties.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

MODULE-1: DIFFERENTIAL CALCULUS - 1

Successive Differentiation: Standard forms of n^{th} derivatives (with proof), examples on standard functions, Leibnitz Theorem (without proof) examples, Taylor's and Maclaurin's series expansions for one variable (statements only), Indeterminate forms.

Self Study : Maxima and minima of one variable.

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

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

MODULE-2: DIFFERENTIAL CALCULUS - 2

Polar Curves: Expression for Angle between radius vector and tangent, length of perpendicular from pole to the tangent, angle between two polar curves, Pedal Equation of polar curves and problems.

Radius of Curvature: Radius of Curvature for Cartesian and polar form (Without proof) and problems.

Self Study : Envelopes and Evalutes.

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

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

MODULE-3: DIFFERENTIAL CALCULUS - 3

Function of several variables, Definitions of Partial Differentiation, Direct and Indirect partial derivatives, Symmetric functions, Jacobian's and its properties, maxima and minima for functions of one and several variables.

Differential Equation: Preamble to differential equations, Exact and Reducible to exact differential equation, Bernoulli's linear differential equation. Applications of first order first degree differential equations: Newton's law of cooling, Law of decay and growth.

Self Study : Homogeneous functions, Euler's theorem, reducible to exact type-2, type-3, type-4.

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

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

MODULE-4: INTEGRAL CALCULUS

Double and Triple integral examples, changing the order of integration, changing into polar form. Application of double and triple integrals to find area and volume.

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

Self Study : Evaluation of double integral over a specific region, Path independence of line integrals and definition of improper integrals of I and II kind.

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

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

MODULE-5: MATRICES

Preamble to matrices , Rank of matrix row reduced by echelon form, Test of consistency of homogeneous and non- homogeneous system of equations by rank, trivial and non trivial solutions, solution of linear equations by Gauss Elimination method, Gauss-Jordan method, Eigen values and Eigen vector, Rayleigh's power method.

Self Study : Orthogonal and unitary matrices, Cayley-Hamilton theorem.

(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. Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bendness of a curve.
2. Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions.
3. Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
4. Solve first order linear/nonlinear differential equation analytically using standard methods.
5. Make use of matrix theory for solving system of linear equations and compute Eigen values and Eigenvectors .

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 &Subobh 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.