

ENGINEERING MATHEMATICS-I
(Common to all branches)
(Effective from the academic year 2019-20)

Course Code: 18U MAC100
Contact Hours/Week: 04(3L+1T)
100
Total Hours: 50 (8L+2T per Unit)
03
Semester: I

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

Course Learning Objectives: This course will enable students to master the basic tools of differential & integral calculus, differential equations and elementary Linear algebra and become skilled to formulate, solve and analyze science and engineering problems.

Course Outcomes: On completion of this course, students are able to:

CO.1	Apply the knowledge of calculus to solve problems related to polar curves, curvature and its applications in determining the bentness of a curve.
CO.2	Learn partial differentiation to calculate rates of change of multivariate functions, solve problems related to composite functions , Jacobians and application such as maxima and minima.
CO.3	Apply the concept of multiple integration and their usage in computing the area and volumes.
CO.4	Compute the solution of system of equations, Eigen values and Eigen vectors and their applications.
CO.5	Solve first order linear differential equations analytically using standard methods and analyze engineering applications.

CHAPTER-I

Differential Calculus-1:-

Review of elementary calculus, Polar curves-angle between the radius vector and tangent, angle between two curves, Pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof). Centre and circle of curvature (formulae only).

Self Study: Applications to Evolute.

8L +

2T

CHAPTER- II

Differential Calculus-2:-

Taylor's and Maclaurin's series expansions for one variable (statements only). Indeterminate forms($\frac{0}{0}, \frac{\infty}{\infty}, 0 \times \infty, \infty - \infty, \infty^{\infty}, 1^{\infty}$)

Partial differentiation; Euler's theorem, Total derivatives, Differentiation of composite functions. Maxima and Minima for a function of two variables, Method of Lagrange's multipliers with one subsidiary condition. Jacobians and properties(without proof).

Self Study: Errors and Approximations.

8L +

2T

CHAPTER -III

Integral Calculus:-

Multiple Integrals: Evaluation of double integrals (direct examples and with region given) . Evaluation of double integrals by change of order of integration and changing into polar coordinates. Evaluation of Triple integrals.

Beta and Gamma functions: Definitions, Relation between Beta and Gamma functions.

Self Study: Applications to find Area and Volume. **8L + 2T**

CHAPTER -IV

Elementary Linear Algebra: Rank of a matrix- Row Echelon form. Solution of system of linear equations – consistency. Gauss-elimination method & Gauss-Seidel iterative method. Eigen values and Eigen vectors- Rayleigh’s power method. Diagonalization of a square matrix of order two.

Self Study: Elementary operations of matrices using MATLAB. **8L + 2T**

CHAPTER -V

Ordinary Differential Equations of first order:-

Leibnitz’s linear equation, Bernoulli’s equation, Exact and reducible to exact differential equations. orthogonal trajectories..Applications of ODE’s- R-C circuit and L-R circuits,

Self Study: Applications of ODE’s to Newton’s law of cooling and Applications of orthogonal trajectories.

8L + 2T

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
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, McGraw-Hill Book Co., New York, 1995.
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T.,” Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L.”Calculus and Analytical Geometry”9th Edition, Pearson, 2012.

Web links and Video Lectures:

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

Course Outcomes: On completion of this course, students are able to:

COs	Description of the course outcomes	Mastering 3	Moderate 2	Introductory 1
CO.1	Apply the knowledge of calculus to solve problems related to polar curves, curvature and its applications in determining the bentness of a curve.			1,2
CO.2	Learn partial differentiation to calculate rates of change of multivariate functions, solve problems related to composite functions , Jacobians and application such as maxima and minima..			1,2
CO.3	Apply the concept of multiple integration and their usage in computing the area and volumes.		1,2	
CO.4	Compute the solution of system of equations, Eigen values and Eigen vectors and their applications.		1,2	
CO.5	Solve first order linear differential equations analytically using standard methods and analyze engineering applications.		1,2	

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	1.6	1.6										

1.Introductory (Slight); 2. Reinforce (Moderate); 3. Mastering (Substantial)