ENGINEERING MATHEMATICS I

ENSH 101

Lecture : 3 **Year : I**
Tutorial : 2 **Part : I**
Practical : 0

Course Objectives:
To equip the students with the essential mathematical skills and techniques that are relevant to the engineering fields and enable them to solve engineering problems using mathematical methods.

1 Derivatives and its Applications (10 hours)

1.1 Review of derivative and differentiability, mean value theorems with interpretations
1.2 Indeterminate forms, types and their real life examples, L-Hospital's rule
1.3 Power series of single valued functions
  1.3.1 Taylor's series
  1.3.2 Maclaurin's series
1.4 Asymptotes to Cartesian and Polar curves
1.5 Pedal equation to Cartesian and Polar curves
1.6 Curvature and radius of curvature for Cartesian curves

2 Antiderivatives and its Applications (11 hours)

2.1 Review of definite and indefinite integrals
2.2 Differentiation under integral sign
2.3 Improper integrals
2.4 Application of Beta and Gamma functions
2.5 Area, arc length, volume and surface of revolution in plane for Cartesian curves
2.6 Centroid and moment of inertia under area of curve

3 Ordinary Differential Equations and its Applications (10 hours)

3.1 Review of order, degree, solution of first order first degree differential equations by variable separation method and solution of homogeneous equations
3.2 Linear differential equation and equations reducible to linear differential equation of first order Bernoulli’s equation, modeling electric circuit
3.3 First order and higher degree differential equations; Clairaut’s form

3.4 Linear second order differential equations with constant coefficient and variable coefficients reducible to constant coefficients, Cauchy's equations and modeling mass spring system

3.5 Application in physical sciences and engineering

4 Plane Analytic Geometry (4 hours)

4.1 Transformation of coordinates: Translation and rotation

4.2 Equation of conic in Cartesian and Polar form, identification of conics

5 Three dimensional geometry (10 hours)

5.1 The straight line: Symmetrical and general form

5.2 Coplanar lines

5.3 Shortest distance

5.4 Sphere: General equation, plane section by planes, tangent planes

5.5 Introduction to right circular cone and right circular cylinder

Tutorials (30 hours)

1. Derivatives and its applications
2. Antiderivatives and its applications
3. Ordinary differential equations and its applications
4. Plane analytic geometry
5. Three dimensional geometry

Reference

1. Jeffery, A., (2001), Advanced Engineering Mathematics. Academic Press.
2. O'Neill, P.V., (2003), Advanced Engineering Mathematics. Thomson Learning.
3. Kreyszig , A. (1993), Advanced engineering Mathematics (Latest Edition). John Wiley & Sons.
4. Sastry, S.S. (2008), Engineering Mathematics Volume I and II. PHI India.
5. Wylie, C., Barrett, L.(1995), Advanced Engineering Mathematics (Latest Edition), McGraw-Hill College.
6. Thomas, T., Finny, R. (1984), Calculus and Analytic Geometry (Latest Edition.), Addison-Wesley.