ENGINEERING MATHEMATICS – I (05.09.2019)
AS – 104   L-3, T-1, P-0, Cr-4

Course outcomes
1. Successive differentiation, expansion of functions, partial derivatives, double points and asymptotes.
2. Tracing of curve of two-dimensional, curvature, quadrature, rectification, volume and surface area of solids of revolutions.
3. Theory of two variable calculus, Eigen values, Eigen vectors, consistency of system, vector space and linear transformations.
4. Solution of ordinary differential equations with its applications.
5. Learning the concepts of partial differential equations.

UNIT-I: CALCULUS OF ONE VARIABLE AND PARTIAL DERIVATIVES   (CO-1)

Successive differentiation, Leibnitz's theorem of nth derivative; Maclaurin's and Taylor's expansion of a function; Partial derivatives and their geometrical interpretation, Total derivative, Total differential coefficient, change of variables i.e. use of Jacobeans.
Double point and its nature; Concavity, convexity and points of inflexion; Oblique and parallel asymptotes.

UNIT-II: CURVE TRACING, CURVATURE AND APPLICATIONS OF INTEGRATION (CO-2)

Two-Dimensional curve tracing in cartesian, polar and parametric forms; Curvature, radius of curvature in cartesian, polar, parametric and implicit forms, radius of curvature at the origin, centre and chord of curvature, evolutes of curves; Finding length, volume and surface area of the curve in cartesian, polar and parametric forms; Formation of pedal and intrinsic equation.

UNIT-III: CALCULUS OF SEVERAL VARIABLES & LINEAR ALGEBRA   (CO-3)

Taylor's expansion of a function of two and more variables; Leibnitz's rule for differentiation under the sign of integration; Maxima and minima of a function of two and more variables including Lagrange's method;
Consistency of a system of simultaneous linear equations using rank, Eigen values and Eigen vectors of a square matrix, Properties of Eigen values, Applications of Cayley-Hamilton theorem and diagonalization of a matrix, vector space, basis, linear dependence and independence of vectors, Linear transformations and related problems.

UNIT-IV: ORDINARY DIFFRENTIAL EQUATIONS   (CO-4)

Orthogonal and isogonal trajectories of a family of curves, complementary function, particular integral and general solution of ordinary linear differential equations of higher order with constant and variable coefficients (Cauchy and Legendre forms); Method of variation of parameters, method of undetermined coefficients and solutions of simultaneous differential equations with constant coefficients.

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS   (CO-5)

Introduction to partial differential equations, change of independent variables in P.D.E.; Lagrange's method of undetermined multipliers for the solution of linear partial differential equations of first order solution of non-linear partial differential equations of first order by means of transformations and Charpit's methods; Complete solution of homogeneous and non-homogeneous L.P.D.E. of higher order with constant and variable coefficients.

Text/ Reference Books
1. A. B. Mathur and V.P. Jaggi; **Advanced Engineering Mathematics**, Khanna Publishers, 2nd edition, 2001.
2. B.S. Grewal; **Higher Engineering Mathematics**, Khanna Publishers, 44th edition, 2017.
3. B. V. Ramana: **Higher Engineering Mathematics**, McGraw Hill Education India, 26th edition 2016.
4. R. K. Jain and S. R. K. Iyengar: **Advanced Engineering Mathematics**, Narosa, 5th Edition, 2018.
5. H. K. Dass; **Advanced Engineering Mathematics**, S. Chand Publishing, 22nd edition, 2018.