Mathematics-II		L	T	P	Credit
MA 114 S2	**Scheme**	3	1	0	04

- **ORDINARY DIFFERENTIAL EQUATION** (**10 Hours**)
  Reorientation of differential equation first order first degree, exact differential equation and Integrating factors, first order higher degree odes, solvable for p, y and x, Solution of homogenous equations higher order, complementary functions, Particular Integrals, Linear differential equation with variable coefficient, Cauchy's Euler and Legendre's equation with variable coefficient, Method of variation of parameters.

- **APPLICATION OF DIFFERENTIAL EQUATION (Mathematical Modelling)** **(07 Hours)**
  Modeling of Real world problems particularly Engineering System, Electrical network models (LCR), spread of epidemic (SI, SIS, SIR), Newton's Law of cooling, Single compartment modelling, Bending of beam models.

- **SERIES SOLUTION AND SPECIAL FUNCTIONS** **(07 Hours)**
  Regular point, Singular point, series solution of ODE of 2nd order with variable coefficient with special emphasis to differential equation of Legendre's and Bessel's for different cases of roots of indicial equations.

- **INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATION** **(07 Hours)**
  Introduction to Partial differential equation, Formation of partial differential Equation, Partial differential Equation of first order, Linear partial differential equation of first order ($P\mathbf{p} + Q\mathbf{q} = R$) and method of obtaining its general solution, Non-linear partial differential equation of first order $f(\mathbf{p}, \mathbf{q})=0$, $f(z, \mathbf{p}, \mathbf{q})=0$, $f(x, \mathbf{p})= g(y, \mathbf{q})$, $z= \mathbf{p}x + \mathbf{q}y + f(\mathbf{p}, \mathbf{q})$.

- **VECTOR CALCULUS** **(07 Hours)**
  Scalar and vector point function, differential operator, gradient, directional derivative, divergence, curl and Laplacian operator with their properties, Line integral, Surface Integral, Volume integral, Green's, Gauss and Stokes theorem (Only statement) & application.

- **SYSTEM OF LINEAR ALGEBRIC EQUATION** **(04 Hours)**
  Linear systems, Elementary row and column transformation, rank of matrix, consistency of linear system of equations, Linear Independence and Dependence of vectors, Gauss Elimination method, Gauss-Jorden Method, Gauss-Jacobi Iteration Method.

  (Total Lecture Hours: 42)

Books Recommended:
1. Kreyszing E., "Advanced Engineering Mathematics", John Wiley & Sons, Singapore, Int. Student Ed. 2015.
2. James Steward De, "Calculus", Thomson Asia, Singapore, 2003.
3. O'Neel Peter., "Advanced Engg. Mathematics", Thompson, Singapore, Ind. Ed. 2002.
4. F. B. Hilderband, "Methods of Applied mathematics", PHI, New Delhi, 1968
5. Wiley C. R., "Advanced Engineering Mathematics", McGraw Hill Inc., New York Ed. 1993.

Reference Books
1. Ramana D. V., "Higher Engg. Mathematics", The MaGraw-Hill Inc., New Delhi, 2007.
2. Hay George E., "Vector and Tensor Analysis". Dover Publications, 2012.
3. Srimanta Pal, Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, New Delhi, 2015.
4. Mary L. Boas, Mathematical Methods in the Physical Sciences, John Wiley & Sons, Ed.2005.
5. J. N. Kapur , Mathematical Models in Biology and Medicine. East west Press, New Delhi 1985.