B.Sc. (Mathematics) (Part III) (Semester – V)
Choice Based Credit System with Multiple Entry and Multiple Exit Option (NEP-2020)
Syllabus to be implemented from Academic Year 2024-25

Course code   :   DSE – E11
Title of course   :   **Partial Differential Equations**
Theory   :   32 Hrs. (40 lecturers of 48 min.)
Marks   :   50 (Credit: 02)

Course Learning Outcomes: This course will enable the students to:

CO1: understand the basic concepts of partial differential equations (PDEs) and their classification.

CO2: analyze and solve linear and some nonlinear partial differential equations using analytical methods.

CO3: apply critical thinking skills to select appropriate solution methods for different types of PDEs.

CO4: able to apply various solution techniques to solve linear partial differential equations of both first and second orders

Unit 1: An Introduction to Partial Differential Equations   (20 Lect.)

   1.1.   Introduction
   1.2.   Order and Degree
   1.3.   Classification of Partial Differential Equations
   1.4.   Solution of Partial Differential Equations
   1.5.   Linear Partial Differential Equations of First Order
   1.6.   Derivation of Partial Differential Equation by the Elimination of arbitrary constants
   1.7.   Derivation of Partial Differential Equation by the Elimination of arbitrary functions
   1.8.   Solutions of Standard forms (non-linear equations)
   1.9.   Lagrange's Linear Partial Differential Equation and it's geometrical interpretation
  1.10.   Charpit's Method
  1.11.   Example on 1.2 to 1.10

Unit 2: Partial Differential Equations of Second Order   (20 Lect.)

   2.1.   Introduction
   2.2.   Linear Homogeneous Partial Differential Equation with constant coefficients
   2.3.   Solution of Linear Partial Differential Equation
   2.4.   Rule for finding the Complementary Function (C.F.)
   2.5.   Method of finding Particular Integral (P.I.) of a Linear Homogeneous Partial Differential Equation
   2.6.   Non-homogeneous Linear Partial Differential Equation with constant coefficients
   2.7.   Method for finding the Complementary Function (C.F.)
   2.8.   Method of finding Particular Integral (P.I.) of a Non-homogeneous Linear Partial Differential Equation

Recommended Book:

1. Advanced Partial Differential Equations, Sudhir Pundir and Rimple Pundir, A Pragati Edition, Meerut (4th Edition).

Scope of Syllabus:

Unit 1: Chapter 1: Sec.: 1.1, 1.2, 1.3, 1.4, 1.5,1.6,1.7,1.8,1.9,1.12,1.14;

Unit 2: Chapter 2: Sec.: 2.1, 2.2, 2.3, 2.4, 2.5,2.6,2.7,2.8

Reference Books:

1. Differential Equations, P. P. Gupta, G. S. Malik and S. K. Mittal, A Pragati Edition, Meerut (14th Edition).
2. Differential Equations, M. L. Khanna, Jai Prakash Nath and Co., Meerut (14th Edition).
3. Theory and Problem of Differential Equations, Frank Ayres JR., Schaum Publishing CO., New York.
4. Ordinary and Partial Differential Equations, Dr. M.D. Raisinghania, S. Chand & Company Ltd., New Delhi (18th Edition)
5. An Elementary Course in Partial Differential Equations, T. Amarnath, Jones and Bartlett Publishers, Sudbary.