    ii.   Sneddon, I. N. (2006). *Elements of Partial Differential Equations*, Dover Publications. Indian Reprint.

Practical /Lab work to be performed in a Computer Lab:

Use of computer algebra systems (CAS), for example Mathematica/MATLAB/Maple/Maxima/ Scilab, etc., for developing the following programs:
1. Solution of first order differential equation.
2. Plotting of second order solution family of differential equation.
3. Plotting of third order solution family of differential equation.
4. Solution of differential equation by variation of parameter method.
5. Solution of systems of ordinary differential equations.
6. Solution of Cauchy problem for first order PDE.
7. Plotting the characteristics for the first order PDE.
8. Plot the integral surfaces of a given first order PDE with initial data.

Teaching Plan (Theory Paper: DSE-1 (i): Differential Equations):
Week 1: First order ordinary differential equations: Basic concepts and ideas.
    [2] Chapter 1 (Section 1.1).
    [3] Chapter 1 (Sections 1.1, and 1.2).
Week 2: First order exact differential equations. Integrating factors and rules to find integrating factors.
    [2] Chapter 1 (Section 1.4).
    [3] Chapter 2 (Sections 2.1, and 2.2).
Weeks 3 and 4: Linear equations and Bernoulli equations, Orthogonal trajectories and oblique trajectories; Basic theory of higher order linear differential equations, Wronskian, and its properties; Solving a differential equation by reducing its order.
    [3] Chapter 2 (Sections 2.3, and 2.4), Chapter 3 (Section 3.1), and Chapter 4 (Section 4.1).
Weeks 5 and 6: Linear homogenous equations with constant coefficients. Linear non-homogenous equations.
    [2] Chapter 2 (Section 2.2).
    [3] Chapter 4 (Sections 4.2, 4.3, and 4.6).
Week 7: The method of variation of parameters, The Cauchy–Euler equation.
    [3] Chapter 4 (Sections 4.4, and 4.5).
Week 8: Simultaneous differential equations.
    [3] Chapter 7 (Sections 7.1, and 7.3).
Week 9: Partial differential equations: Basic concepts and definitions with mathematical problems. Classification of first order partial differential equations.
    [1] Chapter 2 (Sections 2.1, and 2.2).
Week 10: Construction and Geometrical interpretation of first order partial differential equations.
    [1] Chapter 2 (Sections 2.3, and 2.4).
Week 11: Method of characteristics, General solutions of first order partial differential equations.
    [1] Chapter 2 (Section 2.5)
Week 12: Canonical forms and method of separation of variables for first order partial differential equations.
    [1] Chapter 2 (Sections 2.6, and 2.7).
Week 13: Classification of second order partial differential equations, reduction to canonical forms.
    [1] Chapter 4 (Sections 4.1, and 4.2).
Week 14: Second order partial differential equations with constant coefficients, General solutions.
    [1] Chapter 4 (Sections 4.3, and 4.4).

Facilitating the Achievement of Course Learning Outcomes

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Solve the exact, linear and Bernoulli equations and find orthogonal trajectories.	(i) Each topic to be explained with illustrations.	• Presentations and class discussions.
2.	Apply the method of variation of parameters to solve linear differential equations.	(ii) Students to be encouraged to discover the relevant concepts. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical and practical problems in the class.	• Assignments and class tests. • Student presentations. • Mid-term examinations.
3.	Formulate and solve various types of first and second order partial differential equations.	(v) Students to be encouraged to apply concepts to real world problems.	• Practical and viva-voce examinations. • End-term examinations.

Keywords: Integrating factors, Bernoulli equations, Wronskian, Cauchy–Euler equation, First and second order PDE's.