



Indraprastha College for Women

University of Delhi

Course Name:	B.Sc.(H) Mathematics
Paper Title:	Partial Differential Equations
Unique Paper Code:	2352013503
Semester:	V
Faculty(s):	Dr. Manju Sharma
Year:	2026-27

Work Plan			
Period	Unit No.	Learning Objective	Topics to be Covered
1,2,3	I	First Order Partial Differential Equations	Basic concepts, classification, construction
4,5			geometrical interpretation of first-order PDEs.
6,7,8			Method of characteristics and general solutions
9,10,11,12,13			Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations; Method of separation of variables.
14,15			Charpit's method for solving non-linear PDEs.
1,2	II	Classification and Solutions of Second-Order Linear PDEs	Classification (hyperbolic, parabolic, and elliptic), reduction to canonical forms,
3,4,5,6			general solutions of second-order linear PDEs
7,8,9,10,11,12			Higher order linear partial differential equations with constant coefficients.
1,2	III	Application of Partial Differential Equations	: Mathematical models: The vibrating string, vibrating membrane,
3,4,5,6			conduction of heat in solids, the gravitational potential, conservation laws and the Burgers equation,
7,8			Traffic flow.
9,10,11,12			Cauchy problem and wave equations: Solutions of

			homogeneous wave equations with initial boundary-value problems
	III		MID SEMESTER BREAK
13,14,15			non-homogeneous boundary conditions.
16,17,18			Cauchy problem for nonhomogeneous wave equations
REVISION			
DISBERSAL OF CLASSES			

SYLLABUS	
Unit	TOPICS
I	First Order Partial Differential Equations Basic concepts, classification, construction, and geometrical interpretation; Method of characteristics and general solutions, Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations; Method of separation of variables; Charpit's method for solving non-linear PDEs.
II	Classification and Solutions of Second-Order Linear PDEs Classification (hyperbolic, parabolic, and elliptic), reduction to canonical forms, and general solutions of second-order linear PDEs; Higher order linear partial differential equations with constant coefficients.
III	Applications of Partial Differential Equations Mathematical models: The vibrating string, vibrating membrane, conduction of heat in solids, the gravitational potential, conservation laws and the Burgers equation, Traffic flow; Cauchy problem and wave equations: Solutions of homogeneous wave equations with initial boundary-value problems, and non-homogeneous boundary conditions, Cauchy problem for non-homogeneous wave equations.
S. No.	Name of Authors/Books/Publishers
1.	Myint-U, Tyn & Debnath, Lokenath. (2007). Linear Partial Differential Equations for Scientists and Engineers (4th ed.). Birkhäuser. Indian Reprint.
2.	2 Sneddon, Ian N. (2006). Elements of Partial Differential Equations, Dover Publications. Indian Reprint
3.	Abell, Martha & Braselton, J.P. (2004) Differential Equations with Mathematica, Elsevier, Academic Press, Third Edition.
4.	Stavroulakis, Ioannis P & Tersian, Stepan A. (2004). Partial Differential Equations: An Introduction with Mathematica and MAPLE (2nd ed.). World Scientific.