

Indraprastha College for women, Univ. of Delhi

WORK PLAN (January, 2023-May, 2023)

Course Name: B.Sc.(H) Mathematics

Semester: IV

Paper Code: 32351401

Paper Name: Partial Differential Equations

Faculty: Dr. Chander Shekhar

Week	Theme/ Curriculum
1	Introduction, Classification, Construction of first order partial differential equations (PDE).
2	Method of characteristics and general solution of first order PDE.
3	Canonical form of first order PDE, Method of separation of variables for first order PDE.
4	The vibrating string, Vibrating membrane, Gravitational potential, Conservation laws.
5	Reduction to canonical forms, Equations with constant coefficients, General solution.
6	Reduction to canonical forms, Equations with constant coefficients, General solution.
7	The Cauchy problem for second order PDE, Homogeneous wave equation.
8	The Cauchy problem for second order PDE, Homogeneous wave equation.
9	Initial boundary value problem, Non-homogeneous boundary conditions, Finite
10	string with fixed ends, Non-homogeneous wave equation, Goursat problem.
11	Method of separation of variables for second order PDE, Vibrating string problem.
12	Method of separation of variables for second order PDE, Vibrating string problem.
13	Existence (omit proof) and uniqueness of vibrating string problem. Heat conduction problem. Existence (omit proof) and uniqueness of the solution of heat conduction problem. Non-homogeneous problem.
14	Existence (omit proof) and uniqueness of vibrating string problem. Heat conduction problem. Existence (omit proof) and uniqueness of the solution of heat conduction problem. Non-homogeneous problem.
15	Existence (omit proof) and uniqueness of vibrating string problem. Heat conduction problem. Existence (omit proof) and uniqueness of the solution of heat conduction problem. Non-homogeneous problem.
16	Revision
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Readings/Reference Texts: 1. Myint-U, Tyn & Debnath, Lokenath. (2007). *Linear Partial Differential Equation for*

Scientists and Engineers (4th ed.). Springer, Third Indian Reprint, 2013

Additional Readings:

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

ii. Stavroulakis, Ioannis P & Tersian, Stepan A. (2004). *Partial Differential Equations:*

An Introduction with Mathematica and MAPLE (2nd ed.). World Scientific.