

TEACHING PLAN	
Course Title: Partial Differential Equations	Duration of Examination: 3 hours
Course Code: PGAMT2E005T	Maximum Marks: 100
Course Instructor: Dr. Sanjay Kumar	
Unit I	
LECTURE 1	Introduction to PDE
LECTURE 2	Formulation of first order partial differential equations
TUTORIAL 1	Exercises and examples related to Lecture I and Lecture 2
LECTURE 3	Derivation of PDE by elimination method of arbitrary functions
LECTURE 4	Solution of linear first order partial differential equations (Lagrange method)
TUTORIAL 2	Examples and exercises related to Lecture 3 and Lecture 4
LECTURE 5	Integral surfaces passing through a given curve
LECTURE 6	The Cauchy Problem for first order PDE
TUTORIAL 3	Examples and Exercises related to Lecture 5 and Lecture 6
LECTURE 7	Lagranges linear PDE of first order
LECTURE 8	Lagranges non-linear PDE of first order
TUTORIAL 4	Exercises related to Lecture 7 and Lecture 8
Unit II	
LECTURE 9	Compatible systems of first order partial differential equations
LECTURE 10	Examples of compatible systems of first order partial differential equations
TUTORIAL 5	Exercises related to Lecture 9 and Lecture 10
LECTURE 11	Charpits method for solving first order non linear Partial differential equations
LECTURE 12	Examples of Charpits method
TUTORIAL 6	Exercises related to Lecture 11 and Lecture 12
LECTURE 13	Classification of second order Partial Differential Equations
LECTURE 14	Canonical form for Elliptic equations
TUTORIAL 7	Exercise and examples related to Lecture 13 and Lecture 14
LECTURE 15	Canonical form for Parabolic equations
LECTURE 16	Canonical form for Hyperbolic equations
TUTORIAL 8	Exercises related to Lecture 15 and Lecture 16
Unit III	
LECTURE 17	Laplace Equation and its derivation
LECTURE 18	Boundary value Problems
TUTORIAL 9	Exercises related to Lecture 17 and Lecture 18
LECTURE 19	Properties of Harmonic functions
LECTURE 20	Spherical mean

TUTORIAL 10	Exercises related to Lecture 19 and Lecture 20
LECTURE 21	Mean Value theorem
LECTURE 22	Maximum-Minimum Principle and its applications
TUTORIAL 11	Exercises related to Lecture 21 and Lecture 22
LECTURE 23	Separation of variables
LECTURE 24	Dirichlet and Neumann problem for a rectangle
TUTORIAL 12	Exercises related to Lecture 23 and Lecture 24
Unit IV	
LECTURE 25	Occurrence of the Diffusion Equation
LECTURE 26	Elementary solutions of the diffusion equation
TUTORIAL 13	Examples and exercises related to Lecture 25 and Lecture 26
LECTURE 27	Boundary equations
LECTURE 28	Examples of Boundary equations
TUTORIAL 14	Exercises related to Lecture 27 and Lecture 28
LECTURE 29	Dirac Delta function
LECTURE 30	Examples of Dirac Delta function
TUTORIAL 15	Examples and exercises related to Lecture 29 and Lecture 30
LECTURE 31	Separation of variables method
LECTURE 32	Examples of separation of variables method
TUTORIAL 16	Examples and exercises related to Lecture 31 and Lecture 32
Unit V	
LECTURE 33	Wave Equation: Derivation of one dimensional wave equation
LECTURE 34	Initial value problem of Cauchy's type
TUTORIAL 17	Exercises related to Lecture 33 and Lecture 34
LECTURE 35	D'Alembert's solution
LECTURE 36	Vibrating string-variables separable solution
TUTORIAL 18	Exercises related to Lecture 35 and Lecture 36
LECTURE 37	Boundary and initial value problems for two-dimensional wave equations-eigenfunction method
LECTURE 38	Examples related to Lecture 37
TUTORIAL 19	Exercises related to Lecture 37 and Lecture 38
LECTURE 39	Uniqueness of solution for the wave equation
LECTURE 40	Examples related to Lecture 39
TUTORIAL 20	Exercises related to Lecture 39 and Lecture 40
Total Lectures: 40 Total Tutorials: 20 Total = 60	

Text book:

K Sankara Rao, Introduction to partial differential equations, Prentice Hall of India, 2nd Edition, New Delhi, 2007.

Reference books:

1. Renardy and Rogers, An introduction to PDEs, Springer-Verlag, 1999.
2. Smoller, Shock Waves and reaction-diffusion equations, second edition, 1994.
3. Kevorkian, Partial Differential equations, Wadsworth and Brooks/ cole
4. F John, Partial differential equations
5. L C Evans, Partial differential equations, AMS, 1998.
6. B Folland, Introduction to partial differential equations.
7. D Gilbarg and N S Trudinger, Elliptic Partial differential equations of second order.
8. W A Strauss, Partial differential equations, An Introduction, Wiley, John and sons 1992.
9. B P Parashar, Differential and Integral equations, Oscar Publication