

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Partial Differential Equations
2.	Course Number	MA6024
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mathematics
8.	To take effect from	July 2019
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	Course Objective: To introduce PDEs such as Laplace, heat and wave equations. To learn classifications of second-order PDEs. To introduce various methods to solve first order, second order, linear, quasi-linear and non-linear PDEs.	
12.	Course Content: First order PDE: Linear, quasi-linear and non-linear PDE Initial-Value Problem, Homogenous and nonhomogeneous problem, Fundamental solution, Green's Function, Energy methods, mean value formula, Transport, Laplace, heat and wave equations. D'Alembert's solution, Fourier method, Poisson integral formula, PDE problems in Cartesian and polar coordinates on rectangular, circular and annular regions. Non-linear PDE: Complete Integrals, Envelopes, Characteristic ODE, Hamilton-Jacobi equation, conservation laws, weak solution, uniqueness, Riemann problem. Second Order PDE: Classifications – elliptic, parabolic, hyperbolic, canonical forms of equations in two independent variables, Lax-Milgram theorem, maximum-minimum principles, regularity. Applications: Diffusion and wave equations in higher dimensions and a few industry and engineering applications.	
13.	Text book(s): 1. R.C. McOwen, <i>Partial Differential Equations: Methods and Applications</i> , Pearson, (2002). 2. G. B. Folland, <i>Introduction to Partial Differential Equations</i> , Princeton University Press, (1996).	
14.	Reference(s): 1. F. John, <i>Partial Differential Equations</i> , Springer, (1991). 2. L. C. Evans, <i>Partial Differential Equations</i> , American Mathematical Society, (2010). 3. I. P. Stavroulakis, S. A. Tersian, <i>Partial Differential Equations-An Introduction with Mathematica and Maple</i> , World-Scientific, Singapore, (1999). 4. J. Cooper, <i>Introduction to Partial Differential Equations with Matlab</i> , Birkhauser, (1998). 5. I. N. Sneddon, <i>Elements of Partial Differential Equations</i> , McGraw-Hill, New York, (1986).	