

MA2020 Differential Equations

Tentative Course Plan for about 42 Hours

TEXT BOOKS

1. Advanced Engineering Mathematics, Erwin Kreyszig (EK)
2. Differential and Integral calculus, N Piskunov Vol II (NP)

Book	Topics to be covered	# Classes
Ordinary Differential Equations (ODE)		
NP (1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10)	First Order ODE – Definition, Statement of existence and uniqueness solution, separable variables, homogeneous, non-homogeneous, linear, Bernoulli's equation, exact equation, Integrating factors	3*
NP (1.20, 1.21, 1.22, 1.23, 1.24, 1.30)	Second and Higher Order Equations – Homogeneous and non-homogeneous linear equations and linear systems with constant coefficients	6
EK (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8)	Series Solutions – Power series method, Legendre Equation and Legendre polynomials, Frobenius method, Bessel's Equation and Bessel function, Sturm-Liouville problem, Orthogonal eigen function expansions	12
Partial Differential Equations (PDE)		
	First Order PDE	2
EK Pages 597 & 598	Second Order PDE – Classification, Canonical forms	2
EK' (11.4, 11.3, 11.8)	Wave (hyperbolic) Equation – D'Alembert's solution, Separation of variables, 2D wave equation,	5
EK (11.5)	Heat (parabolic) Equation – 1D Unsteady heat flow, non-homogenous case	5
EK (11.5, 11.9, 11.10)	Laplace (elliptic) Equation – Steady heat flow in 2D, Polar coordinates, circular membrane, cylindrical and spherical coordinates	5

1. The above course plan is tentative and we will review, may be, once in every two weeks
2. There are about 13 classes before the Quiz 1, therefore we must cover until Legendre polynomials
3. We may have to circulate some notes for 1st order PDE
4. Assignment sheets? (I don't remember there exists any assignment sheets for this course if any body have some please help me)
5. If needed time to time we may make use of moodle (<http://courses.iitm.ac.in/moodle/>) for general announcements to the students and emails between us

*Students are expected to be familiar with first order ODE already, therefore this part is only like revision