National University of Computer & Emerging Sciences, Karachi
Spring-2022 FAST School of Computing
MT-1006 Differential Equations

Course Content for Final Exam

Contents/Topics	Questions	% included in final Exam
1st Order DE Basic concepts, formation and solution of differential equations Initial value problems, Boundary value problem	1.1 (1-8, 11-14, 21-24, 31-40, 51) 1.2 (1-16, 39-44)	
Solution of 1st order ODE's Separable variables Method Linear Equations Exact Equations Non-Exact Equations	2.2 (1-28), 2.3 (1-40) 2.4 (1-26,31-36)	30%
Solution by Substitution Homogeneous Differential Equations Bernoulli's DE (reducible to linear equations) Riccati.	2.5 (1-30)	
1st Order ODE's arising from real life	3.1 (2-4, 13-15, 31-33) 3.2 (1-4)	
2nd and Higher Order DE Initial and Boundary value problem, Existence of a unique solution. Homogeneous DEs', Linear Dependence and Independence. Wronskian and non-homogeneous Linear Differential Equation	4.1 (1-4, 7, 8, 13-34)	
Reduction of order. Homogeneous Linear Equations with Constant Coefficients. Undetermined Coefficients-Superposition approach Undetermined Coefficients-Annihilator approach. Variation of parameters. Cauchy Euler equation.	4.2 (1-16) 4.3 (15-40, 49-55) 4.4 (1-22, 27-30, 37-40) 4.5 (45-57, 65-68) 4.6 (1-22) 4.7 (1-14, 19-30)	30%
Orthogonal Functions and Fourier Series Orthogonal Functions Fourier Series Fourier Cosine & Sine Series	(DE with BVP book) 11.1 (1-12, 19-24) 11.2 (1-16) 11.3 (1-19)	
Partial Differential Equations Basic concepts of Partial differential equations. Linear homogeneous partial differential equations Heat Equation. Wave Equation.	(DE with BVP book) 12.1 (1-25) 12.3 (1-6) 12.4 (1-6)	40%