Department of Mathematics
Faculty of Sciences, Jamia Millia Islamia

U. G. Minor Papers in Mathematics
(2024-25)
Course Structure and Syllabus

Semester	Code	Title of the Paper	Credit
II	24MATM151	Ordinary Differential Equations	4

24MATM151	**Ordinary Differential Equations**
Unit-I	Formulation of differential equations, Order and degree of a differential equation, Equations of first order and first degree, Method of separation of variables, Homogeneous equations, Linear equations, Bernoulli equations, Exact differential equations.
Unit-II	Equations of the first order and higher degree, Equations solvable for p, y and x, Clairaut's & Lagrange's equations, Orthogonal trajectories. Applications of first order differential equations to electric circuits and growth/decay models.
Unit-III	Linear differential equations of 2^{nd} order with constant coefficient, Method of auxiliary equation, Complementary function and particular integral. Operator method for finding particular integral for functions of the form e^x, $\sin ax$, $\cos ax$, x^m and $e^{ax}V(x)$, Euler-Cauchy equations.
Unit-IV	Linear differential equations of second order, Complete solution in terms of a known integral belonging to the complementary function, Method of order reduction (Normal form), Solution using change of independent variable, Method of undetermined coefficients, Method of variation of parameters.

Books Recommended

1. Dennis G. Zill: *A First Course in Differential Equations with Modelling Applications,* Cengage Learning; 11th Edition, 2019.
2. G.F. Simmons: Differential Equations with Applications and Historical Notes, 3rd edition, CRC press, Taylor & Francis, 2017.
3. S. L. Ross: *Differential equations*, John Wiley and Sons, 2004.
4. Zafar Ahsan: *Textbook of Differential Equations and their Applications*, 2nd Edition, Prentice Hall of India, 2012.
5. Khalil Ahmad: *Textbook of Differential Equations*, World Education Publishers, 2012.