

Course Objectives

To introduce students the theory and concepts of differential equations, linear algebra, Laplace transformations and Fourier series which will equip them with adequate knowledge of mathematics to formulate and solve problems analytically.

Faculty

Dr. S. S. Bhatia, Dr. Satish Kumar Sharma, Dr. Ankush Pathania, Dr. Sapna Sharma, Dr. Jatinderdeep Kaur, Dr. Sumit Chandok, Dr. Vivek, Dr. Parimita Roy, Dr. Anuj Kumar, Dr. Parmod Kr. Vaishnav, Dr. Rajesh Dhayal.

Lectures	Topic	Sections	Text Book
1-12	Ordinary Differential Equations:		
	Review of first order differential equations	1, 2, 7	G. F. Simmons
	Exact differential equations	8-10	
	Second and higher order differential equations	14, 15	
	Solution techniques using one known solution	16	
	Homogenous equation with constant coefficients	17	
	Cauchy - Euler equation	17 (Problem 5)	
	Method of undetermined coefficients	18	
	Variation of parameters method	19	
	Engineering applications of differential equations	20	
13-23	Laplace Transforms:		
	Definitions and existence of Laplace transforms, Laplace transforms of standard functions, First shifting property, Properties of Laplace transforms, Inverse Laplace transform, Unit step function, Impulse function, Applications to solve initial and boundary value problems.	48-53	G. F. Simmons
24-28	Fourier Series:		
	Introduction, Fourier series on arbitrary intervals	9.1, 9.2	Jain and Iyengar
	Half range expansions	9.3	
	Applications of Fourier series to solve heat and wave equations	9.5.3, 9.5.4	
29-39	Linear Algebra:		
	Row reduced echelon form, solution of system of linear equations, matrix inversion	5.7-5.9	V. K. Krishnamurthy et al.
	Linear spaces, subspaces, and span	3.1-3.3	
	Linear independence and dependence	3.5	
	Basis and dimension	3.6	
	Linear transformation and its matrix representation	4.1, 5.1, 5.2	Jain and Iyengar
	Inner product spaces, Gram-Schmidt orthogonalisation process	7.2, 7.3	
	Eigen values, eigen vectors, diagonalization	3.5.1, 3.5.2	

Text Books:

1. R. K. Jain, S. R. K. Iyengar, *Advanced Engineering Mathematics*, 11th edition, Narosa Publishing House (2011).
2. V. K. Krishnamurthy, V. P. Mainra and J. L. Arora, *An introduction to Linear Algebra*, Affiliated East West Press (1976).
3. G. F. Simmons, *Differential Equations (With Applications and Historical Notes)*, 2nd edition, Tata McGraw Hill (2009).

Reference Book:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 8th edition, John Wiley (2006).

Evaluation Scheme:

Sr. No.	Evaluation Element	Weightage (%)
1.	Written Test	70
2.	Sessionals (may include assignments or quizzes)	30