Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS31	**Applied Mathematics-I**	3	1	--	3	1	--	4
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% Weightage)			

Course Objectives:

- To familiarize learners with mathematical tools and methods to solve engineering problems.

Course Outcomes:

Pre-requisite course codes		BS11 (Engineering Mathematics I) BS21 (Engineering Mathematics II)
After successful completion of the course, student will be able to		
Course Outcomes	**CO1**	Check analyticity of function of complex variables
	CO2	Find Laplace and Inverse Laplace Transforms
	CO3	Apply Laplace and Laplace Inverse methods to solve differential equations with initial conditions
	CO4	Expand functions in terms of sine and cosine series on the given interval
	CO5	Evaluate Z-transform and Inverse Z-transform
	CO6	Formulate and solve Linear Programming Problem arising in engineering

Module No.	Module name	Unit No.	Topics	Ref	Hrs.
1	**Complex Variables**	1.1	Analytic functions, Cauchy Riemann equations in Cartesian coordinates and Polar coordinates.	1,2	03
		1.2	Harmonic functions, Analytic method and Milne Thomson methods to find f(z), Orthogonal trajectories.		04
2	**Laplace & Inverse Laplace Transform**	2.1	Definition of Laplace transform, Laplace transform of constant, trigonometric, exponential functions.		02
		2.2	Properties of Laplace transform: First shifting theorem, Laplace transform of $L\{t^n f(t)\}, L\{f(t)/t\}, L\{\frac{d^n}{dt^n} f(t)\}, L\{\int_0^t f(u)du\}, L\{f(at)\}$ without proof.	2,4	04

		2.3	Inverse Laplace transform with Partial fraction and Convolution theorem (without proof).		04
		2.4	Application to solving Differential Equations with given initial conditions.		02
3	**Fourier series**	3.1	Introduction to Fourier Series, Dirichlet's conditions of convergences, Fourier series of periodic functions with period 2π and 2L.	1,2, 3	04
		3.2	Fourier series for even and odd functions		02
		3.3	Half range sine and cosine Fourier series, Parsevel's identities (without proof).		02
		3.4	Orthogonal and Orthonormal functions, Complex form of Fourier series.		02
4	**Z transform**	4.1	Z-transform of standard functions such as $Z(a^n)$, Z(cos ak), Z(sin ak), etc.	1,2	01
		4.2	Properties of Z-transform :Linearity, Change of scale, Shifting property, Multiplication of K, Initial and final value, Convolution theorem (all without proof).		02
		4.3	Inverse Z transform: Method of Partial fraction.		02
5	**Mathematical Programming**	5.1	Introduction to Linear Programming problems and its formulation. Graphical method to solve LPP in two variables, Simplex method to solve LPP	2,3, 5	03
		5.2	Artificial variables, Big –M method (method of penalty). Revised and two phase simplex methods.		03
		5.3	Duality, Dual simplex method.		02
				Total	**42 hrs**

NOTE: ISE component will be evaluated through assignments conducted in the tutorial sessions(tutorials will be conducted class –wise)

References:

[1] Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley
[2] C. Ray Wylie & Louis Barrett, "Advanced Engg. Mathematics",6th Edition, New York : McGraw-Hill, c1995.
[3] K. B. Datta, "Mathematical Methods of Science and Engineering", First edition, Cengage Learning India, 2011
[4] M. R. Spiegel, "Laplace Transforms", McGraw-Hill Education (1 January 1965)
[5] David G. Luenberger," Introduction to Linear and Nonlinear Programming", Addison-Wesley Publishing Company