



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)		

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	Evaluate Laplace and Inverse Laplace transform of functions using various properties.
	CO2	Solve differential equations with given initial conditions using Laplace and Laplace Inverse.
	CO3	Expand functions in terms of sine and cosine series on the given interval.
	CO4	Find Fourier transforms by applying its various properties
	CO5	Check for a function being analytic using Cauchy-Reimann equations and construct analytic functions.
	CO6	Construct Bilinear Transformations and find images under Conformal mappings

Module No	Module Name	Unit No	Topics	Ref	Hours
1	Laplace Transform	1.1	Definition of Laplace Transform, LT of e^{at} , $\sin(at)$, $\cos(at)$, $\sinh(at)$, $\cosh(at)$, $\operatorname{erf}(t)$.	1,2,3,4	03
		1.2	Properties of Laplace Transform: Linearity, change of scale, first shifting theorem, second shifting theorem, multiplication by t, division by t, Laplace Transform of derivatives and integrals.		06
2	Inverse Laplace Transform, Special Functions and Applications of Laplace	2.1	Inverse Laplace Transform using Partial fraction method, Convolution theorem (without proof), differentiation and integration property.	1,2,3,4	04
		2.2	Laplace of Heavi-side unit step, dirac-delta function, LT of periodic function		03
		2.3	Applications of Laplace Transforms to find solution of ordinary differential equations and simultaneous differential equations.		03



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3	Fourier Series and Fourier Transforms	3.1	Introduction to Fourier Series, Dirichlet's condition of convergences, Euler's formulae	1,2,3,4	02
		3.2	Fourier series of algebraic, exponential, trigonometric functions ,half range sine and cosine series, Parsevals Identity. Complex form of Fourier series. Differentiation and Integration of Fourier Series.		05
		3.3	Fourier Transforms, Inverse Fourier Transforms and its applications		06
4	Complex Variable	4.1	Definition of analytic function, Cauchy Reiman equations in Cartesian and polar form. Constructing analytic function by Milne Thompson and analytic method.	1,2,3,4	05
		4.2	Harmonic functions, orthogonal trajectories		02
		4.3	Conformal Mappings		03
Total					42 Hrs

References:

1. Kreyszig, "Advanced Engineering Mathematics, 9th edition", John Wiley
2. H.K.Dass, "Advanced Engineering Mathematics", 28th edition, S.Chand, 2010
3. Grewal B.S., "Higher Engineering Mathematics", 38th edition, Khanna Publication
4. Jain and Iyengar, "Advanced Engineering Mathematics", 4th edition, Narosa Publishing House, Pvt. Ltd, 2014