

Course Code	21MAB201T	Course Name	TRANSFORMS AND BOUNDARY VALUE PROBLEMS	Course Category	B	Basic Sciences	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics	Data Book / Codes / Standards	Nil		

Course Learning Rationale (CLR):		The purpose of learning this course is to:												Program Specific outcomes		
CLR-1 :	Analyze partial differential equations, and interpret the solutions related to PDE in engineering problems.	1	2	3	4	5	6	7	8	9	10	11	12			
CLR-2 :	Compute the Fourier series expansion and express the sine and cosine series.															
CLR-3 :	Analyze one-dimensional wave and heat equations using PDE and Fourier series concepts.															
CLR-4 :	Analyze Fourier transforms and their properties.															
CLR-5 :	Analyze Z transform for solving discrete-time Signal problems.															
Course Outcomes (CO):		At the end of this course, learners will be able to:														
CO-1:	Construct and solve partial differential equations using various techniques.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2:	Explain the Fourier series expansion of a function in terms of sine and cosine series.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-3:	Identify partial differential equations and utilize Fourier series techniques to solve one dimensional wave and heat equations.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-4:	Apply Fourier transforms techniques in signal analysis.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-5:	Solve discrete-time signal problems using Z transforms.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

Unit-1 - Partial Differential Equations	12 Hour
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Formation of partial differential equations by eliminating arbitrary constants & arbitrary functions- Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous types.	
Unit-2 - Fourier Series	12 Hour
Dirichlet's conditions – General Fourier series – Odd and even functions - Half range sine and cosine series - Parseval's identity – Harmonic Analysis	
Unit-3 - Applications of Partial differential equations	12 Hour
Classification of second order partial differential equations - Method of separation of variables – Solutions of one dimensional wave equation - One dimensional equation of heat conduction (Insulated edges excluded) - Steady state condition with zero boundary - Steady state condition with non-zero boundary conditions	
Unit-4 - Fourier Transforms	12 Hour
Fourier transform pair – Properties -Fourier sine and cosine transforms – Properties– Transforms of simple functions - Convolution theorem (without proof) – Parseval's identity.	
Unit-5 - Transforms	12 Hour
Z - transforms – Properties of Z transforms – Inverse Z transforms – Convolution theorem (without Proof) – Solution of linear difference equations with constant coefficients using Z-transform	

Learning Resources	1. Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2015.	5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, New Delhi, 10th edition, 2016.
	2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.	6. Kandasamy P., etal. Engineering Mathematics, Vol.II & Vol.III (4 th revised edition), S. Chand & Co., New Delhi, 2000
	3. Veerarajan T., Transforms and Partial Differential Equations, Tata McGraw-Hill, New Delhi, 3rd edition, 2012.	
	4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 2010 3rd Edition.	

Learning Assessment							
	Bloom's Level of Thinking	Continuous Learning Assessment (CLA)				Summative Final Examination (40% weightage)	
		Formative CLA-1 Average of unit test (50%)		Life-Long Learning CLA-2 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	-	20%	-	20%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	30%	-	30%	-	30%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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