

MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

Department of Civil Engineering

Name of the Subject	TRANSFORM & PARTIAL DIFFERENTIAL EQUATIONS	Name of the handling Faculty	Mr K.Ramamoorthy
Subject Code	MA8353	Year / Sem	II/III
Acad Year	2021-2022	Batch	2020-2024

Course Objective

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Course Outcome-On successful completion of this course, the student will be able to

- Understand how to solve the given standard partial differential equations.
- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations
- Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering
- Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

Lesson Plan

Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I-PARTIAL DIFFERENTIAL EQUATIONS							
1	Formation of partial differential equations – Singular integrals	R3	1	BB	L4	CO1	PO1,
2	Solutions of standard types of first order partial differential eq	R3	1	BB	L4	CO1	PO1,PO2
3	Lagrange’s linear equation	R3	2	BB	L4	CO1	PO1,PO3
4	Linear partial differential equations of second and higher order with constant coefficients of homogenous equation	R3	1	BB	L4	CO1	PO2
5	Linear partial differential equations of second and higher order with constant coefficients of non- homogenous	R3	1	BB	L4	CO1	PO3
6	Tutorial	R3	2	BB	L4	CO1	

Suggested Activity: Assignment given

Evaluation method: Evaluation of Assignment

UNIT II-FOURIER SERIES

7	Dirichlet's conditions, General fourier series	R3	2	BB	L5	CO2	PO1,PO2
8	Odd and even functions	R3	2	BB	L5	CO2	PO2,PO4
9	Half range sine series	R3	2	BB	L5	CO2	PO1, PO2,PO3
10	Half range cosine series	R3	2	BB	L5	CO2	PO3,PO4
11	Complex form of Fourier series	R3	2	BB	L5	CO2	PO1,PO5
12	Parseval's identity	R3	3	BB	L5	CO2	PO3,PO4
13	Harmonic analysis	R3	2	BB	L5	CO2	PO5

Suggested Activity: Assignment given

Evaluation method: Evaluation of Assignment										
UNIT III-APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS										
14	Classification of PDE	R3	2	BB	L1	CO3	PO1, PO2			
15	classification of pde based problems	R3	2	BB	L1	CO3	PO3			
16	Fourier Series Solutions of one dimensional wave equation	R3	2	BB	L1	CO3	PO1,PO3			
17	One dimensional equation of heat conduction	R3	2	BB	L1	CO3	PO2,PO3			
18	Steady state solution of two dimensional equation of heat conduction	R3	1	BB	L1	CO3	PO1,PO2			
19	Tutorial	R3	1	BB	L1	CO3				
Suggested Activity: Assignment given										
Evaluation method: Evaluation of Assignment										
UNIT IV- FOURIER TRANSFORMS										
20	Statement of Fourier integral theorem	R3	2	BB	L2	CO4	PO1.PO2			
21	Fourier transform pair	R3	2	BB	L2	CO4	PO1,PO2			
22	Fourier sine and cosine transforms	R3	2	BB	L2	CO4	PO3,PO4			
23	Properties of fourier Transform	R3	2	BB	L2	CO4	PO1,PO3			
24	Transforms of simple functions	R3	2	BB	L2	CO4	PO2,PO4			
25	Convolution theorem	R3	1	BB	L2	CO4	PO2			
26	Parseval’s identity.	R3	1	BB	L2	CO4	PO5			
Suggested Activity: Assignment given										
Evaluation method: Evaluation of Assignment										
UNIT V-Z - TRANSFORMS AND DIFFERENCE EQUATIONS										
27	Z-transforms - Elementary properties	R3	2	BB	L3	CO5	PO1,PO2			
28	Inverse Z-transform (using partial fraction)	R3	2	BB	L3	CO5	PO1,PO2			
29	Inverse Z-transform (using residues)	R3	2	BB	L3	CO5	PO3,PO4			
30	Initial and final value theorems	R3	2	BB	L3	CO5	PO2			
31	Convolution theorem	R3	2	BB	L3	CO5	PO1,PO4			
32	Solution of difference equations using Z - transform.	R3	2	BB	L3	CO5	PO3			
33	Formation of difference equations	R3	2	BB	L3	CO5	PO4			
Text Books										
1	Grewal B.S., “Higher Engineering Mathematics”, 43rd Edition, Khanna Publishers, New Delhi, 2014.									
2	Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.									
Reference Books										
1	B.V Ramana., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.									
2	Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.									
3	G. James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.									
4	L.C Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.									
5	N.P. Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 201									
6	R.C. Wylie, and Barrett, L.C., “Advanced Engineering Mathematics “Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.									
Blooms Level										
Level 1 (L1) : Remembering		Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing				Higher Order Thinking	Projects / Mini Projects	
Level 2 (L2) : Understanding				Level 5 (L5) : Evaluating						
Level 3 (L3) : Applying				Level 6 (L6) : Creating						
Mapping syllabus with Bloom’s Taxonomy LOT and HOT										
Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total

Unit 1	PARTIAL DIFFERENTIAL EQUATIONS					6	0	0	0	0	0	6	0	6
Unit 2	FOURIER SERIES					0	0	0	0	7	0	0	7	7
Unit 3	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS					0	8	0	0	0	0	8	0	8
Unit 4	FOURIER TRANSFORMS					0	0	0	7	0	0	0	7	7
Unit 5	Z - TRANSFORMS AND DIFFERENCE EQUATIONS					0	0	6	0	0	0	6	0	6
Total						6	8	6	7	7	0	20	14	34
Total Percentage						17.64706	23.52941	17.64706	20.58824	20.58824	0	58.82353	41.17647	100
COs-POs Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	3	3	3	2	-	-	-	-	-	-	-	2	1
CO3	3	3	1	-	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	2	1
CO5	3	3	3	1	1	-	-	-	-	-	-	-	2	-
Avg	3	2.8	2.2	1.4	0.8	0	0	0	0	0	0	0	2	0.6
Justification for CO-PO mapping														
CO1	PO1 (3) - Graduate attains highly basic knowledge about Partial differantial Equations, PO2 (2) - Graduate will be able to analyze the problems on homogenous and non- homogenous equation higher order derivatives, PO3 (1) - Graduate will be development of solutions by standard types of first order of PDE													
CO2	PO1 (3) - Graduate attains basic knowledge of general Fourier Series, PO2 (3) - Graduate will be able to analyze a Fourier complex problems based on Dirichlet's conditions, PO3 (3) - Graduate will be designed and development of half and full range series with odd and even functions													
CO3	PO1 (3) - Graduate attains highly basic knowledge about PDE and its types, PO2 (3) - Graduate will be able to analyze One & Two dimentional wave equations problems by heat conduction applications, PO3 (1) - Graduate will be able to develop the steady state condition for heat conduction													
CO4	PO1 (3) - Graduate will be understanding knowledge on Fourier transform based integral theorem, PO2 (3) - Graduate will be able to analyze the problem by Fourier sine and cosine transform, PO3 (3) - Graduate will be development of solutions by Convolution theorem PO4 (3) - Graduate will be able to conduct the investigate the tranforms problem with simple and complex functions													
CO5	PO1 (3) - Graduate attains basic knowledge about Z-transforms & Inverse Z-transforms and its properties, PO2 (3) - Graduate will be able to analyze the problem using partial and residual Equations, PO3 (3) - Graduate will be develop a formation of difference equations by Z-transforms													
3		High level			2			Moderate level			1		Low level	
Name & Sign of Faculty Incharge :														
Name & Sign of Subject Expert :														
Head of the Department :														

Format No :231

