DEPARTMENT OF MATHEMATICS

Semester : V | **Integrated M.Sc. Mathematics** | **Academic Year : 2019-20**

Subject : 060090502 CC12 Integral Transforms

Teaching Schedule

Course Outcomes: Upon completion of the course student shall be able to

CO1: utilize Laplace Transform to a basic integrodifferential equation.

CO2: solve linear differential equations with constant coefficients and unit step input functions using the Laplace transform.

CO3: analyse applications of hyper geometric differential equations using Mellin transform.

CO4: identify specific application in signal analysis and Imagine Techniques using Mellin transform.

CO5: solve applications based on Cartesian Coordinates in one variable using Hankel Transform.

CO6: make a use of Hankel transforms to solve application of special functions.

CO7: understand how integral transforms can be used to solve a variety of differential equations.

Unit	Sub Unit	No. of Lect.(s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used	Active Learning Activities	Evaluation Parameter
Unit 1: Applications of Laplace Transforms							
[17]	1.1	4	Solution of ordinary Differential Equations, Formulation of integral equations	Ch#4 Debnath L., Integral Transforms & their Applications	Chalk & Talk	**For Slow Learner:** Students must write answer of question(s) given by teacher after completion of each method and verified by teacher to resolve any query of students. **For Advance Learner:** Student will solve exercise given in book after completion of Unit.	Unit Test -1 Assignment-1
	1.2	4	Solution by successive substitutions and successive approximations				
	1.3	4	Integral equations of convolution type and their solutions by Laplace transforms				
	1.4	3	Applications on harmonic oscillator in resisting and non – resisting medium				

Unit 2: Mellin Transforms and Their Applications							
[23]	2.1	2	Introduction, Definition	Ch#8 Debnath L., Integral Transforms & their Applications	Chalk & Talk	**For Slow Learner:** Students must write answer of question(s) given by teacher after completion of each method and verified by teacher to resolve any query of students. **For Advance Learner:** Student will solve exercise given in book after completion of Unit.	Unit Test -1 and 2 Assignment-1
	2.2	4	Basic operational properties of Mellin transforms				
	2.3	4	Convolution theorem				
	2.4	5	Inverse Mellin transforms				
	2.5	5	Applications of Mellin transforms				
Unit 3: Hankel Transforms							
[18]	3.1	2	Introduction, Definition	Ch#7, Ch#13 Debnath L., Integral Transforms & their Applications	Chalk & Talk	**For Slow Learner:** Students must write answer of question(s) given by teacher after completion of each method and verified by teacher to resolve any query of students. **For Advance Learner:** Student will solve exercise given in book after completion of Unit.	Unit Test -2 Assignment-2
	3.2	3	Operational properties of Hankel transforms				
	3.3	3	Inverse Hankel transforms				
	3.4	3	Finite Hankel transforms				
	3.5	4	Properties of finite Hankel transforms				
Unit 4: Applications of Hankel Transforms							
[17]	4.1	3	Applications of infinite Hankel transforms	Ch#7, Ch#13 Debnath L., Integral Transforms & their Applications	Chalk & Talk	**For Slow Learner:** Students must write answer of question(s) given by teacher after completion of each method and verified by teacher to	Internal Examination Assignment-2
	4.2	3	Applications of finite Hankel transforms				

	4.3	3	Applications on free vibration on different Membrane, Steady temperature,			resolve any query of students. **For Advance Learner:** Student will solve exercise given in book after completion of Unit.	
	4.4	3	Applications on Steady temperature				
	4.5	3	Applications on Potential of field				

Text books:

1. Debnath L., "Integral Transforms & their Applications", CRC press, New York, 2006

Reference books:

1. Sneddon I. N., "Special Functions of Mathematical Physics & Chemistry", Longman.
2. Zemanian A. H., "Generalized Integral Transformations", John Wiley & Sons, New York.
3. Andrews L. C. & Shivamoggi B. K., "Integral Transforms for Engineers", SPIE Press, Bellingham, 1999.
4. Andrews L. C. & Phillips. R. L., "Mathematical Techniques for Engineers & Scientists", PHI, New Delhi, 2006.

Course Objectives and Course Outcomes Mapping:

- To provide practice for of solving the real problem in scientific way using techniques of Different types of Transforms. CO1, CO2, CO3, CO7
- Understand the concept of time-bandwidth product and the need for a finite range of spectral components to support a "real" signal. CO4, CO5, CO6, CO7

Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcomes						
		CO1	CO2	CO3	CO4	CO5	CO6	CO7
1	Applications of Laplace Transforms	✓	✓					✓
2	Mellin Transforms and Their Applications			✓	✓			✓
3	Hankel Transforms					✓	✓	✓
4	Applications of Hankel Transforms					✓	✓	✓

Programme Outcomes (PO)

PO1: Knowledge

Provides knowledge about the fundamentals of pure, applied and computing mathematics and its applications to students that creates the opportunities in industries and research centers.

PO2: Core Competence

Creates competency in science and mathematics to formulate, analyses and solve problem and/or also to pursue advanced study or research.

PO3: Breadth

Trains students having good knowledge in unearth core of academia and industry by the roots of mathematics.

PO4: Evaluation

Imparts in students to raise trial and error-based curiosity and problem-solving functionality with research based advanced tutorial for higher level decision makings tools.

Programme Outcomes and Course Outcomes mapping:

Programme Outcomes	Course Outcomes						
	CO1	CO2	CO3	CO4	CO5	CO6	CO7
PO1	✓			✓		✓	✓
PO2		✓	✓		✓		
PO3		✓		✓		✓	
PO4			✓		✓		✓