Name of the Program	B.A. / B.Sc. (LIBERAL EDUCATION)			Year/ Semester:	3rd / 5th
Course Name	**Laplace Transform and Fourier Series**	Course Code:	MT303	Type:	Theory
Credits	04			Total Sessions Hours:	60 Hours
Evaluation Spread	**Internal Continuous Assessment:**	50 Marks		**End Term Exam:**	50 Marks
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objective of this course is to introduce the fundamental ideas of Laplace transform, Inverse Laplace transform and its applications in different fields. To understand concept of Fourier series and representation of Periodic signals. Fourier series is extended to a periodic signal in the form of Fourier transform.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*	
Course Outcome (CO)	**Attributes**
CO1	Student will be able to know the fundamental ideas of Laplace transform, and inverse Laplace transform.
CO2	They can use Laplace and Inverse Laplace transform to solve differential equations.
CO3	Student will be understood periodic function and Fourier series of periodic functions.
CO4	Learn the application periodic function and Fourier series of periodic functions in field of engineering to help society.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 20 Marks Activity: 10 Marks Class test: 05 Marks Online Test/Objective Test: 05 Marks Assignments/Presentation: 05 Marks Attendance: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	Introduction of Laplace transform, Linear Property of Laplace transform, Laplace transforms of elementary functions. First translation property or First shifting property, Second translation property or Heaviside's shifting property and Change of scale property. Laplace transforms of derivatives, Laplace transform of integral, Laplace transforms of function multiplication by t, Laplace transforms of function division by t. **Activity:** Create a working model of Laplace transform on chart paper.	15	CO1

Unit 2	Introduction to inverse Laplace transform. First translation property or First shifting property, Second translation property or shifting property and Change of scale property. Inverse Laplace transforms of derivatives, Inverse Laplace transforms of function multiplication by p, Inverse Laplace transforms of function division by p. Convolution Theorem. Solving first and second order ordinary differential equations simultaneous differential equations using Laplace transform. **Activity:** Create a working model of Inverse Laplace transform on chart paper.	15	CO2
Unit 3	Introduction to periodic functions and Fourier series for periodic function. Dirichlet's conditions for a Fourier series. Determination of Fourier coefficients (Euler's Formula). **Activity:** Assignment based on activity for fourier series.	15	CO3
Unit 4	Fourier series for discontinues functions, even and odd functions. Half range series, half period series, Parseval's Formula and Fourier series in Complex form. **Activity:** Assignment based on activity for fourier series in complex form.	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1					1			1		1			1
CO2	1					1			1					1
CO3	1					1			1					1
CO4	1				2	1	3		1	2	3	1		1

Strong contribution-3,   Average contribution-2 ,   Low contribution-1,

Suggested Readings:

Text- Books	1. Dass, H. K., Introduction to Engineering Mathematics (Volume II). Delhi: S. Chand & Company Pvt. Ltd. 2. Mittal, P. K., Differential equations and Transformation. Delhi: S. Chand Publication.
Reference Books	1. Goel M., Engineering Mathematics II. Delhi: University Science Press (An Imprint of Laxmi Publications Pvt. Ltd.) 2. Kreyszig, E., Advanced Engineering Mathematics. John Wiley and sons, Inc.

Para Text	**Unit 1:**
	  1. https://www.youtube.com/watch?v=CLrTj7D2fLM
	  2. https://www.youtube.com/watch?v=LS1GzGGpc1s
	
	Unit 2:
	  1. https://www.youtube.com/watch?v=D5cDPYVQMkA
	  2. https://www.youtube.com/watch?v=5uWsroxq_cI
	  3. https://www.youtube.com/watch?v=3ll t5wkulT8
	
	Unit 3:
	  1. https://www.youtube.com/watch?v=-7mJWY58vVE
	  2. https://www.youtube.com/watch?v=MZqiIA3zuZo
	
	Unit 4:
	  1. https://www.youtube.com/watch?v=7dideLU49ac
	  2. https://www.youtube.com/watch?v=8iocWnnp0Kc

Recapitulation & Examination Pattern		
Internal Continuous Assessment:		
Component	**Marks**	**Pattern**
Mid Semester	20	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **0.5 mark.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 marks**.
Activity	10	Will be decided by subject teacher.
Class Test	05	Contains **05 descriptive questions.** Each question carries **01** mark.
Online Test/ Objective Test	05	Contains **10 multiple choice questions.** Each question carries **0.5** mark.
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject teacher.
Attendance	05	As per policy.
Total Marks	**50**	

Course created by: **Dr. Sheeba Rizvi** **Dr. Toukeer Khan** **Signature:**	**Approved by: Prof. Nadeem Ur Rahman** **Signature:**