B.Sc. (Mathematics) (Part III) (Semester – V)
Choice Based Credit System with Multiple Entry and Multiple Exit Option (NEP-2020)
Syllabus to be implemented from Academic Year 2024-25

Course code	:	DSE – E12
Title of course	:	**Integral Transform**
Theory	:	32 Hrs. (40 lecturers of 48 min.)
Marks	:	50 (Credit: 02)

Course Learning Outcomes: This course will enable the students to:

CO1: understand meaning of Laplace Transform
CO2: apply properties of LT to solve differential equations.
CO3: understand relation between Laplace and Fourier Transform.
CO4: understand infinite and finite Fourier Transform.

Unit: 1 Laplace and Inverse Laplace Transform. **(20 Lect.)**

1.1 Laplace Transform:

1.1.1 Definitions: Piecewise continuity, Function of exponential order, Function of class A and Laplace transform.

1.1.2 Existence theorem of Laplace transform.

1.1.3 Laplace transform of standard functions.

1.1.4 First shifting theorem, Second shifting theorem and Change of scale property.

1.1.5 Laplace transform of derivatives, Laplace transform of integrals.

1.1.6 Effect of Multiplication, Effect of division.

1.1.7 Laplace transform of periodic functions.

1.1.8 Laplace transform of Heaviside's unit step function and Dirac delta function.

1.1.9 Examples based on 1.1.1 to 1.1.8

1.2 Inverse Laplace Transform:

1.2.1 Inverse Laplace transform.

1.2.2 Standard results of inverse Laplace transform.

1.2.3 First shifting theorem, Second shifting theorem and Change of scale property.

1.2.4 Inverse Laplace transform of derivatives, inverse Laplace transform of integrals.

1.2.5 The Convolution theorem.

1.2.6 Effect of multiplication and division.

1.2.7 Inverse Laplace by partial fractions.

1.2.8 Examples based on 1.2.1 to 1.2.7

(20 Lect.)

Unit 2 Fourier Transform

2.1.1 Infinite Fourier transform.

2.1.2 Infinite Fourier sine and cosine transform.

2.1.3 Infinite inverse Fourier sine and cosine transform.

2.1.4 Relationship between Fourier transform and Laplace transform.

2.1.5 Change of Scale Property, Modulation theorem.

2.1.6 The Derivative theorem, Extension theorem.

2.1.7 Convolution theorem.

2.1.8 Finite Fourier sine and cosine transform.

2.1.9 Finite inverse Fourier sine and cosine transform.

2.1.10 Examples based on 2.1.1 to 2.1.9.

Recommended Books:

1. J. K.Goyal, K.P.Gupta, Laplace and Fourier Transform, A Pragati Prakashan, Meerut, 2016.

Scope of Syllabus:

Unit 1: Part I: 1.0 to 1.6, Part II: 1.0 to 1.3.

Unit 2: Part I: 2.0 to 2.3, Part II: 2.0 to 2.1.

Reference Books:

1. Dr. S. Sreenadh, Fourier series and Integral Transform, S.Chand, New Delhi, 2021
2. B.Davies, Integral Transforms and Their Applications, Springer Science, 2017.
3. Murray R. Spiegel, Laplace Transforms, Schaum's outlines , 2018.