Semester	III	Corse Title	Engineering Mathematics-III	Course Code	18MAT-31
Teaching Period	50 Hours	L – T – P – TL	2 - 1 - 0 - 3	SEE	3 Hours
CIE	40 Marks	SEE	60Marks	Total	100 Marks
CREDITS - 03					

Course objectives:

- To have an insight into Fourier series, Fourier transforms, Laplace transforms, Difference equations and Z-transforms.
- To develop the proficiency in variational calculus and solving ODE's arising in engineering applications, using numerical methods.

:: Module-1 :(10 Hours)

Laplace Transforms: Definition and Laplace transform of elementary functions. Properties of Laplace transforms(without proof). Laplace transforms of Periodic functions (statement only) and unit-step function – problems.
Inverse Laplace Transforms: Inverse Laplace transform - problems, Convolution theorem to find the inverse Laplace transform (without proof) and problems, solution of linear differential equations using Laplace transforms.
RBTL – L1, L2

:: Module-2 :: (10 Hours)

Fourier series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions period 2π and arbitrary period 2l. Fourier series of even and odd function. Half range Fourier series. Practical harmonic analysis, examples from engineering field.
RBTL –L1, L2

:: Module-3 :: (10 Hours)

Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms, simple problems.
Difference Equations and Z-Transforms: Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping and shifting rules, initial value and final value theorems (without proof) and problems, Inverse z-transforms, simple problems.
RBTL –L1, L2

:: Module-4 :: (10 Hours)

Numerical Solutions of Ordinary Differential Equations (ODE's): Numerical solution of ODE's of first order and first degree- Taylor's series method, Modified Euler's method. Runge - Kutta method of fourth order, Milne's and Adam's- Bashforth predictor and corrector method (No derivations of formulae), Problems.
RBTL –L1, L2

:: Module-5 :: (10 Hours)

Numerical Solution of Second Order ODE's: Runge -Kutta method and Milne's predictor and corrector method (No derivations of formulae)-Problems.
Calculus of Variations: Variation of function and functional, variational problems, Euler's equation, Geodesics, hanging chain, problems.
RBTL –L1,L3
L1-Understanding, L2-Remembering, L3-Applying.

Course outcomes:

At the end of the course the student will be able to:

1. CO1: Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
2. CO2: Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
3. CO3: Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
4. CO4: Solve first and second order ordinary differential equations arising in engineering problems by applying single step and multistep numerical methods.
5. CO5: Determine the extremals of functionals using the calculus of variations and solve problems arising in the dynamics of Rigid bodies and vibration analysis.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.

The students will have to answer five full questions, selecting one full question from each module.

Textbooks

1. Advanced Engineering Mathematics, E. Kreyszing, John Wiley & Sons, 10th Edition, 2016.

2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.

Reference Books

1. Higher Engineering Mathematics, B.V. Ramana, McGraw-Hill, 11th Edition, 2010.

2. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 2014.