MTH 223.3 Engineering Mathematics IV (3-2-0)

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

1 To understand complex variable.
2 To apply concepts of Fourier and Z-transform in the signal processing.
3 To study wave and diffusion equations in cartesian, cylindrical, and polar coordinates.
4 To provide basic knowledge of Linear Programming.

Course Contents:

1. Analytical Solid Geometry (4 hrs)

Curves in space, Tangent line, and tangent plane, Ellipsoid, hyperboloids, and para boloids, Projection of area.

2. The Fourier Integral (8 hrs)

Review of Fourier series. Fourier integral and inversion formula, Frequency and phase spectra, Fourier analysis of step and delta function.

3. Complex Variables (8 hrs)

Review of the complex number system, Function of a complex variable, Taylor series and Laurent series. Singularities and poles, Complex integration, Residues.

4. Partial Differential Equations (10 hrs)

The diffusion equation in Cartesian coordinates, separation of variables, The wave equation in Cartesian coordinates, separation of variables, the Laplacian in cylindrical coordinates and Bessel's equation, The Laplacian in spherical coordinates and Legend's equation, Engineering applications.

5. The Z-Transform (8 hrs)

Region of convergence, relationship to causality, Properties of Z-transform, Single sided and double sided Z-transform and its applications, Convolution and the product of transforms, Inverse of Z-transform, Praseval's theorem, Solution of difference equations.

6. Linear Programming (7 hrs)

The simplex method, objective function and constraint conditions, changing inequalities to equalities, the conical form, of solution, optimal values of variables.

Reference :

1. E. Kreyszig, *Advanced Engineering Mathematics,* Wiley-Eastern Publication.
2. A.V. Oppenheim, *Discrete-Time Signal Processing,* Prentice Hall, India Limited, 1990.
3. K. Ogata, *Discrete-Time Control Systems,* Prentice Hall, India Limited, 1993.