MATHEMATICS-III

General Course Information:

Course Code: **BSC/7-T** Course Credits: 3.0 Mode: Lecture (L) Type: Program Core Teaching Schedule L T P: 3 0 0 Examination Duration: 3 hours	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Three minor tests, each of 20 marks, will be conducted. The third minor will be conducted in open book mode by the Course Coordinator. No date sheet will be issued for the third minor at the level of the Departments. For the purpose of internal assessment, the average of the highest marks obtained by a student in any two minor examinations will be considered. All the minor examination question papers will be prepared and evaluated by following the Outcome Based Education framework. Class Performance will be measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks). The end semester examination will be of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Define concepts and terminology of Fourier series and Fourier transforms, Functions of complex variables, Power Series and, Probability distributions and hypothesis testing.	**L1(Remembering)**
CO2.	Solve problems using Fourier transforms in domains like digital electronics and image processing.	**L2 (Remembering)**
CO3.	Apply mathematical principles to solve computational problems	**L3(Apply)**
CO4.	Compare various probability distributions	**L4(Analysis)**
CO5.	Select suitable hypothesis testing methods for given problems and interpret the respective outcomes.	**L5(Evaluating)**
CO6.	Integrate the knowledge of Fourier series and Fourier transforms, Functions of complex variables, Power Series and, Probability distributions and hypothesis testing for solving real world problems.	**L6(Creating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

Course Content

UNIT- I

Fourier Series and Fourier Transforms: Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

UNIT-II

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac delta function.

Linear Programming Problem (LPP): Introduction, Formulation of linear programming problem (LPP); Graphical method for its solution; Standard form of LPP; Basic feasible solutions; Simplex Method and Dual Simplex Method for solving LPP.

UNIT-III

Functions of Complex Variable: Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity. Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions.

UNIT-IV

Complex integral, Cauchy Goursat theorem (without proof), Cauchy integral formula (without proof), Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi-circle only).

Text and Reference Books:

1. F. Kreyszig, Advanced Engineering Mathematics, 10th edition, Wiley, 2015.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th edition, 1965.

3. R. K. Jain, S.R.K. Iyenger. Advance Engineering. Mathematics, 4^{th} edition, Narosa Publishing House, 2012.

4. Michael D. Greenberg, Advanced Engineering Mathematics, 2^{nd} edition, Pearson Education, 2002.

5. Johnson and Miller Probability and statistics for Engineers, 8^{th} edition, Pearson Education India, 2015.