

BS 901 MT

University College of Engineering(A)

With effect from the academic year 2016 – 2017

MATHEMATICS-III
(BME)

Instruction	4 Periods per week (3 Theory + 1 Tutorial)
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course objectives:

- To introduce the concept of functions of complex variables and their properties
- To formulate partial differential equations and to introduce a few methods to solve first order linear and non-linear partial differential equations
- To study Fourier series and its applications to partial differential equations

Outcomes: At the end of the course students will be able to

- determine the analyticity of complex functions and expand functions as Taylor and Laurent series
- evaluate complex and real integrals using residue theorem
- expand functions as a Fourier series
- find solutions of first order and second order partial differential equations

UNIT-I

Functions of Complex Variables:

Limits and continuity of function, differentiability and analyticity, necessary & sufficient conditions for a function to be analytic, Cauchy- Reimann equations in polar form, harmonic functions, complex integration, Cauchy's integral theorem, extension of Cauchy's integral theorem for multiply connected regions, Cauchy's integral formula, Cauchy's formula for derivatives and their applications.

UNIT-II

Residue Calculus:

Power series, Taylor's series, Laurent's series, zeros and singularities, residues, residue theorem, evaluation of real integrals using residue theorem, bilinear transformation, conformal mapping.

UNIT-III

Fourier series:

Fourier series, Fourier series expansions of even and odd functions, convergence of Fourier series, Fourier half range series.

UNIT-IV

Partial differential equations:

Formation of first and second order partial differential equations, solution of first order equations, Lagrange's equation, Nonlinear first order equations, Charpit's method, higher order linear equations with constant coefficients.

UNIT-V

Fourier series applications to partial differential equations:

Classification of linear second order partial differential equations, separation of variables method (Fourier method), Fourier series solution of one dimensional heat and wave equations, Laplace's equation.

Suggested Reading :

1. R.K.Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition, 2014.
2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
3. Gupta & Kapoor, *Fundamentals of Mathematical statistics*, Sultan chand & sons, New Delhi, 2014.
4. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 9th Edition, 2012.
5. James Brown and Ruel Churchill, *Complex variables and Applications*, McGraw-Hill Education, 9th Edition, 2013.

* * * * *