

BMS COLLEGE OF ENGINEERING, BANGALORE – 560019

MATHEMATICS DEPARTMENT

SYLLABUS (2011 - 2012)

THIRD SEMESTER B.E COURSE - (Common to all branches)

Course Name	Engineering Mathematics -3	Course Code	11MA3ICMAT
Credits	04	L – T - P	3 -1- 0
Contact hours	52 hours (40L+12T)		

Objectives:

The purpose of the course is to make the students well conversant with Fourier- Series, Fourier Transforms, formulate physical problems in terms of Partial Differential Equations, find insight into the physical behavior of systems from mathematical solution and develop computational skills using efficient numerical methods for problems in science and engineering.

Course outcomes :

Students on completion of the course will

- i) Express given functions to form Fourier series.
- ii) Demonstrate an understanding of Fourier transforms techniques.
- iii) Employ analytical techniques to solve partial differential equations with appropriate boundary conditions.
- iv) Compute interpolating polynomials, derivatives, integrals for a given function from a given data.
- v) Apply Z- transforms techniques to solve difference equations.
- vi) Use calculus of variations to find the extremal of a functional.

UNIT-1

FOURIER SERIES

[9 hours]

Infinite series, convergence and divergence of infinite series of positive terms, power series, periodic function, Dirichlet's conditions, statement of Fourier Theorem, Fourier series of periodic function of period 2π and arbitrary period, half range Fourier series, practical harmonic analysis.

(7L+2T)

UNIT-2

FOURIER TRANSFORMS [9 hours]

Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms, Convolution theorem (statement only), Parseval's identities for Fourier transform. Fourier transforms of the derivatives of a function. **(7L+2T)**

UNIT-3

PARTIAL DIFFERENTIAL EQUATIONS

[12 hours]

Formation of Partial differential equations-elimination of arbitrary constants, elimination of arbitrary functions. Equations of first order- The linear equation $P p + Q q = R$ (Lagrange's partial differential equation). Method of separation of variables.

(5L+2T)

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

One-dimensional heat equation and wave equation (without proof), various possible solutions of these by the method of separation of variables, D'Alembert's solution of wave equation.

(4L+1T)

UNIT-4

NUMERICAL METHODS

[11 hours]

Finite Differences and interpolation: Forward differences, Backward differences. Interpolation: Newton-Gregory forward interpolation formula, Newton-Gregory backward interpolation formula, Lagrange's interpolation formula, Lagrange's inverse interpolation.

Numerical differentiation: Numerical differentiation using Newton-Gregory forward and backward interpolation formula. **(4L+2T)**

Numerical integration: Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule, Simpson's $3/8^{\text{th}}$ rule, Weddle's rule.

Solution of algebraic and transcendental equations: Newton-Raphson method, Numerical solution of ordinary differential equations: Euler's modified method, Runge-Kutta method of fourth order. **(4L+1T)**

UNIT-5

Z -TRANSFORMS

[11 hours] Definition, Properties,

Transforms of standard functions, Inverse transforms.

APPLICATIONS OF Z-TRANSFORMS

Solution of difference equations using Z- transforms.

(5L+1T)

CALCULUS OF VARIATIONS

Variation of function and functional, Euler's equation, variational problem.

APPLICATIONS OF CALCULUS OF VARIATIONS

Geodesics of a right circular cylinder, minimal surface of revolution, hanging chain, Brachistochrone problem. **(4L+1T)**

Text Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, 2007, Wiley-India
2. Higher Engineering Mathematics, B.S. Grewal, 40th edition, 2007, Khanna Publishers.
3. Introductory methods of Numerical Analysis, S. S. Sastry, 3rd edition, 1999, Prentice-Hall of India.

Reference Books:

1. Advanced Modern Engineering Mathematics, Glyn James, 3rd edition, 2004, Pearson Education.
2. Higher Engineering Mathematics, B.V. Ramana, 2007, Tata Mc. Graw Hill.
3. Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.
4. Advanced Engineering Mathematics, 3rd edition by Dennis G. Zill and Cullen, Jones and Bartlett India Pvt. Ltd.

Question Paper Pattern:

1. Each unit consists of one full question.
2. Each full question consists of three or four subdivisions.
3. Five full questions to be answered.
4. Internal Choice in Unit 4 and Unit 5