SHARNBASVA UNIVERSITY, KALABURAGI

ENGINEERING MATHEMATICS-IV

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2018-19)

Course Code : 18MAT41	**CIE Marks : 50**
Contact Hours/Week : 04	**SEE Marks: 50**
Total Hours:50	**Exam Hours:03**
Semester : IV	**Credits: 04**

Course Learning Objectives:

This course will enable students to:

- Learn Fourier series and Fourier transforms.
- Conversant with numerical methods to solve ordinary differential equations, complex analysis, joint probability distribution and stochastic processes arising in science and engineering.

MODULE-I

Fourier Series: Periodic functions, Dirichlet's condition, Fourier Series of periodicfunctions with period 2π and with arbitrary period 2c. Fourier series of even and odd functions Half range Fourier Series, practical harmonic analysis(5 Assignment Problem).

MODULE-II

Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier-transform (5 Assignment Problem).

Complex line Integrals: Cauchy's Integration theorem, Cauchy integral formula, Laurent's Series, types of singularities. Residue, Poles, Cauchy's Residue theorem (without proof) and Problems.

Transformations: Bilinear transformations and problems.

MODULE-III

Numerical Methods: Numerical solution of ordinary differential equations of first order an d first degree, Taylor's series method, modified Euler's-method

Runge Kutta method of fourth order. Milne's and Adams- Bashforth predictor and corrector methods (No derivations of formulae). (5 Assignment Problem).

MODULE-IV

Numerical Methods: Numerical solution of second order ordinary differential equations, Runge- Kutta Method and Milne's Method, Numerical solution of P.D.E: Numerical solution of heat equation, wave equation , problems. (5 Assignment Problem).

MODULE-V

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient

Stochastic process: Stochastic processes, probability vector, stochastic matrices, fixed poin ts, regular stochastic matrices, Markov chains, higher transition probability-simple problems. (5 Assignment Problem)

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Course Outcomes: On completion of this course, students are able to:

- Know the use of periodic signals and Fourier series to analyze circuits and system communications.
- Explain the general linear system theory for continuous time signals and digital signal processing using the Fourier Transform.
- Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods.
- Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory.
- Describe bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing.
- Solve problems on probability distributions relating to digital signal processing, information theory and optimization concepts of stability of design and structural engineering.
- Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events.
- Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons,10th Ed., 2015.

Reference Books:

1. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers , 7th Ed., 2010.
2. B.V.Ramana: "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.
3. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.

Web Link and Video Lectures:

1. *http://nptel.ac.in/courses.php?disciplineID=111*
2. *http://www.khanacademy.org/*
3. *http://www.class-central.com/subject/math*

(G.J. Reddy)
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