ENGINEERING MATHEMATICS-III

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)
SEMESTER – III

Subject Code	**15MAT31**	**IA Marks**	**20**
Number of Lecture Hours/Week	**04**	**Exam Marks**	**80**
Total Number of Lecture Hours	**50**	**Exam Hours**	**03**

CREDITS – 04

Course objectives: This course will enable students to

- Comprehend and use of analytical and numerical methods in different engineering fields
- Apprehend and apply Fourier Series
- Realize and use of Fourier transforms and Z-Transforms
- Use of statistical methods in curve fitting applications
- Use of numerical methods to solve algebraic and transcendental equations, vector integration and calculus of variation

Module -1	**Teaching Hours**
Fourier Series: Periodic functions, Dirichlet's condition, Fourier Series of Periodic functions with period 2π and with arbitrary period 2c, Fourier series of even and odd functions, Half range Fourier Series, practical Harmonic analysis. Complex Fourier series	**10Hours**
Module -2	
Fourier Transforms: Infinite Fourier transforms, Fourier Sine and Cosine transforms, Inverse transform. Z-transform: Difference equations, basic definition, z-transform - definition, Standard z-transforms, Damping rule, Shifting rule, Initial value and final value theorems (without proof) and problems, Inverse z-transform. Applications of z-transforms to solve difference equations.	**10 Hours**
Module – 3	
Statistical Methods: Correlation and rank Correlation coefficients, Regression and Regression coefficients, lines of regression - problems **Curve fitting:** Curve fitting by the method of least squares, Fitting of the curves of the form, $y = ax + b, y = ax^2 + bx + c, y = ae^{bx}, y = ax^b$. **Numerical Methods:** Numerical solution of algebraic and transcendental equations by: Regular-falsi method, Secant method, Newton - Raphson method and Graphical method.	**10 Hours**
Module-4	
Finite differences: Forward and backward differences, Newton's forward and backward interpolation formulae. Divided differences-Newton's divided difference formula. Lagrange's interpolation formula and inverse interpolation formula. Central Difference-Stirling's and Bessel's formulae (all formulae without proof)-Problems. **Numerical integration**: Simpson's 1/3, 3/8 rule, Weddle's rule (without proof) -Problems	**10 Hours**

Module-5	
Vector integration: Line integrals-definition and problems, surface and volume integrals-definition, Green's theorem in a plane, Stokes and Gauss-divergence theorem (without proof) and problems. **Calculus of Variations:** Variation of function and Functional, variational problems, Euler's equation, Geodesics, minimal surface of revolution, hanging chain, problems	**10 Hours**

Course outcomes:

After Studying this course, students will be able to

- Use of periodic signals and Fourier series to analyze circuits
- Explain the general linear system theory for continuous-time signals and systems using the Fourier Transform
- Analyze discrete-time systems using convolution and the z-transform
- Use appropriate numerical methods to solve algebraic and transcendental equations and also to calculate a definite integral
- Use curl and divergence of a vector function in three dimensions, as well as apply the Green's Theorem, Divergence Theorem and Stokes' theorem in various applications
- Solve the simple problem of the calculus of variations

Graduate Attributes (as per NBA)

1. Engineering Knowledge
2. Problem Analysis
3. Life-Long Learning
4. Conduct Investigations of Complex Problems

Question paper pattern:

The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have 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, 42nd edition, 2013.
2. B.V. Ramana "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.

Reference Books:

1. N. P. Bali and Manish Goyal, "A text book of Engineering mathematics" , Laxmi publications, latest edition.
2. Kreyszig, "Advanced Engineering Mathematics " - 9th edition, Wiley.
3. H. K Dass and Er. Rajnish Verma ,"Higher Engineering Mathematics", S. Chand, 1st ed.

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