

## 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			
<b>Course objectives:</b> This course will enable students to <ul style="list-style-type: none"><li>• Comprehend and use of analytical and numerical methods in different engineering fields</li><li>• Apprehend and apply Fourier Series</li><li>• Realize and use of Fourier transforms and Z-Transforms</li><li>• Use of statistical methods in curve fitting applications</li><li>• Use of numerical methods to solve algebraic and transcendental equations, vector integration and calculus of variation</li></ul>			
<b>Module -1</b>			<b>Teaching Hours</b>
<b>Fourier Series:</b> Periodic functions, Dirichlet's condition, Fourier Series of Periodic functions with period $2\pi$ and with arbitrary period $2c$ , Fourier series of even and odd functions, Half range Fourier Series, practical Harmonic analysis. Complex Fourier series			<b>10Hours</b>
<b>Module -2</b>			
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.			<b>10 Hours</b>
<b>Module – 3</b>			
<b>Statistical Methods:</b> Correlation and rank Correlation coefficients, Regression and Regression coefficients, lines of regression - problems <b>Curve fitting:</b> Curve fitting by the method of least squares, Fitting of the curves of the form, $y = ax + b$ , $y = ax^2 + bx + c$ , $y = ae^{bx}$ , $y = ax^b$ . <b>Numerical Methods:</b> Numerical solution of algebraic and transcendental equations by: Regular-falsi method, Secant method, Newton - Raphson method and Graphical method.			<b>10 Hours</b>
<b>Module-4</b>			
<b>Finite differences:</b> 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. <b>Numerical integration:</b> Simpson's 1/3, 3/8 rule, Weddle's rule (without proof ) -Problems			<b>10 Hours</b>

<b>Module-5</b>	
<p><b>Vector integration:</b> 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.</p> <p><b>Calculus of Variations:</b> Variation of function and Functional, variational problems, Euler's equation, Geodesics, minimal surface of revolution, hanging chain, problems</p>	<b>10 Hours</b>
<b>Course outcomes:</b>	
<p>After Studying this course, students will be able to</p> <ul style="list-style-type: none"> <li>• Use of periodic signals and Fourier series to analyze circuits</li> <li>• Explain the general linear system theory for continuous-time signals and systems using the Fourier Transform</li> <li>• Analyze discrete-time systems using convolution and the z-transform</li> <li>• Use appropriate numerical methods to solve algebraic and transcendental equations and also to calculate a definite integral</li> <li>• 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</li> <li>• Solve the simple problem of the calculus of variations</li> </ul>	
<b>Graduate Attributes (as per NBA)</b>	
<ol style="list-style-type: none"> <li>1. Engineering Knowledge</li> <li>2. Problem Analysis</li> <li>3. Life-Long Learning</li> <li>4. Conduct Investigations of Complex Problems</li> </ol>	
<b>Question paper pattern:</b>	
<p>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.</p>	
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. B. S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.</li> <li>2. B.V. Ramana "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. N. P. Bali and Manish Goyal, "A text book of Engineering mathematics", Laxmi publications, latest edition.</li> <li>2. Kreyszig, "Advanced Engineering Mathematics" - 9th edition, Wiley.</li> <li>3. H. K Dass and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand, 1st ed.</li> </ol>	