|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **B. TECH 1st SEMESTER** | **L** | **T** | **P** | **C** |
| **3** | **-** | **-** | **3** |
| **16MA1T02: Numerical Methods and Integral Transforms** |

**PREREQUISITES**

The two year intermediate course of Mathematics.

**COURSE OBJECTIVES**

1. To give a good training to the student in each topic and method.
2. To get the good results of the student in competitive examinations like GRE, GATE etc., by training in this context.
3. To develop the skills of the student to solve the different mathematical methods efficiently to meet the needs of solving the different mathematical models involving in real world process and engineering.
4. To motivate the student for innovating ideas by learning mathematical methods in the context of the real world applications and the need of the world.
5. To produce the competent engineers and professional, to meet the needs of industries in the context scenario.

**COURSE OUTCOMES**

Students are able to

1. solve the algebraic and transcendental equations by different methods and also know the different interpolation formulae to find a polynomial or the value of the polynomial at a given point.
2. find the quadrature, the solutions of ODEs by different formulae.
3. solve the problems on Z-transforms and Fourier transforms.
4. interpret a function as a Fourier series.

**Syllabus**

**UNIT-I**

**Solution of Algebraic and Transcendental Equations:** Introduction - Bisection Method - Method of False Position - Iteration Method - Newton Raphson Method.

**UNIT-II**

**Interpolation:** Introduction - Finite differences - Forward Differences Backward differences - Central differences - Symbolic relations, Differences of a polynomial - Newton’s formulae for interpolation -
Lagrange’s Interpolation formula for unevenly spaced points.

 **UNIT-III**

**Numerical integration and solution of ordinary differential equations:** Numerical Integration: Trapezoidal rule - Simpson’s 1/3 rule - Simpson’s 3/8 rule.

Numerical Solution of Ordinary Differential Equations: Solution by Taylor’s series method - Euler’s Method - Euler’s Modified Method - IV order Runge Kutta Method

**UNIT-IV**

**Z-Transform:** Introduction - properties - Damping rule - Shifting rule - Initial and final value theorems - Inverse z transform- -Convolution theorem.

**Applications:** Solution of difference equations by Z-transforms.

**UNIT–V**

**Fourier Series:** Introduction- Determination of Fourier coefficients - even and odd functions - change of interval - Half-range sine and cosine series

**UNIT – VI**

**Fourier Transforms:** Fourier integral theorem (statement only) - Fourier Transforms, Fourier sine and cosine transforms - properties - inverse transforms - Finite Fourier transforms.

**Text Books:**

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

**Reference Books:**

1. S. S. Sastri (PHI), Introductory Methods of Numerical Analysis 5th Edition.
2. ERWIN KREYSZIG, Advanced Engineering Mathematics, 9th Edition, Wiley-India