

Applied Mathematics – III [AM-III]

S.E. Sem. III [CMPN]

EVALUATION SYSTEM

| | Time | Marks |
|-----------------------|--------|-------|
| Theory Exam | 3 Hrs. | 100 |
| Practical / Oral Exam | – | – |
| Oral Exam | – | – |
| Term Work | – | 25 |

SYLLABUS

1. Laplace Transform

- Function of bounded variations, Laplace Transform of standard functions such as l , t^n , e^{at} , $\sin at$, $\cos at$, $\sinh at$, $\cosh at$, $\operatorname{erf}(t)$.
- Linearity property of Laplace Transform. First Shifting property, second shifting property, Change of scale property of Laplace Transform.

$$L\{t^n f(t)\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int_0^t f(u)du\right\}, L\{f^{(n)}(t)\}$$

Heaviside Unit step function. Direct Delta function. Periodic functions and their Laplace Transform.

- Inverse Laplace Transform: Linearity Property, use of theorems to find inverse Laplace Transform, Partial fractions method and convolution theorem (without proof).
- Applications to solve initial and boundary value problems involving ordinary differential equations with one dependent variable.

2. Matrices (I)

- Types of matrices, Adjoint of a matrix, Inverse of a matrix, orthogonal matrix, unitary matrix, Rank of a matrix, reduction to normal form PAQ, Linear dependence and independence of rows/columns over a field.
- System of homogeneous and non-homogeneous equation, their consistency and solutions.

3. Fourier Series

- Orthogonal and orthonormal set, Expressions of a function in a series of orthogonal functions. Dirichlet's conditions. Fourier series of periodic function in the interval $[c, c + 2\pi]$ $[c, c + 2l]$.
- Dirichlet's theorem even and odd functions. Half range sine and cosine series. Parseval's identities (without proof)
- Complex form of Fourier series
- Practical harmonic analysis

4. Fourier Transform

Introduction, Fourier integrals-Fourier sine and cosine integrals, Fourier sine and cosine transform, Linearity property, change of scale property, shifting property, convolution theorem (without proof)

5. Z-transform

Z-transform of standard functions such as $Z(a^n)$, $Z(n^p)$, Linearity property, damping rule, shifting rules, Initial and Final value theorem, convolution theorem (all without proof) idea of Inverse Z-transform.

6. Use of Scilab (Computer Software) to solve integral transform.

References :

1. Elements of Applied Mathematics (*P N & J N Wartikar*) – Pune Vidarthi Gruha Prakashan .
2. Advanced Engineering Mathematics (*E Kreyszing*) – Wiley Eastern Limited.
3. Advanced Modern Engineering Mathematics (*Glyn James*)
4. Fourier Transform (*Schuam Series*)
5. Higher Engineering Mathematics (*B. V. Ramanna*) – Tata McGraw Hill

