

Applied Mathematics – III
S.E. Sem. III [MECH/AUTO/MARINE]

EVALUATION SYSTEM

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

SYLLABUS

1. Complex Variables

Functions of complex variable. Continuity (only statement) and derivability. Analytic function. Necessary conditions for the function to be analytic (statement of sufficient condition). Cauchy Riemann equations in polar coordinates. Harmonic function and orthogonal trajectories. Milne-Thomson method to find analytic function $f(z) = u + iv$ for given $u, v, u + v, u - v$.

2. Mapping

Conformal mapping. Standard transformations and Bilinear transformation. Fixed points and cross ratio.

3. Complex Integration

Regions and paths in the Z-plane. Line integral of a function of complex variable. Cauchy's integral theorem. Cauchy's integral formula and deduction (without proof). Taylor's and Laurent's development (without proof). Singularities, poles, residue at isolated singularity and its evaluation.

4. Laplace's Transforms

Function of bounded variation (statement only). Laplace's transforms of $1, t^n, e^{at}, \sin(at), \cos(at), \sinh(at), \cosh(at)$. Linearity property, expressions (without proof) for $L[e^{at} f(t)], L[f(at)], L[t^n f(t)],$

$$L[f(t)/t], L\left\{\int_0^t f(u) du\right\}, L\left\{\frac{d^n}{dt^n}(f(t))\right\}$$

Periodic functions, Heaviside unit step function. Dirac-delta Function and their Laplace transforms (statement only)

5. Inverse Laplace Transforms

Linearity property evaluation of inverse Laplace Transforms using theorems and by partial fraction method. Convolution Theorem (without proof) and Heaviside development. Application to solve initial and boundary value problems involving ordinary differential equations with one dependent variable.

6. Matrices

Types of Matrices. Adjoint of matrix Inverse of a matrix, orthogonal and Unitary matrices. Elementary transformations, rank of a matrix. Reduction to a normal form. System of homogeneous and non-homogeneous equations, their consistency and solution. Brief revision of vectors over real field, Inner product, Norm, Linear dependence and independence, orthogonality of matrix. Characteristic polynomial, values and vectors of square matrix. Characteristic polynomial, Cayley Hamilton theorem (without proof) Functions of square matrix.

Reference :

1. Matrices (*Vasistha*).
2. A Text Book of Applied Mathematics (*P.N. & J.N. Wartikar*).
3. Higher Engineering Mathematics (*B.S. Grewal*).
4. Advance Engineering Mathematics (*E. Kreyszig*).
5. Complex Variables (*R.V. Churchill*).
6. Laplace Transforms (*Schaum Series*).

