

Applied Mathematics – I

S.E. Sem. III [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.
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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.

References :

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 variable : (*R. V. Churchill*)
6. Laplace Transform : (*Schaum series*)

