Applied Mathematics - III

S.E. Sem. III [CIVIL/CONE]

EVALUATION SYSTEM

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

SYLLABUS

1. **Complex Variables**
   - Necessary and sufficient conditions for function f(z) to be analytic (without proof), Harmonic functions. Orthogonal trajectories.
   - Milne Thomson's method to find analytic function from its real or imagining parts.
   - Cauchy Riemann's equation in polar –coordinates
   - Mapping, Conformal mapping.
   - Linear, bilinear mapping with geometrical interpretations.
   - Applications of Complex variables to Civil Engineering problems.
2. **Fourier Series & Integrals**
   - Orthogonal & Orthonormal set of functions.
   - Fourier series, Determination of Fourier constants, Dirichlet's conditions.
   - Fourier series for f(x), $x \in [c, c + 2\pi]$ and $x \in [c, c + 2L]$.
   - Fourier series of Odd and Even functions.
   - Half range Fourier Sine & Cosine series, Parseval's Identity.
   - Complex form of Fourier series.
   - Fourier Integral, Fourier integrals of even and odd functions.
3. **Laplace Transforms**
   - Function of bounded variation(Statement only) Laplace Transforms of 1, e^{at}, sin at, cos at, sinh at, cosh at, t, $\operatorname{erf}\left(\sqrt{t}\right).J_0(t)$.
   - Shifting theorems, change of scale.

     $$L\left\{t^n f(t)\right\}.L\left\{\frac{f(t)}{t}\right\}L\left\{\frac{d^n f(t)}{dt^n}\right\}L\left\{\int_0^t f(u)du\right\}$$
   - Convolution theorem (with proof), Evaluation of real integrals using Laplace transforms
   - Laplace transforms of special functions (Heaviside Unit step function, Dirac Delta function and periodic functions).
   - Inverse Laplace Transforms.
   - Evaluation of Inverse Laplace Transforms using partial fractions, convolution, theorems, shifting theorems and other properties.
   - Application of Laplace Transform to solve initial & boundary value problems involving ordinary differential equation with one dependent variables.
4. **Matrices**
   - Types of matrices(including orthogonal & unitary).
   - Adjoint of a matrix, Partitioning of Matrices. Inverse of a matrix
   - Elementary Transformation, rank of a matrix, normal form
   - System of Homogeneous and Non Homogeneous linear equations, their consistency & Solution.
   - Eigen values and Eigen vector
   - Cayley Hamilton Theorem(without proof), problems based on Cayley Hamilton theorem.

Reference :

1. Complex Variables and Applications (*R.V. Churchill & J.W. Brown*) McGraw Hill.
2. Theory of Functions of a Complex Variable (*Shanti Narayan*) S. Chand.
3. Laplace Transforms (*Murray Spiegel*) Schaum Series.
4. Engineering Mathematics (*Bali & Iyengar*) Laxmi Publications.
5. Matrices (*Shanti Narayan*) S. Chand.

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