SYLLABUS

MATHEMATICS – VIII

(4 Lecture hours per week + 2 hours of problem working classes)

1. COMPLEX ANALYSIS

Complex numbers - The complex plane-conjugate and modulus of a complex number-polar form-geometrical representation-Euler's formula:

Function of a complex variable : Limit, continuity and differentiability.

Analytic function-Cauchy-Riemann equations in Cartesian and polar forms-Sufficiency conditions for analyticity (in Cartesian form)-standard properties of analytic functions-construction of analytic functions, given real or imaginary parts-Milne-Thomson method.

Transformations -definition of a conformal transformation. Examples.

Discussion of the transformations : ,

The bilinear transformation-cross ratio property-bilinear transformation transforms circles into circles or lines-problems thereon.

The complex line integral-Examples and properties.

Cauchy's integral theorem (proof using Green's theorem) and its direct consequences. The Cauchy's integral formula for the function and the derivatives. Applications to evaluation of simple line integrals-Cauchy's inequality-Liouville's theorem-Fundamental theorem of algebra

30 lecture hours

2. FOURIER TRANSFORMS

The Fourier Integral-Complex Fourier transform-Inverse transform-Basic properties-Transforms of the derivative and the derivative of the transform-Problems thereon

Fourier sine and cosine transforms and inverses-transforms for first and second order derivatives-problems thereon.

15 lecture hours

3. NUMERICAL ANALYSIS

Solution of Algebraic and transcendental equations, method of successive bisection-method of false position-secant method-Newton-Raphson method.

Numerical solutions of non-homogeneous systems of linear algebraic equations in 3 variables by Jacobi's and Gauss-Seidel methods-Computation of largest eigen value of a square matrix by power method.

Solution of initial value problems by ordinary linear first order differential equations by Taylor's , Euler's , modified Euler's Runge-Kutta method

15 lecture hours

BOOKS FOR STUDY REFERENCE

1. L.H. Ahlfor's Complex Analysis (McGraw Hill)
2. R.V. Churchill: Introduction to Complex Variables and Applications

(McGraw Hill)
3. I.N. Senddon Fourier Transforms (McGraw Hill)
4, S.S. Shastry: Numerical Analysis (Prentice-Hall)
5. M.K. Jain, SRK Iyengar and R.K. Jain. Numerical methods for Scientific and Engineering Computation (Wiley Eastern)

SUGGESTED DISTRIBUTION OF TEACHING WORK

1. Complex Analysis : 2 hours/week
2. Fourier Transforms, Numerical Analysis : 2 hours/ week