Table 1: Tentative lecture schedule **Mathematics-III**

Lecture	**Topics to be covered**
1	Field of Complex Numbers, Absolute value of a complex number and its properties.
2	Conjugate of a complex number and its properties, Polar form of a complex number.
3	Argument of a complex number, Demoivre's theorem,
4	n^{th} root of a complex number, geometrical interpretation, applications in trigonometry.
5	Complex valued functions, Concepts of limits, continuity & differentiability.
6	Analyticity of a complex function, Cauchy-Riemann Equations.
7	Harmonic functions, conjugate harmonic functions.
8	Elementary complex functions, exponential function and its periodicity, Logarithmic function as the inverse of exponential function.
9	Trigonometric/hyperbolic functions in terms of exponential function, Inverse trigonometric functions.
10	Complex powers of a complex variable, principle values of multi-valued functions.
11	Conformality of analytic functions, mappings of various plane regions by means of elementary analytic functions.
12	Mobius transformations, composition of Mobius transformations, Mobius transformation as a composition of translation, dilatation, rotation, inversion.
13	Fixed points of a Mobius transformation, Invariance of cross-ratios.
14	Mapping of disks/half planes using Mobius transformations, determination of Mobius transformation which map a given region onto another prescribed region.
15	Complex Integration, Line integral and its properties, ML- inequality.
16	Caughy's Integral Theorem for a simply connected domain and its extension to multiply connected domains, Existence of anti-derivative.
17	Cauchy's Integral Formula, existence of derivatives of all orders of an analytic function.
18	Cauchy's Inequality, Liouville's Theorem, Morera's Theorem.
19	Fundamental Theorem of Algebra, Gauss's Theorem.
20	Sequences and Series of complex numbers, Convergence, Absolute convergence, Conditional convergence of a series of complex numbers.