MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Mathematics
Course Hand-out

Complex analysis | MA16101| 4 Credits | 3 1
04
Session: Jan 18 – May 18 | Faculty: Dr. Virendra Singh Chouhan | Class: B.Sc. (Hons.)

Course Objectives: At the end of the course, students will be able to

[1611.1] Enhance the limit, continuity, differentiability and analyticity of the complex valued functions.

[1611.2] Find some special type of complex transforms which improve their analytical skills.

[1611.3] Evaluate the complex integrations and apply them in the relevant applications which enhance their employability skills.

[1611.4] Apply their skill to find some theorems used for complex valued function.

[1611.5] Develop the skill to find out singularity and radius of convergence.

A. SYLLABUS

Complex valued function, Limits, Continuity, Differentiability, Complex plane, Connected and compact sets, Statement of Jordan curve theorem, Extended complex plane, Stereographic projection. **Analytic functions**: CR equations (Cartesian and polar form), Harmonic functions, Construction of an analytic function. **Conformal Mappings. Bilinear Transformations and Its Properties. Power Series**: Absolute convergence, Cauchy Hadamard theorem, Radius of convergence, Analyticity of sum function of a power series. **Complex Integration:** Complex line integral, Cauchy's integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions, Cauchy's integral formula, Analyticity of the derivative of analytic function, Liouville's theorem, Poisson's integral formula, Morera's theorem, Taylor's and Laurent's series, Maximum modulus principle. **Singularities:** Branch points, Kinds of singularities, monomorphic functions, Entire functions, Riemann's theorem, Cauchy-Weierstrass theorem.

A. TEXT BOOKS

1. R.V. Churchill, J. W. Brown, Complex Variables and Applications, McGraw Hill, 2000.
2. Shanti Narayan, P. K. Mittal, Complex Variables, S. Chand & Co., 2014.
3. S. Ponnusamy, Foundations of Complex Analysis, Narosa Pub. House, 2008.
4. J. B. Conway, Functions of One Complex Variable, Springer Int. St. Ed., Narosa Publishing House, 2000.