Indian Institute of Space Science and Technology

Thiruvananthapuram

MA 221 PDE, Calculus of Variations and Complex Analysis 3-0-0-3

Complex Analysis:

- **Introduction**—Complex numbers, geometry of complex numbers, algebra of complex numbers.
  (Sec1.2, 1.3, 1.4, 1.5)
- **Functions of complex variable**—Limit continuity and derivative of functions of complex variable, analytical functions, harmonic functions and applications.
  (Sec2.1, 2.3, 3.1, 3.2, 3.3)
- **Elementary functions**—Complex exponential function, complex logarithm function, complex trigonometric and hyperbolic function.
  (Sec 5.1, 5.2, 5.4)
- **Complex integration**—Complex integrals, contours and contour integrals, Cauchy's theorem, Definite integrals, Cauchy's integral formula, Louville's theorem.
  (Sec 6.1, 6.2, 6.3, 6.4, 6.5, 6.6)
- **Taylor and Laurent series**—Power series , Taylor's theorem, Laurent's theorem, singularities, zeros, and poles.
  (Sec 4.4, 7.2, 7.3, 7.4)
- **Residue theory**—Calculations of residues, Cauchy's residue theorem and applications.
  (Sec 8.1, 8.2, 8.3, 8.4, 8.5)

P.T.O.

- **Conformal mapping and bilinear transformations. (Sec 10.1, 10.2)**

Textbook:

- Mathews, J.H. and Howell, R., Complex Analysis for Mathematics and Engineering, Jones & Bartlett Learning.

References:

- Jain, R.K. and Iyenger, S.R.K., Advanced Engineering Mathematics, Narosa.
- Zill, Dennis G. and Shanahan, Patrick D., A First Course in Complex Analysis with Applications, Jones & Bartlett.
- Churchill, R.V. and Brown, J.W., Complex Variables and Applications, McGraw-Hill.

Instructor: Dr. Kaushik Mukherjee
