LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **MATHEMATICS**

SIXTH SEMESTER – NOVEMBER 2012

# MT 6603/6600 - COMPLEX ANALYSIS

Date : 05/11/2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**PART-A**

**Answer ALL questions (10x2=20 )**

1. Show that the function  is nowhere differentiable.
2. When do we say that a function is harmonic.
3. Find the radius of convergence of the series .
4. State Cauchy Goursat theorem.
5. Expand as a Taylor’s series about the point .
6. Define meromorphic function with an example.
7. Define residue of a function at a point.
8. State argument principle.
9. Define the cross ratio of a bilinear transformation.
10. Define an isogonal mapping.

**PART-B**

**Answer any FIVE questions. (5x8=40)**

1. Show that the function is discontinuous at given that when and .
2. Find the analytic function of which the real part is .
3. Evaluate along the closed curve containing paths and .
4. State and prove Morera’s theorem.
5. State and prove Maxmimum modulus principle.
6. Find out the zeros and discuss the nature of the singularity of .
7. State and prove Rouche’s theorem.
8. Find the bilinear transformation which maps the points into the points respectively.

**PART C**

**Answer any TWO questions (2x20=40)**

19. (a) Let be a function defined in a region such that and their first order partial derivatives are continuous in . If the first order partial derivatives of satisfy the Cauchy-Riemann equations at a point  in D then show that f is differentiable at .

(b) Prove that every power series represents an analytic function inside its circle of convergence.

20. (a) State and prove Cauchy’s integral formula.

(b) Expand in a Laurent’s series for (i) (ii)   
(iii) .

21. (a) State and prove Residue theorem.

(b) Using contour integration evaluate .

22. (a) Let be analytic in a region and  for .Prove that f is conformal at .

(b) Find the bilinear transformation which maps the unit circle onto the unit circle .

- - - o o o O O O o o o - - -

