LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SIXTH SEMESTER – APRIL 2012

# MT 6603/MT 6600 - COMPLEX ANALYSIS

Date : 16-04-2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**PART - A**

**Answer all questions: (10**

1. Find the absolute value of
2. Define harmonic function.
3. Find the radius of convergence of the series .
4. Using Cauchy integral formulas evaluate where is the unit circle .
5. Define zero and poles of a function.
6. Write Maclaurin series expansion of s.
7. Define residue of a function.
8. State Argument principle.
9. Define isogonal mapping.
10. Define critical point.

**PART - B**

**Answer any FIVE questions: (5**

1. Let f(z)= . Show that f(z) satisfies CR equations at zero but not differential at .
2. Prove that is harmonic and find its Harmonic conjugate.
3. State and prove Liouvilles theorem and deduce Fundamental theorem of algebra.
4. Find the Taylors series to represent in .
5. Suppose is analytical in the region and is not identically zero in .Show that the set of all zeros of is isolated.
6. Use residue calculus to evaluate  dz over where is the unit circle.
7. Show that any bilinear transformation can be expressed as a product of translation, rotation, magnification or contraction and inversion.
8. Find the bilinear transformation which maps the points onto

**PART – C**

**Answer any TWO questions: (2**

1. (a) Derive CR equations in polar coordinates.

(b) Find the real part of the analytic function whose imaginary part isand construct the analytic function.

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

(b) Let F be an analytic inside and on a simple closed curve C. Let z be a point inside C. Show that f’(z) = dt.

21. (a) Expand in a Laurants series in (i) , ( ii) .

(b) Using method of contour integration evaluate dx.

22. (a) Show that any bilinear transformation which maps the unit circle = 1 onto = 1 can be written in the form where is real.

(b)State and prove Rouche’s theorem.

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