B.Sc. DEGREE EXAMINATION, APRIL 2018.

III YEAR VI SEMESTER

Core Major - Paper XIV - COMPLEX ANALYSIS

Time : 3 Hours Max. Marks : 75

SECTION A – (10 × 2 = 20 marks)

Answer any *TEN* questions

1. Define an analytic function and give an example.
2. Verify Cauchy Riemann equations for the function.
3. Evaluate  , where C is the unit circle.
4. Define simply and multiply connected domains.
5. State Maclaurin series. Write down the Maclaurin series for.
6. State fundemental theorem of algebra.
7. What type of singularity does the function  have at z = 0? Give reasons.

$$z\_{0}$$

1. Define residue of an analytic function at an isolated singular point .
2. Define a bilinear transformation.
3. Find the fixed points of the transformation.
4. State Goursat theorem.
5. Define removable singularity and give an example.

SECTION B – (5 × 5 = 25 marks)

Answer any *FIVE* questions

1. Show that the function  is continuous but nowhere differentiable except at the origin.
2. Evaluate I =, where C is the right-hand half,  of the circle , from  to .
3. State and prove Lioville's theorem.
4. Evaluate the integral  , where C is the circle  described counter-clockwise.

[P.T.O.]

1. Find the bilinear transformation that maps the points, onto the points .
2. Find the residue of at its poles. Also determine order of each pole.
3. Prove that if a function  is analytic in a domain D, then its component functions u and v are harmonic in D.

SECTION C – (3 × 10 = 30 marks)

Answer any *THREE* questions

1. Derive Cauchy-Riemann equations in polar form.
2. State and prove Cauchy's integral formula.
3. State and prove Laurent's theorem.

23. State and prove Cauchy's residue theorem.

24. Discuss the transformation 