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**University Examinations 2014/2015**

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE (ACTUARIAL)

**SMA 2305: COMPLEX ANALYSIS**

**DATE: OCTOBER 2015 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Write the given number in the form axis

 (4 Marks)

1. Express in polar form (3 Marks)
2. Find the fourth roots of  (3 Marks)
3. Suppose that we choose the principal branch of to be that one for which 

Prove that  (3 Marks)

1. By definition find the deviation of  at the point where (3 Marks)
2. Given that is analytic in a region , prove that and are harmonie in if they have continuous second partial derivatives in  (4 Marks)
3. Evaluate  (2 Marks)
4. Verify Green’s theorem in the pone for



Where c is the closed curve of the region bounded by and  (4 Marks)

1. A force field is given by  Find the work done in moving an object in this force field along the paratola from to  (4 Marks)



**QUESTION TWO (20 MARKS)**

1. Evaluate  (8 Marks)
2. Let where we consider the branch that has the zero value when 
3. Expand in Taylor series about (7 Marks)
4. Determine the region of convergence for the series (5 Marks)

**QUESTION THREE (20 MARKS)**

1. Evaluate where C is the circle  (6 Marks)
2. Find the Laurent series about the indicated singularity for the function below

**** (7 Marks)

1. Show that the function

**** is not analytic at any point (7 Marks)

**QUESTION FOUR (20 MARKS)**

1. Find the real number and such that  (3 Marks)
2. Find the values of for which and locate their values in the complex plane

(12 Marks)

1. Solve the equation

 (5 Marks)

**QUESTION FIVE (20 MARKS)**

1. Prove that  (4 Marks)
2. Prove that in polar form the Cauchy-Reimann equations can be written as

 (9 Marks)

1. (i) Prove that is harmonic (5 Marks)

(ii) Find such that is analytic (2 Marks)