**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS**

**SEPTEMBER/OCTOBER 2015 EXAMINATION**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**COURSE CODE: MTH 305**

**COURSE TITLE: COMPLEX ANALYSIS II**

**TIME: 3 HOURS**

**TOTAL: 70 MARKS**

**CREDIT UNIT: 3**

**INSTRUCTION: ANSWER ANY 4 QUESTIONS**

1 (a) Let, prove that **(10 marks)**

(b) Derive formula for the real and imaginary parts of the complex function

**(7 ½ mark)**

2. (a) Using Cauchy Riemann equation, prove that

(i) is differentiable **(10 marks)**

(ii)  is not differentiable **(7 ½ marks)**

3.(a) Find the Laurent expansion of the following around 

(i) , valid for  **(10 marks)**

(ii) , valid for **(7 ½ marks)**

4.(a) Find the expansion for the function  valid on the annuli

(i) **(10 marks)**

(ii) **(7 ½ marks)**

5.(a) Find a Laurent expansion for the function  in power of  valid

for . **(10 marks)**

(b) Find the poles and their orders of the functions

(i)  (ii) **(7 ½ marks)**

6. Use Cauchy’s Residue theorem to evaluate integral

(a) **(10 marks)**

(b)  (**7 ½ marks)**