NATIONAL OPEN UNIVERSITY OF NIGERIA

14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS

SCHOOL OF SCIENCE AND TECHNOLOGY

MARCH/APRIL 2014 EXAMINATION

COURSE CODE: MTH 304

COURSE TITLE: COMPLEX ANALYSIS I

TIME ALLOWED: 3 HOURS

INSTRUCTION: ANSWER ANY 4 QUESTIONS

1(a) Write the function $f(z)=z^2-z+2$ in both its cartesian and polar form, and in each case identify the

function u and v.

10 marks

(b) Show that the real and imaginary parts of the function defined by $f(z)=z^2$ are harmonic **7½ mark**

2(a) Show that $f(z)=z^2$ satisfies that cauchy-Riemann equations

10 marks

(b) Find the zero of $\cos hz$

7 ½ marks

3 (a) Examine the contiuuity of the function $f(z)=z^2+3z-1$

10 marks

(b) Show that series $\sum_{n=1}^{\infty} n^2-2 \ni \frac{¿}{3n+4} ¿$

7 ½ marks

4(a) Find the Taylor series expansion of $f(z)=(8+z)^{\frac{-1}{2}}$ about the $z_0=1$

10 marks

(b) Find the $\oint_c \left(\frac{4}{z-1}-\frac{5}{z+4}\right)dz$, where c is the circle $|z|=2$

7 ½ marks

5(a) Find the Macularin series of $Arcsinz$

7 ½ marks

(b) Find up to the term in z^5 the macularin series expansion of $f(z)=\frac{sinz}{1+3z^2}$

10 marks

6(a) Find the laurent series expansion of $f(z)=\frac{1}{6-z-z^2}$ in the domain D_1 determined by

$|z|<2$ **10marks**

(b) Expand $f(z)=\exp\left(z+\frac{1}{z}\right)$ as a laurent series about the origin.