KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: **MATH 313**

COURSE TITLE: **COMPLEX ANALYSIS**

STREAM: **SESSION VI & VII**

DAY: **WEDNESDAY**

TIME: **9.00 – 11.00 A.M.**

DATE: **13/04/2011**

INSTRUCTIONS:

Attempt question **ONE** and any other **TWO** questions

PLEASE TURN OVER

QUESTION ONE

(a) Show the point $= 3$ $^{\circ}$ on argard diagram. (4 marks)

(b) Define continuity of a complex functions at a point . (3 marks)

(c) From first principles differentiate the complex functions at a specified point.

i. $( ) =$ at $= 0$ (4 marks)

ii. f(z)= $\sin$ $= 720°$ (5 marks)

(d) If $( ) =$ $+$is analytic function and $= - 3$ Find V. (4 marks)

(e) Evaluate $\oint \frac{}{( )}$ where c is the circle $|$ |= 1 (6 marks)

(f) If $( ) =$ $+ 1$ show that $\oint ( )$ $= 0$ h h $| - 2| = 5$. (4 marks)

QUESTION TWO (20 MARKS)

(a) Derive the C – R equations and hence verify whether $( ) =$ $^{-}$ is analytic or not.

(15 marks)

(b) Given $( ) =$ $y -$. Show that u is harmonic and find the harmonic conjugate V.

(5 marks)

QUESTION THREE (20 MARKS)

(a) Evaluate $\int_{\infty}^{\infty} \frac{}{( ) ( )}$ (10 marks)

(b) Evaluate $\int \frac{}{( )}$

(10 marks)

QUESTION FOUR (20 MARKS)

(a) Evaluate $\int_{(,)}^{(,)} (3 +)$ $+(2 -)$dy along

(i) The curve y = $+ 1$ (4 marks)

(ii) The straight line joining (0,1) and (2,5) (4 marks)

(iii) The straight line joining (0,1) to (0,5) and then from (0,1) to (2,5)

(5 marks)

(b) Expand —— in a Taylor's series about z = 0 and determine the region of convergence. (4mks)

(c) f(z)=3z+1/(z-4)(z-1) find the poles and residues at the poles for f(z) (3marks)

QUESTION FIVE (20MARKS)

If ( ) is analytic inside and on the boundary C of a simple connected region then show that ( ) = —— $\int \frac{(\ )}{\ }$ and ( ) = —— ! $\int \frac{(\ )}{(\quad)}$ where n = 1,2,3 taking a specific example of = 1 and hence generalize. (20 marks)