NATIONAL OEN UNIVERSITY OF NIGERIA
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi, Abuja

FACULTY OF SCIENCES
April/May Examination 2019

Course Code:	MTH305
Course Title:	Complex Analysis II
Credit Unit:	3
Time Allowed:	3HOURS
Total:	70 Marks
Instruction:	ATTEMPT QUESTION NUMBER ONE AND ANY OTHER FOUR (4) QUESTIONS

1. (a) Find the value of $\oint_c \frac{\sin^6 z}{(z-\pi/6)^3}$ where c is a circle |z| = 1 (8 Marks)

   (b) If C is the curve $y = x^3 - 3x^2 - 4x - 1$ joining the point (1,1) and (2,3), show that

   $\oint(12z^2.4iz)dz$ is independent of the path joining (1,1) and (2,3) (8 Marks)

   (c) Suppose that $f(z) = z^2$ at any point z, find the derivative of $f(z)$. (6 Marks)

2. Find the value of the integral $I_1 = \int_{c_1} z^2 dz$ where C_1 is the line segment from z=0 to z = z + I
   (12 marks)

3. For each of the following functions, determine the pole and the residues at the pole.
   (a) $\frac{2z+1}{z^2-z-2}$ (6 Marks)
   (b) $\left(\frac{z+1}{z-1}\right)^2$ (6 Marks)

4. (a) Prove that $cosh^2 z - sinh^2 z = 1$ (8 Marks)
   (b) Define absolute convergence of a series (4 Marks)

5. Expand f(z) = cosz in Taylor series about $z = \frac{\pi}{4}$ and determine its region of convergence (12 marks)

6. (a)Expand $f(z) = \frac{z}{(z-1)(z-2)}$ in Laurent series valid for $|z| < 1$ (8 marks)

   (b) Define derivative of a function. (4 marks)