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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCES**

**JULY 2018 EXAMINATIONS**

**COURSE CODE: PHY 313**

**COURSE TITLE: MATHEMATICAL METHODS FOR PHYSICS I**

**CREDIT UNIT 3**

**TIME ALLOWED (21/2 HRS)**

**INSTRUCTION: *Answer question one (1) and any other four (4) questions***

**QUESTION 1**

1. a) Given three complex numbers , and .

Prove the following laws:

(i) Associative [5 marks] (ii) Commutative [5 marks]

bi) State the necessary condition that be analytic in a region .

[3 marks]

(ii) Hence, show that the function is analytic. [5 marks]

c) Given the function , prove that [4 marks]

**QUESTION 2**

1. If and, show explicitly that
2. [6 marks]
3. [6 marks]

**QUESTION 3**

3. a) Show that andif the complex number [4 marks]

b) Express the functions (i) [4 marks]

(ii) in terms of and [4 marks]

**QUESTION 4**

4. Find the real and imaginary parts of the complex numbers

1. [4 marks]
2. [4 marks]
3. [4 marks]

**QUESTION 5**

5. Given , prove that

(a) [4 marks]

[4 marks]

(c) [4 marks]

**QUESTION 6**

6 a) Define an analytic function [2 marks]

b) Prove that the function satisfies Laplace’s equation [10 marks]