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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 SCIENCE**

**APRIL/MAY, 2019 EXAMINATIONS**

**COURSE CODE: PHY 313**

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

**CREDIT UNIT 3**

**TIME ALLOWED (2½ HRS)**

**INSTRUCTION: *Answer question 1 and any other four questions***

**QUESTION 1**

(a) Express by a formula involving the variables z and **[6 marks]**

(b) Determine the partial differential equation for z = ( x2 –y2) **[ 5 marks]**

(c ) Express f(t) = z5+4z2-6 in polar form. **[5 marks]**

(d) Solve  **[6 marks]**

**QUESTION 2**

2(a) Generate the parametric equation of an ellipse centered at the origin represented by the equation s(t) = 2cost+isint for 0≤t≤2π . Rotate the ellipse by an angle of π/6 radians and shift the center of the ellipse 2 units to the right and 1 unit up. **[8 marks]**

(b) Write the Cauchy Riemann equation **[4 marks]**

**QUESTION 3**

3. (a). Find the Fourier series of the sine function represented by f (x) = 0 for x ≤ 2 and f (x) = 2 for x > 2 the points ( 0, 3). **[6 marks]**

(b) Q. Show that the function  satisfies the one dimensional heat conduction **[6 marks]**

**QUESTION 4**

4.. Determine the residues of the following functions at the points indicated (a)  (z = j) (b)  (z = 0) (c)  (z =- 1) **[4 marks each]**

**QUESTION 5**

5. (a) Show that f(t):→ defined by f(t) =ez is analytic in C and that**[6 marks]**

5(b) Show that **[6marks]**

**QUESTION 6**

6 (a) Show that **[6 marks]**



(b) given the Fourier series determine the Fourier coefficient of a0. **[6 marks]**