National Open University of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Sciences
JANUARY 2018 Examination Questions

COURSE CODE: PHY404
COURSE TITLE: Electrodynamics II
CREDIT UNIT : 3
TIME: 2 HOURS
INSTRUCTION: Answer question 1 and any other three questions.

Question 1

. a. Define Resonance (1.5 marks)

b. The aerial circuit of a radio set is equipped with a tuning coil of inductance 1.8mH. What a tuning capacitor must be used with this to tune to the BBC long wave station 200kHz (5 marks)

c. Define (i) skin depth (ii) skin effect (4 marks)

d. Determine the skin depth when the frequency is 60Hz. (5 marks)

e. Define a transmission line. (2 marks)

Question 2

. Using the Maxwell's equation show that the wave equation for electric and magnetic fields is given by

$$\nabla^2 E = \frac{1}{C^2}\frac{\mathrm{d}^2 E}{\mathrm{d}t^2} \text{ and } \nabla^2 B = \frac{1}{C^2}\frac{\mathrm{d}^2 B}{\mathrm{d}t^2}$$

(17.5 marks)

Question 3

Show that the natural angular frequency, w, of resonant circuit is given by $w = \frac{1}{\sqrt{LC}}$ (17.5marks)

Question 4

(a) Define reflection coefficient (R) and transmitted coefficient (T) (5 marks)

(b) Given that the refractive index, n, of water for wave of frequency 100mHz is a 9. Calculate the reflection and transmission coefficient of the medium. (12.5 marks)

Question 5

a) State the two boundary conditions on the planes for the transmission of waves in a pair of parallel conducting planes. 7.5 MARKS

b) Outline how the characteristic impedance and speed of propagation of coaxial cable and wire transmission line be determined. 6 MARKS

c) State the types of waves propagated in the following: 4 MARKS

i) Parallel wire transmission line

ii) coaxial cable