



EDO UNIVERSITY IYAMHO, EDO STATE, NIGERIA
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS
Second Semester Examination, 2017/2018 Session

Course Code: PHY 121

Course Title: General Physics II

Time Allowed: 2^{1/2} hours

Date: 3rd September, 2018

Instruction: Attempt any four questions

Note: All symbols have their usual meaning and where applicable take:

$\pi = 3.142$, $g = 9.80\text{ms}^{-2}$, $k = 8.89 \times 10^9 \text{Nm}^2\text{C}^{-2}$, $h = 6.63 \times 10^{-34} \text{Js}$, $c = 3.0 \times 10^8 \text{ms}^{-1}$,

$\epsilon_0 = 8.85 \times 10^{-12} \text{C/Nm}^2$, $1\text{eV} = 1.60 \times 10^{-19} \text{J}$, $\mu_0 = 4\pi \times 10^{-7} \text{Tm/A}$, $e = 1.60 \times 10^{-19} \text{C}$,

Mass of electron = $9.10 \times 10^{-31} \text{Kg}$, Mass of proton = $1.67 \times 10^{-27} \text{Kg}$

1. (a) State Ohm's Law and Coulomb's Law mathematically (**6marks**)
(b) Define relative permittivity for a dielectric medium (**3marks**)
(c) If a proton is placed in a uniform electric field, what would be the magnitude and direction of this field if the electrostatic force acting on the proton is just to balance its weight? (**8.5marks**)
2. (a) Explain what you understand for an electric charge to be quantized and conserved (**6marks**)
(b) Define a dipole. Hence, write the expression for calculating the electric moment of a dipole (**5marks**)
(c) If the electric intensity between two parallel plates, placed 1cm apart is 10^4NC^{-1} and the direction of the field of this intensity is vertically upward. Find the force on an electron in this field and compare the force on the electron with the electron's weight (**6.5marks**)
3. (a) Write the expressions for the electric field strength due to several charges in terms of volume charge density, area charge density and linear charge density respectively (**6marks**)
(b) Show that the electric flux only depends on the charge enclosed (**5marks**)
(c) Calculate the magnitude of electric field strength at a point 3cm from an infinite line of charge of linear density $18 \mu\text{C/cm}$ situated in a medium of whose $\epsilon_r = 1.5$ (**6.5marks**)
4. (a) State Joule's Law of electrical heating mathematically (**4marks**)
(b) What does the negative sign implies in Faraday's Law and what is the relationship between electricity and magnetism? (**6marks**)
(c) If the magnetic flux through a loop increases according to the relation; $\Phi = 6t^2 + 7t$, where Φ is in milliweber (mWb) and t is in seconds. Calculate the magnitude of e.m.f induced in the loop when $t = 2\text{s}$ (**7.5marks**)
5. (a) Define Specific Charge and Thermionic Emission (**6marks**)
(b) Write briefly on J. J Thomson Atomic Model (**5marks**)
(c) Find the corresponding wavelength if a photoconductivity occurs in a substance when it is illuminated with photon of energy 1.14eV (**6.5marks**)
6. (a) Write short note on Half life and Decay Rate (**6marks**)
(b) Define Nuclear force. Hence, list the particles of the Nucleus (**5marks**)
(c) Find the half-life of a radioactive sample, if the activity drops to 1/16 of its initial value of 80 minutes (**6.5marks**)