ELIZADE UNIVERSITY
ILARA-MOKIN
ONDO STATE

FACULTY: Basic and Applied Sciences
DEPARTMENT: Physical and Chemical Sciences
SECOND SEMESTER EXAMINATIONS
2015/2016 ACADEMIC SESSION

COURSE CODE: PHY 102
COURSE TITLE: General Physics II
DURATION: 2 hours

HOD's SIGNATURE

TOTAL MARKS: 60
Matriculation Number: _____

INSTRUCTIONS:

1. This question paper consists of 1 page with printing on both sides.
2. Write your matriculation number in the space provided above and also on the cover page of the exam booklet.
3. Attempt any (6) of the eight (8) questions.
4. Answer all questions in the exam booklet provided.
5. Show ALL your work! More marks are awarded for problem solving method used to solve problems than for the final numerical answer.
6. Box your final answers.
7. Show your units throughout your calculation. Points are deducted if there are no units.
8. Indicate which problems you attempted on your answer booklet.
9. At the end of this examination, place the question paper inside the exam booklet.

$I = \frac{dQ}{dt}$	$r = \frac{mv_\perp}{qB}$	$\vec{F}_G = G\frac{m_1 m_0}{r_{10}^2}\hat{r}_{10}$	$G = 6.67\times10^{-11}\,N\cdot m^2/kg^2$	$e = \pm1.60\times10^{-19}\,C$	$T = \frac{2\pi m_e}{qB}$
$\vec{\tau} = \vec{\mu}\times\vec{B}$	$p = v_\parallel T$	$m_p = 1.67\times10^{-27}\,kg$	$\Delta y_1 = \frac{qE_y}{2mv_0^2}x_1^2$	$K = \frac{1}{2}mv^2$	$\vec{B} = \frac{2k_B\vec{\mu}}{r^3}$
$\vec{\mu} = NIA\hat{n}$	$v_0 = \frac{E}{B}$	$\vec{F}_E = k_E\frac{q_1 q_0}{r_{10}^2}\hat{r}_{10}$	$k_E = 9\times10^9\,N\cdot m^2/C^2$	$T = \frac{N}{Am} = \frac{Ns}{Cm}$	$\vec{F}_B = q_{m0}\vec{B}$
$\frac{N}{C} = \frac{V}{m}$	$\hat{r} = \frac{\vec{r}}{\lvert\vec{r}\rvert}$	$k_B = 10^{-7}\,N/A^2$	$\Delta V_H = v_d Bw = \frac{\lvert I\rvert}{nte}B$	$v_\parallel = \cos\theta$	$v_\perp = \sin\theta$
$\vec{\mu} = q_m \ell\hat{n}$	$\vec{F}_L = q_0\vec{E}$	$\Delta y_2 = \frac{qE_y}{mv_0^2}x_1x_2$	$m_e = 9.11\times10^{-31}\,kg$	$\vec{F}_B = k_m\frac{q_{m1}q_{m0}}{r_{10}^2}\hat{r}_{10}$	$U = -\vec{\mu}\cdot\vec{B}$

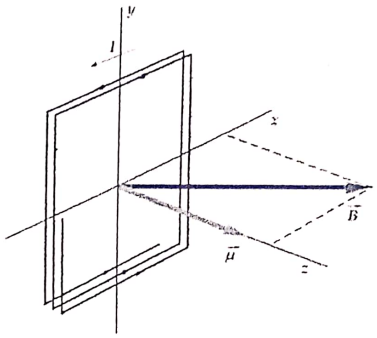
Answer any six (6) questions. Each question is worth ten (10) points.

1. In a hypothetical atom, the electron is separated from the proton by a distance of $6.3\times10^{-12}\,\text{m}$. (a) Calculate the magnitude of the electrostatic force of attraction between the proton and the electron. (b) Calculate magnitude of the gravitational force between the proton and the electron. (c) Calculate the ratio of the electric force to the gravitational force.

2. A positive point charge $q_1 = 8.0\,\text{nC}$ is on the x-axis at $x = -1.5\,\text{m}$, and a second positive point charge $q_2 = 10.0\,\text{nC}$ is on the x-axis at $x = 2.0\,\text{m}$. Find the net electric field at a point P on the axis at $x = 5.0\,\text{m}$

3. An electric current in a conductor varies with time according to the expression $I(t) = 50\sin(75\pi t)$, where I is in amperes and t is in seconds. What is the total charge passing a given point in the conductor from $t = 0$ to $t = (1/150)\,\text{s}$?

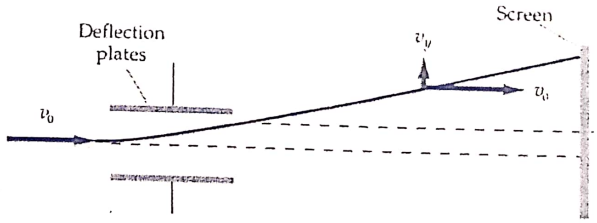
4. A 50-turn square coil has an edge length equal to 20.0 cm and carries a current of 5.0 A. It lies in the $z = 0$ plane, in a uniform magnetic field $\vec{B} = 0.200\,(\text{N/Am})\hat{i} + 0.300\,(\text{N/Am})\hat{k}$. (a) Calculate the magnetic moment of the coil. (b) Calculate the torque exerted on the coil. (c) Calculate the potential energy of the coil.



5. An electron with a kinetic energy of 30 eV moves into a region of uniform magnetic field $\vec{B}$ of magnitude $5.00\times10^{-4}\,\text{T}$. The angle between the direction of $\vec{B}$ and the electron's velocity $\vec{v}$ is 35°. (a) Calculate the speed of the electron. (b) Calculate the period of revolution. (c) Calculate the cyclotron radius. (d) Calculate the pitch of the helical path taken by the electron.

6. A copper strip has 8.50×10^{22} electrons per cubic centimeter, is 3.00 cm wide, is 0.50 cm thick, has a current of 20.0 A and a Hall voltage of $3.25\,\mu\text{V}$. (a) Find the magnitude of the magnetic field. (b) Find the drift speed of the electrons.

7. Electrons pass undeflected through the plates of an apparatus when the electric field is 4000 V/m and there is a crossed magnetic field of 0.200 mT. If the plates are 5.00 cm long and the ends of the plates are 30.0 cm from a screen surface, find the deflection on the screen when there is no magnetic field.



8. For $|\vec{B}| = 0.75\,\text{T}$ in a region of space, the force is 0.95 N on a single pole q_m of a $\ell = 15\,\text{cm}$ long magnet. (a) Find q_m. (b) Find the magnetic dipole moment of the magnet. Find the magnetic field due to the north magnetic pole (c) at a point ***P*** a distance d = 7 cm along its axis and (d) at the point ***S*** a distance d = 7 cm along its perpendicular bisector.