



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Basic and Applied Sciences

Lecturers : Physics Staff

Course : Physics I

Course Code : BA 113

Date : 04 / 06 /2012

Marks: 40

Time : 2 hours

Final Exam Paper

Answer the Following Questions:

Question 1:

Total [10 marks]

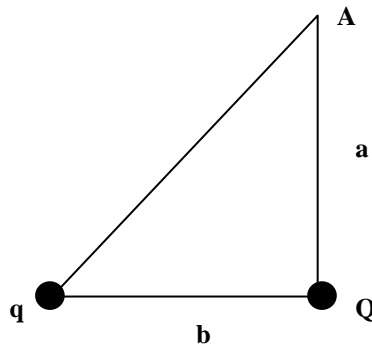
a. Two point charges q and Q are positioned as shown in the figure below.

If $q = +2.0 \text{ nC}$, $Q = - 2.0 \text{ nC}$, $a = 3.0 \text{ m}$, and $b = 4.0 \text{ m}$.

i. What is the net electric field at point A?

ii. What is the total electric potential at point A?

[6 Marks]



b. An electron moves in a circular path perpendicular to a uniform magnetic field with a magnitude of 2.00 mT . If the speed of the electron is $1.50 \times 10^7 \text{ m/s}$, determine the radius of the circular path.

[2 Marks]

c. Calculate the magnitude of the magnetic field at a point 25 cm from a long thin conductor carrying a current of 2 A .

[2 Marks]

Question 2:

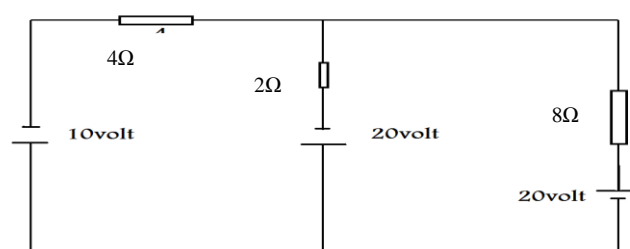
Total [10 marks]

a. A Nichrome wire having a length of 100 cm , radius of 0.2 mm and a resistivity of $\rho = 10^{-6} \Omega \cdot \text{m}$, is connected to a battery having a potential difference of 10 V . Calculate the current passing through this wire?

[3 Marks]

b. Applying Kirchhoff's rules, calculate the current passing in each resistor through the circuit shown below?

[7 Marks]

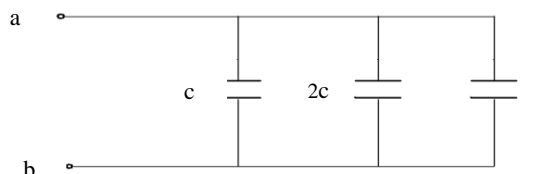


Question 3:**Total [10 marks]**

- a. A rectangular coil having dimensions of $5.4\text{cm} \times 8.5\text{cm}$ containing 25 turns of wire and carries a current of 15 mA. A 0.35 T magnetic field is applied parallel to the plane of this coil.
- Calculate the magnitude of the magnetic dipole moment of the coil?
 - What is the magnitude of the torque acting on the coil?
- [5 Marks]
- b. In R-C circuit, the e.m.f of the battery is 9 V, the capacitance of the capacitor is $20\ \mu\text{F}$ and the value of the resistor is $100\ \Omega$.
- Find:
- The maximum current in the circuit.
 - The maximum charge in the capacitor.
 - After closing the switch by 10 seconds, find the current through the resistor and the charge on the capacitor.

[5 Marks]**Question 4:****Total [10 marks]****a. Choose the correct answer:****[6 Marks]**

- Two distant like point charges repel each other with an electric force "F". If the separating distance is halved, the exerted force will be:
 - F/4
 - F/2
 - 2F
 - 4F
- A rod 20cm long is uniformly charged and has a total charge 10nC. The magnitude of the electric field along the axis of the rod at a point 20cm from its center is equal...
 - 30 N/C
 - 300 N/C
 - 3000 N/C
 - 210 N/C
- A proton placed at rest in a uniform electric field of magnitude 500N/C. The speed of proton after 20 nsec is
 - 10^3 m/sec
 - 1.8×10^3 m/sec
 - 1.8×10^2 m/sec
 - 1.8×10^{-2} m/sec
- The equivalent capacitance of the circuit shown below is
 - 0.2 C.
 - 0.4 C.
 - 1.0 C.
 - 4.0 C.



- b. A long solenoid has 1000 turns uniformly distributed over a length of 0.400 m produces a magnetic field of magnitude of $1.00 \times 10^{-4}\text{T}$ at its center. What current is required in the windings for that to occur?
- [2 Marks]
- c. A proton moving at 4.00×10^6 m/s through a magnetic field of magnitude 1.70 T experiences a magnetic force of magnitude 8.20×10^{-13} N. What is the angle between the proton's velocity and the field?

[2 Marks]

You may use the following constants

Quantity	Symbol	constants
Charge of Electron	e	$1.6 \times 10^{-19} \text{ C}$
Coulombs' constant	k	$9 \times 10^9 \text{ N.m}^2/\text{C}^2$
Mass of the electron	m_e	$9.109 \times 10^{-31} \text{ kg}$
Mass of the proton	m_p	$1.672 \times 10^{-27} \text{ kg}$
Permittivity of air	ϵ_0	$8.85 \times 10^{-12} \text{ C}^2/\text{N.m}^2$
Permeability of free space	μ_0	$4 \times 10^{-7} \text{ T.m/A}$

Members of Course Examination Committee	Signature	Date
Dr. Mohamed Abd El-Zaher		
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Dr. Ali Abd El-Moniem		

Good Luck