

St John Baptist De La Salle Catholic School, Addis Ababa

Homework 3

3rd Quarter

Aaron GK

March 9, 2023

Notes, and use of other aids is allowed. Read all directions carefully and write your answers in the space provided. To receive full credit, you must show all of your work. **Cheating or indications of cheating and similar answers will be punished accordingly.**

Information

- The homework is due on **Friday, March 3**.
- You should Work on it **in groups** and consult me if you have any questions. Cheating within groups is unacceptable.
- For purposes of neatness and simplicity of grading, you should do the homework on an **A-4 paper**.

Questions

1. What is the force and torque on a square-shaped 6A current carrying loop of conducting wire that has an area of $0.0064m^2$ and surrounded by a permanent magnet with a field strength of $B = 3.0 \times 10^5 T$ that is tilted at 30° to the loop?
2. If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in that region is necessarily zero?
3. What is the angle between the current carrying wire and the magnetic field when the force exerted on the wire is half of the maximum force possible?

Advanced Problems

4. Find the charge to mass ratio of a charge moving if it is moving at a speed of $v = 5.0 \times 10^3 m/s$ in a magnetic field of 0.08G and it has the same trajectory as an electron in the same magnetic field.
5. What is the magnetic field 2cm away due to a straight current carrying wire made of Manganese if the wire has a volume $27cm^3$ and length 3cm, if it is switched on for 5 seconds?(Hint: *calculate the electron density of Manganese to find the current*)