

National University of Singapore

PC2131 – Electricity and Magnetism I

(Semester II, AY2010/2011)

TIME ALLOWED: 2 hours

Instructions to the candidate:

- This examination consists of **TWO** pages and **FOUR** questions.
- Answer all questions
- Each question is worth 20 points
- This is a closed book examination
- One help sheet (A4 size, both sides) is allowed for this examination
- Present your solutions in a clear and comprehensible manner.

## QUESTIONS:

1. Consider an infinitely long wire carrying a current  $I$ . The cross section of the wire is illustrated in Figure 1. Determine the magnetic field at the centre of the wire (at the point  $P$ ).

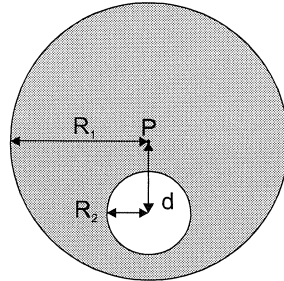


Figure 1: Wire cross section

2. An electron is located a distance  $z$  from a flat metallic surface held at zero electric potential. Determine the force on the electron? In which direction will the electron move?

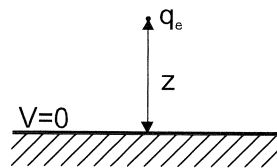


Figure 2: An electron above conductive plane

3. A randomly polarized beam of light hits a water surface at Brewster angle. What is the intensity of the transmitted and reflected beams? The refractive index of water is  $n = 1.33$

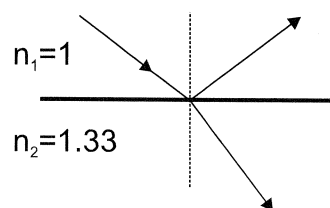


Figure 3: Light hitting a water surface at Brewster angle

4. How would you build an instrument that measures magnetic fields? Analyze your proposal.

END OF PAPER