國立嘉義大學九十五學年度
科學教育研究所碩士班招生考試試題

科目：普通物理

說明：本試題分三部分，第一部分為選擇題，請標明題號，只需將答案作答在「答案卷」上；第二部分為名詞解釋，請標明題號作答；第三部份為計算與簡答題，請標明題號，並將過程作答在「答案卷」上。

一、選擇題：（每題 5%，共 20%）

1. A physics textbook is suspended on a spring scale in an elevator. Of the following, the scale shows the highest reading when the elevator:
   A) moves downward with increasing speed
   B) moves downward with decreasing speed
   C) remains stationary
   D) moves upward with decreasing speed

2. Water is pumped through the hose shown below, from a lower level to an upper level. Compared to the water at point 1, the water at point 2:
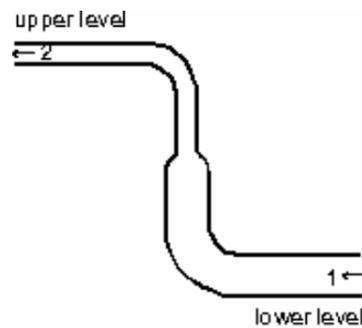
   A) has greater speed and greater pressure
   B) has greater speed and less pressure
   C) has less speed and less pressure
   D) has less speed and greater pressure

3. A positively charged ion, due to a cosmic ray, is headed through the Earth's atmosphere toward the center of the Earth. Due to the Earth's magnetic field, the ion will be deflected:
   A) south
   B) north
   C) west
   D) east

4. Consider: radio waves (r), visible light (v), infrared (i), x-rays (x), and ultraviolet (u). In order of increasing frequency, they are:
   A) r, v, i, x, u
   B) r, i, v, u, x
   C) i, r, v, u, x
   D) i, v, r, u, x

二、名詞解釋：（每題 5%，共 20%）

1. Snell 折射定律
2. 槓桿原理
3. Ohm's law
4. Doppler effect

三、計算與簡答題

1. Two large parallel plates carry positive charge of equal magnitude that is distributed uniformly over their inner surfaces. Rank the points 1 through 5 according to the magnitude of the electric field at the points, from the least to the greatest. (10%)
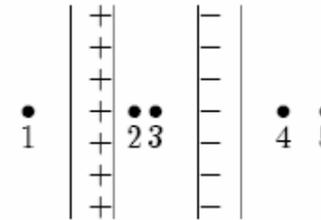
2. A long line of charge with λ_1 charge per unit length runs along the cylindrical axis of a cylindrical shell which carries a charge per unit length of λ_2. What are the charge per unit length on the inner and outer surfaces of the shell? (10%)

3. Positive charge Q is placed on a conducting spherical shell with inner radius R1 and outer radius R2. A point charge q is placed at the center of the cavity. What is the magnitude of the electric field at a point outside the shell, a distance r from the center? (10%)

4. Each of the resistors in the diagram has a resistance of 12 Ω. What is the resistance of the entire circuit? (10%)
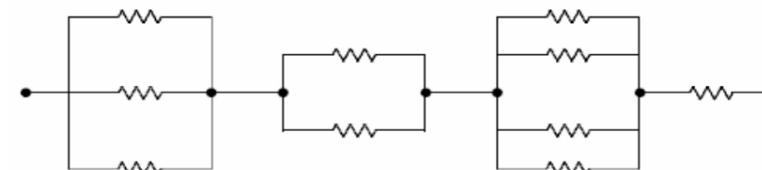
5. A can is suspended from a magnet M, and the tube of the blowgun is aimed directly at the can. The magnet releases the can just as the ball leaves the blowgun. Please show that the projectile ball always hits the falling can. (20%)