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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
END SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KPH – PHYSICS II

Date: 17TH APRIL 2023
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Define electric field as used in electrostatics (2 Marks)

b) State and explain three main properties of electric charge? (6 Marks)

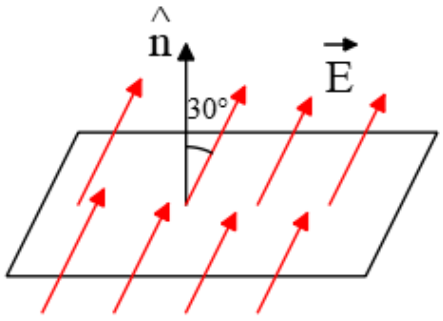
c) Given that the charge in an electron is 1.6×10^{-19} C, determine how many electrons are present in 1 Coulomb of charge. (4 Marks)

d) A charged particle is in an electric field with electric field strength 3.5×10^4 N/C where it experiences a force of 0.3 N. Calculate the charge of the particle. (4 Marks)

e) State the four rules for electric field lines. (4 Marks)

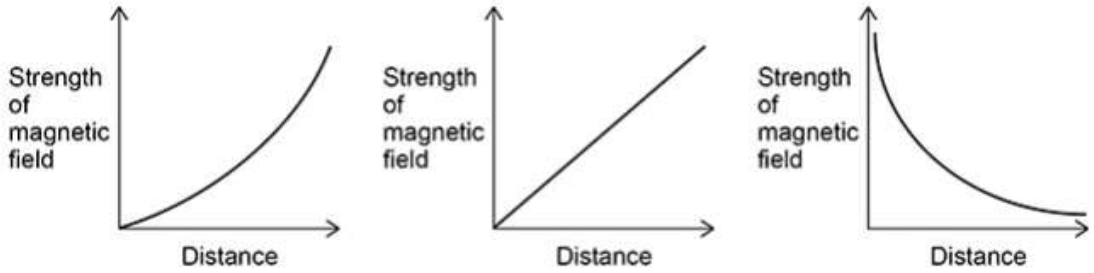
f) Define the following types of potential energy. (4 Marks)
   i) Gravitational potential energy
   ii) Elastic potential energy

g) A uniform electric field with a magnitude of E = 400N/C incident on a plane with a surface of area A = 10 m^2 and makes an angle of 30° with it. Find the electric flux through this surface. (6 Marks)



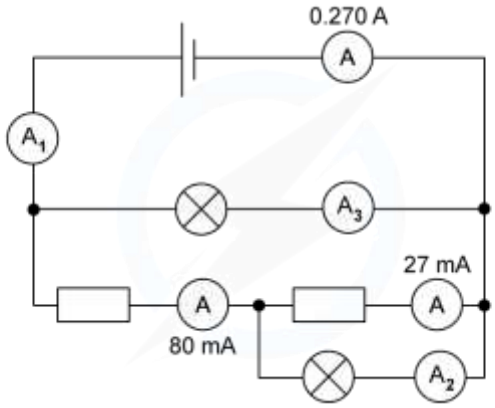
QUESTION TWO (20 MARKS)

a) Which graph shows how the strength of the magnetic field varies with distance from a bar magnet? Give a reason for your answer. (4 Marks)



b) State Ohms law (2 Marks)

c) Study the electrical circuit below.



Using Kirchhoff's' laws, find the readings on the following ammeters.

i) Ammeter A_1 (2 Marks)
ii) Ammeter A_2 (4 Marks)
iii) Ammeter A_3 (4 Marks)

d) Explain what we mean by conservation of charges in Electrostatics (4 Marks)

QUESTION THREE (20 MARKS)

a) There are two main ways of charging an object in electrostatics, conduction and induction. With the aid of well labelled diagrams, explain these two concepts. (10 Marks)

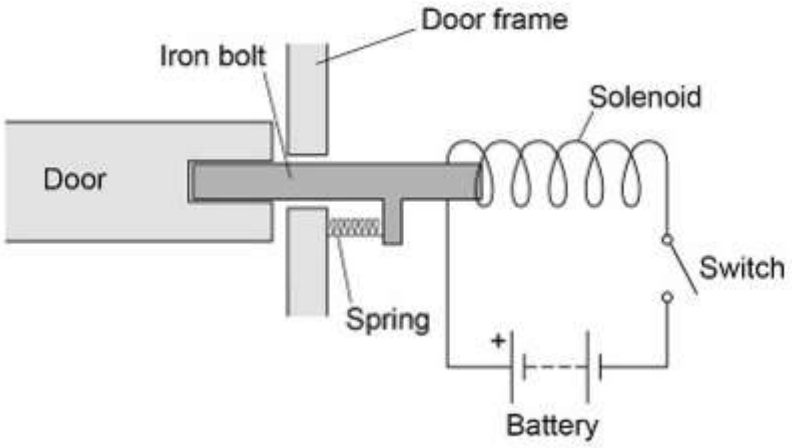
b) Give the difference between resistivity and resistance of a material? (4 Marks)

c) Suppose you want to connect your stereo to remote speakers. If each wire must be 20 m long, what diameter of copper wire should you use to make the resistance 0.010ohms per wire(6 Marks)

QUESTION FOUR (20 MARKS)

a) Briefly explain what you understand by magnetic field. (4 Marks)

b) The figure below shows a diagram of an electromagnetic lock used to secure a door.



The electromagnetic lock contains a spring. When the door is unlocked the extension of the spring is 0.040 m. Spring constant = 200 N/m. Calculate the elastic potential energy of the spring when the door is unlocked.
Use the equation: elastic potential energy = 0.5 × spring constant × $(\text{extension})^2$ (6 Marks)

c) What will be the gravitational potential energy possessed by a ball of mass 10 kg when it is raised to a height of 4 m above the ground. ($g = 9.8\ m\ s^2$) (4 Marks)

d) Explain the following electrical quantities. (6 Marks)

i) Electrical current
ii) Electrical voltage
iii) Electrical power

QUESTION FIVE (20 MARKS)

a) Define capacitance (2 Marks)

b) Calculate the voltage of a battery connected to a parallel plate capacitor with a plate area of 2.0 cm2 and a plate separation of 2 mm if the charge stored on plates is 4.0×10^{-12} C. (6 Marks)

c) State the difference between half wave rectifier and full wave rectifier. (4 Marks)

d) With the aid of a diagram explain the working of half-wave rectifier. (8 Marks)