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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KPH 102 – PHYSICS II

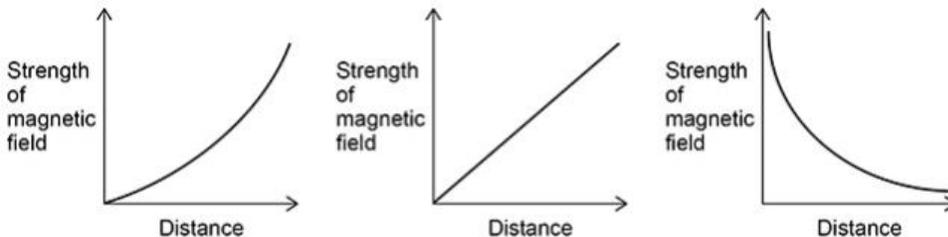
Date: 08TH December 2023
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

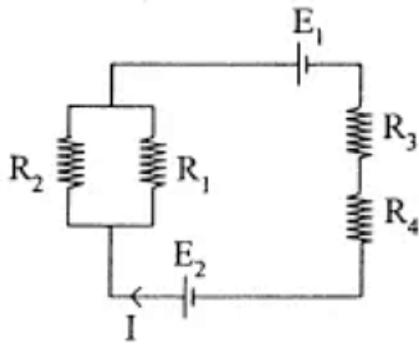
- a) Define terms as used in electrostatics (4 Marks)
- Electric Charge
 - Electric Field
 - Electric flux
 - Electric force
- b) Given that the charge in an electron is 1.6×10^{-19} C, determine how many electrons are present in 5 Coulombs of charge. (4 Marks)
- c) State coulomb's law. (2 Marks)
- d) 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)
- $$k = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$$
- e) A mass of 10Kg is taken from the ground for 10m uphill on the wedge. The wedge makes an angle of 30° with the ground. Find the potential energy of the block. (6 Marks)
- f) State Faraday's law. (2 Marks)
- g) Which graph shows how the strength of the magnetic field varies with distance from a bar magnet? Explain your answer (4 Marks)



- h) State the different properties of magnetic field lines. (4 Marks)

QUESTION TWO (20 MARKS)

- a) State the differences between magnetism and electromagnetism. (4 Marks)
- b) An electric circuit consists of four resistors, $R_1 = 12$ Ohm, $R_2 = 12$ Ohm, $R_3 = 3$ Ohm and $R_4 = 6$ Ohm, and are connected with a source of emf $E_1 = 6$ V, $E_2 = 12$ V. Determine the electric current flows in the circuit as shown in the figure below. (6 Marks)



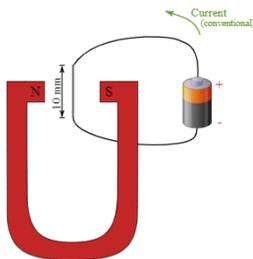
- c) State the differences between the following.
- Resistance and Resistivity
 - Electrical voltage and electrical power
 - Conventional current and electron current (6 Marks)
- d) Calculate the voltage of a battery connected to a parallel plate capacitor with a plate of area 2.0 cm^2 and a plate separation of 2 mm if the charge stored on the plates is 4.0 pC (4 Marks)

QUESTION THREE (20 MARKS)

- a) State and explain the three properties of electric charge. (6 Marks)
- b) 5 different types of charges are present in an isolated system, the values of the charges are- $+5 \text{ nC}$, -6 nC , $+3 \text{ nC}$, $+4 \text{ nC}$, $+1 \text{ nC}$. What is the total charge present in the system? (4 Marks)
- c) Suppose a system has 0 charge overall. Is it true that there are no charges present in the system? Explain your answer. (4 Marks)
- d) With the aid of a well labeled diagram, explain how an object can be charging through induction method. (6 Marks)

QUESTION FOUR (20 MARKS)

- a) Define the following;
- Electromagnet.
 - Magnetic field (4 Marks)
- b) Using a diagram, explain how electromagnet works. (6 Marks)
- c) The figure below shows a wire running through the north and south poles of a horseshoe magnet. A battery which is connected to the wire causes a current of 5 A to flow through the wire in the direction shown. If the magnetic field between the poles is known to be 0.2 T , what is the magnitude and direction of the force on the 10 mm section of wire between the poles? (4 Marks)



- d) Explain how you can use Fleming's left hand rule to determine the direction of the force, the direction of current and the direction of the magnetic field? (6 Marks)

QUESTION FIVE (20 MARKS)

- a) State the two kirchoff's law (4 Marks)
- b) In an experiment of measuring the current through an unknown resistor, a student obtained the following data.
- | Voltage (V) | Current (I) |
|-------------|-------------|
| 3.0 | 0.151 |
| 6.0 | 0.310 |
| 9.0 | 0.448 |
| 12.0 | 0.511 |
| 15.0 | 0.750 |
- i) By drawing a graph on paper, show the relationship between current and voltage (4 Marks)
- ii) Using that graph, determine the resistance of the resistor. (4 Marks)
- c) Explain path, node, branch and loop which are commonly used in DC circuits (4 Marks)
- d) Kirchoff's laws are used in the analysis of complex circuits in electrical circuitry. Discuss the basic procedure for using kirchoff's circuit law. (4 Marks)