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### **KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY UNIVERSITY EXAMINATIONS, 2024/2025 ACADEMIC YEAR** FIRTS YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

### KPH 2102 PHYSICS II

Date: 14<sup>TH</sup> AUGUST, 2024 Time: 8:30 AM - 10:30 AM

(2 Marks)

#### **INSTRUCTIONS TO CANDIDATES** ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

### **QUESTION ONE: COMPULSORY (30 MARKS)**

- a) State two types of electric charge and explain their characteristics. (4 Marks) b) Given that the charge in an electron is  $1.6 \times 10^{-19}$  C, determine how many electrons are present in 5 Coulombs of charge. (2 Marks) (4 Marks)
- c) Differentiate between resistance and resistivity in conducting materials.
- d) A charged particle is in an electric field with electric field strength  $3.5 \times 10^4$  N/C where it experiences a force of 0.3 N. Calculate the charge of the particle. (4 Marks)

### $k = 8.99 \times 10^9 Nm^2/C^2$

- e) A point charge  $Q_1 = 5 \mu C$  located at origin and another point charge  $Q_2 = -8 \mu C$  is on the coordinate (x = 3, y = 4) m.
  - i) Find the electric force on charge  $Q_1$ . (4 Marks) ii) Is the force attractive or repulsive? (2 Marks) (4 Marks)
- f) Briefly demonstrate how an uncharged object can be charged be conduction.
- g) State Faraday's first law of magnetic induction and give four ways in which you can change the magnetic field intensity in a closed conductor circuit loop. (6 Marks)

# **QUESTION TWO: (20 MARKS)**

- a) With a suitable diagram(s), demonstrate how electromagnet works to induce current and electromotive force using electric fields and magnet. (8 Marks)
- b) Using half wave rectifier, you can transform an AC power to DC power, using suitable diagram(s), explain how a half – wave rectifier works to perform this transformation of AC to DC. (6 Marks)
- c) If the plate separation for a capacitor is  $2.0 \times 10^{-3}$ m. determine the area of the plate if the capacitance is exactly 1F. (4 Marks)
- d) In a DC circuit, what is the difference between path and branch.

# **OUESTION THREE (20 MARKS)**

a) Using the Kirchhoff's Current and voltage kirchhoff's Law. Find the current flowing through the  $20\Omega$ Resistor, R<sub>2</sub>. (6 Marks)



b) State and explain the three main properties of electric charge.

(6 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) 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 0.10  $\Omega$  per wire. (4 Marks)

#### **QUESTION FOUR: (20 MARKS)**

a) Consider the figure below



- i) Find the equivalent capacitance between A and B.
- ii) Find the potential difference across 3uF capacitor. (4 Marks) (4 Marks)
- iii) Find the amount of charge on 2uF capacitor.
- b) Illustrate using well labelled diagrams how uncharged body can be charging through induction.

(8 Marks)

(4 Marks)

#### **OUESTION FIVE: (20 MARKS)**

- a) State coulomb's law. (2 Marks) b) A polythene is rubbed against a woolen cloth, the charge developed on the woolen cloth is  $7 \times 10$ -9C. What is the amount of charges transferred? (4 Marks)
- c) A plane surface with dimensions 2m by 2m is positioned in a uniform electric field of E = 120 N/C as shown in the figure below. Find the electric flux through the surface. (6 Marks)



- d) Calculate the gravitational potential energy possessed by a ball of mass 1 kg when it is raised to a height of 6 m above the ground. ( $g = 9.8 \text{ m/s}^2$ ) (4 Marks)
- e) State the four properties of magnetic field lines.

(4 Marks)