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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2018/2019 ACADEMIC YEAR TWO**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: PHY 210/PHY 211**

**COURSE TITLE: ELECTRICITY AND MAGNETISM**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 07/02/2020 TIME: 2.00-4.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FOUR (4) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. (i) Name three kinds of charge density **[6 marks]**

(ii) Outline important characteristics of a charge **[2 marks]**

 (iii) Classify molecules of dielectrics **[2 marks]**

1. (i) What is capacitor? **[2 marks]**

(ii) What are the functions of a capacitor in an electric circuit? **[4 marks]**

(iii) A parallel plate capacitor has an area of A = 2 and

 a plate separation of d = 1 cm. Find the capacitance. **[4 marks]**

1. (i) Define electric potential difference between two points in an electric field **[2 marks]**

(ii) What do you understand by the term magnetic induction? **[2 marks]**

(iii)Find the Lorentz force on a point charge moving in a magnetic field **[2 marks]**

**QUESTION TWO**

1. (i) State the Gauss law and give its differential form **[3 marks]**

(ii) Use the above law to find the field due spherically symmetric charge

 Distribution at an external point **[5 marks]**

(ii) A point Three different point charges are located as shown.

 Charge ,

 3m

 **4m**

 **6m**

 Find

1. the magnitude **[6 marks]**
2. The direction of the net force on **[6 marks]**

**QUESTION THREE**

1. Show that the potential due to point charges is given by

 , where symbols have their usual meaning **[11 marks]**

1. Two point charges and are located respectively at two corners of an equilateral triangle of side 1m

 1m 1m

 1m

 (i) Find the potential v at the other corner of the triangle (v=0 at v=) **[3 marks]**

(ii) Find the work required to bring a third charge and from infinity to the

 unoccupied corner **[3 marks]**

(iii) Find the electric potential energy of the system of the three charges **[3 marks]**

**QUESTION FOUR**

1. Five capacitors are connected as shown below. Find the equivalent capacitance of the combination **[5 marks]**



1. A series RLC circuit has a resistance of 250Ω, a capacitance of 50 and an inductance of 0.300H. If the circuit is driven by 120V-60 Hz source, What are
2. The Impendence of the circuit **[5 marks]**
3. The current in the circuit **[5 marks]**
4. Phase angle between the current and the voltage **[5 marks]**

**QUESTION FIVE**

1. State the parameters upon which a force between two current elements carrying steady current depends on. **[8 marks]**
2. (i) Show that the Biot-savart law is given by

Where symbols have their usual meaning **[6 marks]**

(ii)Deduce the amperes force law **[6 marks]**