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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2019/2020 ACADEMIC YEAR TWO**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: PHY 122/212**

**COURSE TITLE: MODERN PHYSICS**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 18/12/2020 TIME: 09.00-11.00 AM**

**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 TWO (2) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

 (a) (i) Define an electron volt (eV). **[2 marks]**

 (ii) State the Plank’s hypothesis **[3 marks]**

 (b) Distinguish between

 (i) Coherent and incoherent scattering. **[3 marks]**

 (ii) Photoelectric effect and blackbody radiations **[3 marks]**

 (c) (i) An electron and a photon have the same de-Broglie wavelength. Show

 that the energy of the electron is greater than that of the photon. **[5 marks]**

(ii) Name the three isotopes of hydrogen **[3 marks]**

 (d) (i) What is radioactivity? **[2 marks]**

(ii) In radioactivity, outline important features of the following particles

 ($α),\left(β\right), (γ$) **[9 marks]**

**QUESTION TWO**

1. (i) State the Heisenberg uncertainty principle **[2 marks]**

(ii) Using 2(a)(i) Show that an electron cannot be inside the nucleus. **[8 marks]**

1. X-ray of wavelength 1A0 falls on a metal plate. Find the kinetic energy of

 the photo-electron emitted. Neglect work function. **[10 marks]**

**QUESTION THREE**

1. Derive the de-Broglie wavelength

$λ=\frac{h}{mv}$ , where symbol have their usual meaning. **[8 marks]**

1. What is the de-Broglie wavelength of an electron having KE = 1MeV **[8 marks]**
2. What are the difficulties introduced by Rutherford’s atomic model? **[4 marks]**

**QUESTION FOUR**

1. State the four postulates upon which the Bohr’s theory of atomic structure is based. **[8 marks]**
2. On basis of the Bohr’s theory, calculate
3. The velocity of an electron in the inner most orbit (n = 1) of the

 hydrogen atom. **[6 marks]**

1. The energy of an electron in the ground state of the hydrogen atom. **[6 marks]**

**QUESTION FIVE**

1. State the two postulates upon which the theory of relativity is based on. **[8 marks]**
2. Explain how Michelson-Morley experiment proved the non-existence of the ether hypothesis. **[12 marks]**