



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BSc. CONSTRUCTION
MANAGEMENT AND RENEWABLE ENERGY.

2023/2024 EXAMINATION

MAIN

REGULAR

COURSE CODE: SPH 3121

COURSE TITLE: PHYSICS 11

EXAM VENUE:

STREAM: (BED SCI)

DATE:

EXAM SESSION:

TIME: 2:00HRS

Instructions:

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**
- 4. Take $h = 6.63 \times 10^{-31} \text{js}$, $m_e = 9.11 \times 10^{-31} \text{kg}$**

SECTION A

QUESTION ONE (Compulsory) (30 Marks)

- a. Define Thermoelectric Effect (2 marks)
- b. Explain why concave lenses are referred to as diverging lenses (2 marks)
- c. State any four properties of the image of an object placed between the focal point and the pole of a diverging lens (4 marks)
- d. With aid of a ray diagram trace the image of an object placed at infinity for both converging mirror (4 marks)
- e. Define the term photoelectric effect (2 marks)
- f. Distinguish between nuclear fusion and nuclear fission (2 marks)
- g. A radioactive element X, [${}_{82}^{214}\text{X}$] decays to another element Y, by emitting 4 alpha particles and one beta particle. Write down the equation of the decay process. (4 marks)
- h. Write down and explain the Einstein equation of photoelectric effect (4 marks)
- i. A metal has work function 4.8 eV. Calculate its threshold frequency and the maximum velocity of the photoelectron produced when its surface is illuminated by light of wavelength $2.6 \times 10^{-8}\text{m}$. (6marks)

SECTION B

QUESTION TWO (20 Marks)

- a. In terms of magnetic susceptibility, magnetic materials can be classified into three broad classes. Discuss the these three classes giving an example of a material in each class.
 - i. Ferromagnetic Materials (3 marks)
 - ii. Paramagnetic Materials (3 marks)
 - iii. Diamagnetic Materials (3 marks)
- b. Using well labelled diagrams, fully explain how the following optical instruments work
 - i. Human Eye (5 marks)
 - ii. Telescope (6 Marks)

QUESTION THREE (20 Marks)

- a. Discuss the following giving differences
 - (i) Peltier effect (5 marks)

- (ii) Seebeck Effect (5 marks)
- b. Derive the lens formula (5 marks)
- c. Using ray diagram, state the properties of images formed on a plane mirror (5 marks)

QUESTION FOUR

(20 Marks)

- a. Define the following terms, stating their SI units
- i) work function (2 marks)
- ii) threshold frequency (2 marks)
- b. The minimum frequency of light that will cause photoelectric emission from a metal surface is $4.8 \times 10^{14} \text{ Hz}$. When the surface is irradiated using a certain source, photoelectrons are emitted with a speed of $7.2 \times 10^5 \text{ m/s}$, calculate;
- i. The work function of potassium (4 marks)
- ii. The maximum Kinetic Energy of the photoelectron (4 marks)
- iii. The frequency of the source of irradiation (4 marks)
- d. Explain the concept of the Compton Effect (4 marks)

QUESTION FIVE

(20 Marks)

- a. Define the following terms
- i) Radionuclide (2 marks)
- ii) Half-life (2 marks)
- b. The half-life of certain radioactive element is 300 years.
- i) What fraction of the element will be remaining after 900 years? (4 marks)
- ii) What fraction of the element will have decayed after 1.5×10^4 years (4 marks)
- c. State and explain any three applications of radioactivity (8 marks)