

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2022/2023 ACADEMIC YEAR

FIRST YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN BIOMEDICAL SCIENCES

PHYS 120: GENERAL PHYSICS

STREAM: R

TIME: 2 HRS

DAY: MONDAY [11.30AM – 13.30] DATE: 05/12/2022

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

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SECTION A 30 marks

INSTRUCTIONS: - Answer all the question

QUESTION ONE

- (a) What is meant by the following terms? - (4 marks)
- (i) Radioactive decay
 - (ii) Isotope
- (b) State one use of radioactivity in each of the following (2 marks)
- (i) Medicine
 - (ii) Agriculture
- (c) Alpha particles are more ionizing than beta particles. Explain why? (2 marks)
- (d) State two laws of reflection of light (2 marks)
- (e) Differentiate between beam of light and a ray of light (2 marks)
- (f) Name the type of mirror used in the design of solar furnaces. Explain how high temperature is achieved by this device (3 marks)
- (g) What is meant by the word thermodynamics? (2 marks)
- (h) List three types of forces (3 marks)
- (i) State three properties of x-rays (3 marks)
- (j) What is a rigid body? (2marks)
- (k) Radon gas ${}^{222}_{86}\text{Rn}$ decays by emission of α particles. Show by use an equation, the transformation of the gas. (3 marks)
- (l) Give two uses of cobalt-60 as a radioactive sources (2 marks)

SECTION B (40mks) - Answer any two questions

QUESTION TWO

- (a.) radioactive carbon-14 decays to nitrogen by beta emissions as shown



Determine the value of x and y in the equation (3marks)

- (b) Discuss two types of X-rays (4marks)
- (c) Using Label diagram explain how a Geiger-Muller tube detects radioactive particles/rays. (13marks)

QUESTION THREE

(a) A ray of light from air travels successfully through parallel layers of water, oil glass and then into air again the angle of incidence in air is 60° . The refractive indices of water oil and glass are $4/3$, $6/5$ and $3/2$ respectively

- (i) Draw a diagram to show how the ray passes through the multiple layers (4 marks)
- (ii) Calculate the angle of
 - a) Refraction in water (4 marks)
 - b) Incidence at the oil-glass interface (4 marks)

b) A concave mirror has focal length of 20cm. At what distance from the mirror, should a 4cm tall object be placed; so that it forms an image at a distance 30cm from the mirror? Calculate the size of the object c) list four characteristics of an image formed by a plane mirror.

(4 marks)

QUESTION FOUR

- (a) state and explain the three types of mechanics (6 marks)
- (b) Explain the following terms (10 marks)
 - (i) Distance
 - (ii) Displacement
 - (iii) Velocity
 - (iv) Acceleration

(b) Differentiate between a scalar and a vector quantity, giving examples in each.

(4 marks)

QUESTION FIVE

- (a) state the three newton's laws of motion (6 marks)
- (b) Explain how x-rays are produced (10 marks)
- (c) State the sources of background radiations (4 marks)