



KIBABII UNIVERSITY

SUPPLIMENTARY/SPECIAL UNIVERSITY EXAMINATIONS

ACADEMIC YEAR 2021/2022

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

BACHELOR OF SCIENCE

COURSE CODE: SPH 418

COURSE TITLE: NUCLEAR PHYSICS

DATE: 17/11/2022

TIME: 8:00AM-10:00AM

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any TWO of the remaining.

Time: 2 hours

KIBU observes ZERO tolerance to examination cheating

QUESTION ONE (30 MARKS)

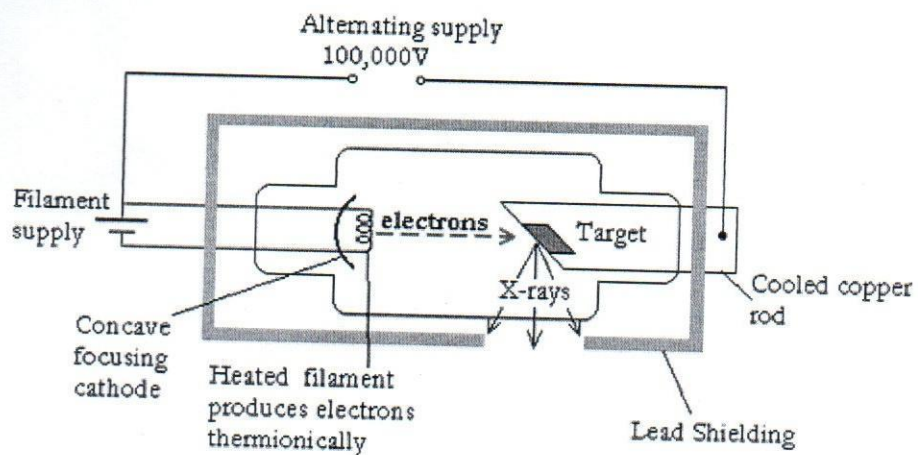
- a) State Dalton's atomic theory (2 marks)
- b) Differentiate between mass number (A) and atomic number (Z) (2 marks)
- c) Define half-life (2 marks)
- d) State any three properties of X-rays (3 marks)
- e) State any three properties used to detect X-rays (3 marks)
- f) State two major developments that played a major role in the formulation of the Bohr's model of atom (2 marks)
- h) What is ionization energy? (3 marks)
- i) State Pauli exclusion principle (2 marks)
- j) State the Aufbau principle (2 marks)
- k) Name any two types of radioactive decay (2 marks)
- l) What are nuclear forces? (1 mark)
- m) Define carbon Dating? (2 marks)
- n) Name three fundamental particles that make up an atom (3 marks)

QUESTION TWO (20 MARKS)

- a) What is natural radioactivity? (2 marks)
- b) Discuss the penetrating power of radiation of the three types of radioactive decays (3 marks)
- c) The half-life of a Radium is 1590 years. Find its decay constant λ and determine the number of nuclei in one gram of Radium. (5 marks)
- d) Discuss nuclear reactions (10 marks)

QUESTION THREE (20 MARKS)

- a) (i) A Curie is very large and dangerous amount of radioactivity. How long would one have to wait for the tritium activity to reduce to 1 mCi? (4 marks)
- (ii) The half-life of radium equal to 1590 years. Find its decay constant λ and determine the number of the nuclei in one gram of Radium. (4 marks)
- b) The Figure below shows a set up used to produce X-rays.



Describe how the X-rays are produced by the set up and highlight the uses of X-rays

(12 marks)

QUESTION FOUR (20 MARKS)

Discuss Bohr's postulates of the hydrogen atom

(20 marks)

QUESTION FIVE (20 MARKS)

Write notes on Yukawa's theory of nuclear forces

(20 marks)