

**HNDS 0111**

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE  
IN HUMAN NUTRITION AND DIETETICS**

**HNDS 0111: PHYSICAL SCIENCE**

**STREAMS: B.Sc (HNDS)**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 11/04/2023**

**11.30 A.M. – 1.30 P.M.**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO**

**QUESTION ONE (30 MARKS)**

- a) Distinguish between derived quantities and fundamental quantities giving two examples in each case. (4 marks)
- b) Define the following terms:
- (i) Dynamics (1 mark)
  - (ii) Wave (1 mark)
  - (iii) Kinetic energy (1 mark)
  - (iv) Magnetism (1 mark)
- c) (i) State the newton's second law of motion. (2 marks)
- (ii) A car of mass 1200kg travelling at 45m/s is brought to rest in 9 seconds. Calculate the average retardation of the car and the average force applied by the brakes. (3 marks)
- d) (i) State the law of conservation of energy. (1 mark)
- (ii) State four properties of static electricity. (2 marks)
- e) State 3 ways in which turning effect can be increased in direct current. (2 marks)
- f) (i) Differentiate between a compound and a mixture. (2 marks)
- (ii) An element with three stable isotopes has 82 protons. The separate isotopes contain 124, 125, and 126 neutrons. Identify the element and write symbols for the isotopes. (2 marks)

## HNDS 0111

- g) Describe Lewis theory of chemical bonding. (3 marks)
- h) Give three properties of acids and three properties of bases. (3 marks)
- i) Give three conditions for formation of an ionic bond. (2 marks)

### QUESTION TWO (20 MARKS)

- a) (i) Calculate the time in seconds taken by a moving body with a uniform speed of 720km/h to cover a distance of 6000km. (4 marks)
- (ii) The velocity of a body increases from 72km/h to 144km/h in 10 seconds. Calculate its acceleration. (3 marks)
- (iii) A body is uniformly accelerated from rest to a final velocity of 100m/s in 10 seconds. Calculate the distance covered. (3 marks)
- b) An electric motor rated 2.5kW is used to lift bales of hay to a store in a dairy farm. A single bale has mass of 5kg. If the store is 4 metres above the ground, how many bales can the motor raise in 2 minutes? (5 marks)
- c) Distinguish between chemical energy and heat energy. (2 marks)
- d) How many times a minute does a boat bob up and down on ocean waves that have a wavelength of 40.0 m and a propagation speed of 5.00m/s? (3 marks)

### QUESTION THREE (20 MARKS)

- a) A man runs 800m due north in 100 seconds, followed by 400m due south in 80 seconds. Calculate;
- (i) His average speed (3 marks)
- (ii) His average velocity (3 marks)
- (iii) His change in velocity for the whole journey (3 marks)
- b) A stone is released from the top of a cliff 180m high. Calculate:
- (i) The time it takes to hit the water. (4 marks)
- (ii) The velocity with which it hits the water (Take  $g=10\text{ms}^{-2}$ ) (3 marks)
- c) Explain why people who have the lens of their eye removed because of cataracts are able to see low-frequency ultraviolet. (4 marks)

**QUESTION FOUR (20 MARKS)**

- a) A stone is projected vertically upwards with a velocity of 30m/s from the ground. Calculate:
- (i) The time it takes to attain maximum height (2 marks)
  - (ii) The time of flight (1 marks)
  - (iii) The maximum height reached (2 marks)
  - (iv) The velocity with which it lands on the ground (take  $g=10\text{ms}^{-2}$ ) (2 marks)
- b) A stone is thrown horizontally from a building that is 45m high above a horizontal ground. The stone hits the ground at point which is 60m from the foot of the building. Calculate the initial velocity of the stone (take  $g=10\text{m/s}^2$ ) (4 marks)
- c) (i) Distinguish between atomic number and mass number. (2 marks)
- (ii) How many neon atoms are present in 10.1g of neon? (3 marks)
  - (iii) Compare the physical properties of ionic compounds and covalent substances (4 marks)
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