

**CHUKA UNIVERSITY**  
**HNDS 0111: PHYSICAL SCIENCE**

**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)
- 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 mark)

(ii) The time of flight (1 mark)

(iii) The maximum height reached (2 mark)

(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)