

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN COMPUTER SCIENCE

PHYS 00111: FUNDAMENTALS OF PHYSICS

STREAMS: CERT (COMP & SCI)Y1S1

TIME: 2 HOURS

DAY/DATE: FRIDAY 12/4/2024

11.30A.M. – 1.30 P.M.

INSTRUCTIONS:

- Answer Question One in Section A and any other Two Questions in Section B
- Do not write anything on the question paper
- This is a closed book exam, No reference materials are allowed in the examination room
- There will be No use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely
- You may use the data below

$$g=10 \text{ m/s}^2$$

$$c=3.0 \times 10^8 \text{ m/s}$$

QUESTION ONE (30MARKS)

- a) List six types of simple machines (3marks)
- b) What are the three states of static equilibrium (3marks)
- c) Differentiate between vector quantity and scalar quantity giving two examples for each (4marks)
- d) A 2kg book falls off the top of a 2.3m bookshelf. What is its kinetic energy right before it hits the ground? (2marks)
- e) State the laws of refraction (3marks)
- f) State the three newton laws of motion (6marks)

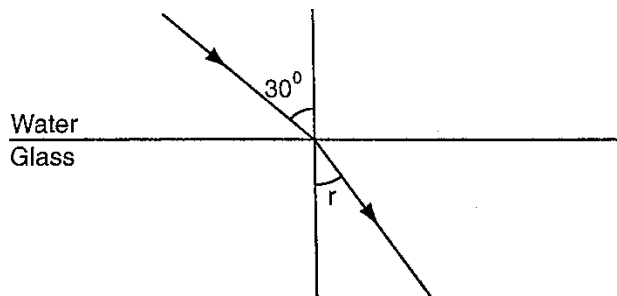
- g) Determine the position, size and nature of the image of an object 4cm tall placed on the principal axis of a concave mirror of focal length 15cm at a distance 30cm from the mirror (4marks)
- h) A body is uniformly accelerated from rest to a final velocity of 100m/s in 10 seconds. Calculate the distance covered (3marks)
- i) Define the following terms:
- i. Displacement
 - ii. Dispersion of light (2marks)

QUESTION TWO (20 MARKS)

- a. If an electron (mass $m = 9.11 \times 10^{-31}$ kg) in copper near the lowest possible temperature has a kinetic energy of 6.7×10^{-19} J, what is the speed of the electron (4marks)
- b. A ball is thrown from the top of a cliff 20m high with a horizontal velocity of 10m/s. Calculate,
- i. The time taken by the ball to strike the ground (3marks)
 - ii. The distance from the foot of the cliff to where the ball strikes the ground. (2marks)
- c. A stone is projected vertically upwards with a velocity of 60m/s from the ground. Calculate:
- i. The time it takes to attain maximum height (2marks)
 - ii. The time of flight (3marks)
 - iii. The maximum height reached (3marks)
 - iv. The velocity with which it lands on the ground (3marks)

QUESTION THREE (20MARKS)

- a. List three applications of spherical mirrors and curved reflecting surfaces (3marks)
- b. A ray of light is incident on a water-glass interface as shown. Calculate 'r'. (Take the refractive index of glass and water as 3/2 and 4/3 respectively) (4marks)



- c. What do you understand by the following terms:
- Focal length.
 - Principal axis.
 - Centre of curvature. (6marks)
- d. Given that the refractive index of diamond is 2.42 and the velocity of light in air is 3.0×10^8 m/s, calculate the velocity of light in diamond. (3marks)
- e. Draw the sketch of a fiber optic cable and label the main parts. Hence list two other examples of optical instruments. (4marks)

QUESTION FOUR (20 MARKS)

- a. Define the term energy and hence state and explain six sources of energy. (6marks)
- b. Differentiate between renewable and non-renewable energy, giving two examples for each. (3marks)
- c. Two objects are kept at different heights, first object is at 5 meters and second object is placed at 15 meters. Which object has more Potential energy if the first object is 5 times heavier than the second? (5marks)
- d. In a machine, the load moves 2m when the effort moves 8m. If an effort of 20N is used to rise a load of 60N, calculate for:
- Mechanical advantage (M.A). (2marks)
 - Velocity ratio (V.R). (2marks)
 - Efficiency of the machine. (2marks)

QUESTION FIVE (20MARKS)

- a. A body moves 30 m due east in 4 seconds, then 40 m due north in 8 seconds. Determine:
- i. The total distance moved by the body. (2marks)
 - ii. The displacement of the body. (3marks)
 - iii. The average speed of the body. (3marks)
 - iv. The average velocity of the body. (3marks)
- b. Determine the work done when a force of 50 N pushes an object 1.5 km in the same direction as the force. (4marks)
- c. State the law of conservation of energy. Hence list four forms of energy (5marks)
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