**INTERNATIONAL UNIVERSITY OF EAST AFRICA**

*'Learning to Succeed'*

**HIGHER EDUCATION CERTIFICATE**

**END OF SEMESTER EXAMINATIONS - APRIL 2025**

**PROGRAMME: HEC**

**YEAR/SEM: YEAR 1/SEMESTER 1**

**COURSE CODE: FDN 1106**

**NAME: FOUNDATION PHYSICS ONE**

**DATE: 2025-04-29**

**TIME: 9:00AM-12:00PM**

**INSTRUCTIONS TO CANDIDATES:**

1. Read the instructions very carefully

2. The time allowed for this examination is STRICTLY three hours

3. Read each question carefully before you attempt and allocate your time equally between all the Sections

4. Write clearly and legibly. Illegible handwriting cannot be marked

5. Number the questions you have attempted

6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks

7. Any examination malpractice detected will lead to automatic disqualification.

**DO NOT WRITE ANYTHING ON THE QUESTION PAPER**

# Section A Attempt ALL Questions (Each question carries 4 marks)

**Question 1:**

State the ohms law as and the mathematical expression as used in electricity

**Question 2:**

Find the heat required to raise the temperature of 200g of ice from 0 degrees to 30 degree ( s.h.c of water is 4200 J/Kg/k and latent heat of fusion is 3.36 $X10^5 JKg^{-1}$)

**Question 3:**

The frequency of a sound wave is 200Hz and its wavelength is 2 m. What is the speed of the sound waves?

**Question 4:**

A 3.0 Kg sample of a substance is at its boiling point. If 5,360kJ of energy are enough to boil away the entire substance. What is its latent heat of vaporization?

**Question 5:**

1.95 kJ of heat is required to raise the temperature of 500 g of lead from 15°C to its final temperature. Taking the specific heat capacity of lead to be 130 J/(kg °C), find the final temperature .
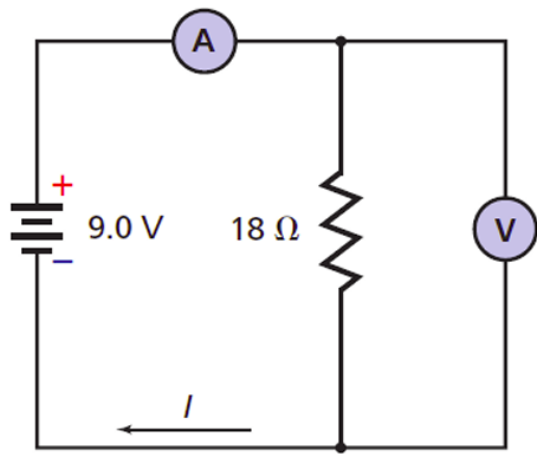
**Question 6:**

. A 10 cm rod is positioned along the major axis of a concave mirror with a focal length of 10 cm, with its end closest to the pole 20 cm from the mirror. Find the length of the image.

**Question 7:**

Find the quantity of heat required to raise the temperature of 500 g of iron by 2°C, given that the specific heat capacity is 500 J/(kg °C).

**Question 8:**

??Consider the circuit diagram below

**a.** What should the ammeter reading be?
**b.** What should the voltmeter reading be?
**c.** How much power is delivered to the resistor?
**d.** How much energy is delivered to the resistor per hour?

**Question 9:**

An object is placed in front of a plane mirror at a distance of 0.5 m. Find the distance between object and the image

**Question 10:**

a) Define electric power
b) Derive the mathematical expression of electric power

# Section B Attempt any three (Each question carries 20 marks)

**Question 1:**

a) Define a crest and a trough.

   ii) Distinguish between sound and light waves waves and state four characteristics of each

   iii) Classify the following as either transverse or longitudinal waves;

   light, ripples, sound waves, and radio waves.

b) Derive the general equation of a wave $V = f\lambda$ , whereby v=speed of a wave, f=frequency of a wave and lamda is the wave length

c) The figure below shows a transverse wave in motion displacement
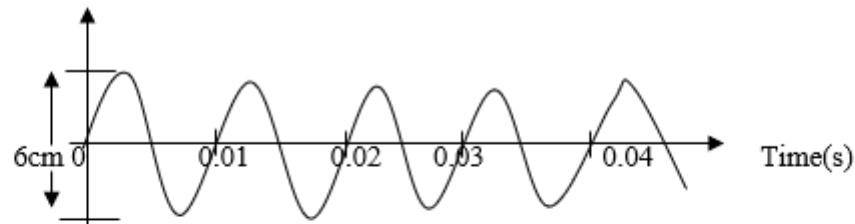


   i)      State the *amplitude* and *period* of the wave.

   ii)     Given that the wavelength of the wave is 0.6m, calculate the speed of the wave.

d) A popular radio station in Juba broadcasts its signal at a frequency of 91.13MHz. Calculate the wavelength of its signal.

**Question 2:**

a) i) Define heat energy and state the S.I units

    iii)Outline at least two properties of thermometric property

    iv) The highest officially recorded temperature in Uganda was 134°F during the last month of March. What is this temperature on the Celsius scale?

b) I) Define specific heat capacity and state the S.I units

    ii) Explain briefly why water is preferred as a coolant in car engines

    iii)A heater rated 2 k W is used for heating the solid of mass 6 kg, if its temperature rises from 30°C to 40°C  In 12 s, find the S.H.C of the solid.

c) i) What is the meaning of latent heat?

    ii) Explain briefly why specific latent heat of vaporization is always higher than specific latent heat of fusion

    iv)An ice making machine removes heat from water at a rate of 40J/s. How long will it take 2kg of ice at 20 oc to ice at 0oc. (S.L.H of ice =3.36x105 and S.H.C of water is 4200J/Kg/K)

## Question 3:

a) Define specific heat capacity and state the S.I unit.     .

b) Describe an experiment to determine the specific heat capacitor of a liquid by method of mixture.

C) Hot water of mass 0.4kg at 100°c is poured into calorimeter of mass 0.3kg and specific heat 400kg/kg/k and contains 0.2kg of a liquid at 10°C. The final temperature of mixture is 40°c. Determine the specific heat capacity of a liquid.

d) i) Define specific latent heat of vaporization

ii) Explain why specific latent heat of vaporization of water is higher than specific latent eat of fusion.

iii) Calculate the heat required to turn 500g of ice at 0°C into water at 100°C (Specific Latent eat of fusion of ice=340000J/kg and Specific heat Capacity of water=4200J/kg/k)

## Question 4:

a) i) Define momentum and state the S.I units

ii) State at least two effects caused by a force

iii) Forces of 2 N, 3N, 4N, 5N and 6N act on a particle in the direction of 30 degrees, 90 degrees, 120 degrees, 210 degrees and 330 degrees respectively from the vertical line. Find the resultant force.
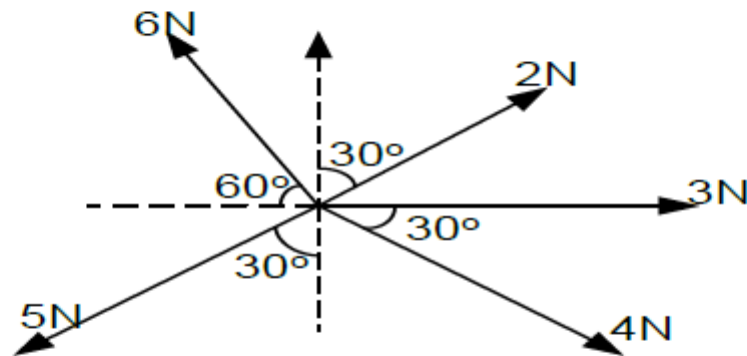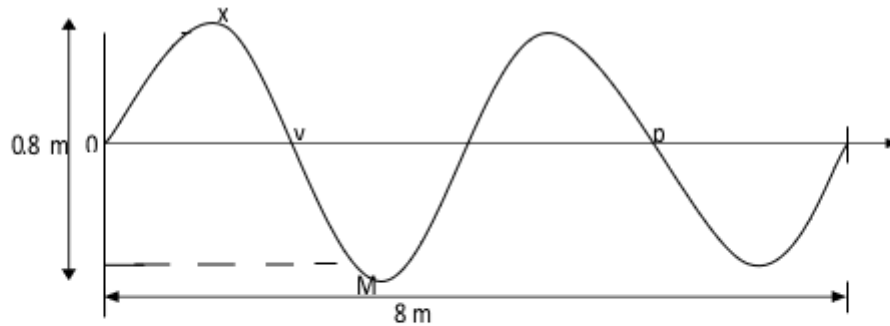


b) i) Define dimension analysis

ii) Give two importances of dimension analysis

iii) The centripetal force F acting on a particle moving uniformly in a circle may depend upon mass(m), velocity(v) and radius(r) of the circle. Derive the equation relating the quantities

c) I) Define physics as a science subject

**Question 5:**

a) What do you understand by the term amplitude and wave length as applied to wave motion?

(b)(I)   Derive an equation relating velocity V, frequency f, and wavelength $\lambda$ of a wave

(ii) A local radio station in your area transmits at a frequency of 1500KHz. Calculate its wavelength. (Given the speed of light in vacuum is $3 \times 10^8$m/s)

(iii)   Water waves travel at a distance of 60 cm in 4 s. if the distance apart of a crest is 3 cm, find the frequency of the vibrator producing the waves.

(C)(I) Distinguish between transverse waves and longitudinal waves and give examples each.

d) The diagram below shows a wave travelling in water.



(e) Name (I) Any two points on the wave which are in phase

(ii) Labeled m and x

(iii) Determine the amplitude of the wave.


**Question 6:**

a) i) Define basic quantities and derived quantities

   ii) Give at least four examples in each case above


b) Use the dimension analysis to prove the validity of the following equations in physics

   i) $S = ut + \frac{1}{2}at$

   ii) $V = u + at$

       Whereby s- is the distance moved, U- initial velocity, V-final velocity, a –

       acceleration and t-time.

c) Find the resultant force in the network of forces below