KAMONYI DISTRICT

HOLYDAYS WORK, 2024-2025

SUBJECT: PHYSICS

CLASS: SENIOR THREE (S3)

***INSTRUCTIONS*:**

*1) This paper consists of **THREE** sections: **A, B** and **C**.*

- ***Section A:** Answer **ALL** questions.* ***(55 marks)***
- ***Section B:** Answer **THREE** questions.* ***(30 marks)***
- ***Section C: Answer only one question*** ***(15 marks)***

*2) Use **blue** or **black** pen and pencil for drawing.*

3) Copy the numbering of questions and sub-questions correctly.

SECTION A: ATTEMPT ALL QUESTIONS ***(55 marks)***

Q1) Choose the best alternative that completes each of the statements below:

a) The upthrust/buoyant force exerted on a body immersed in a liquid is equal to the:

i) Weight of the liquid
ii) Weight of the liquid displaced.
iii) mass of the liquid displaced.
iv) density of the liquid. **(1 mark)**

b) The pressure exerted by liquid ……..

i) Increases with depth.
ii) Decreases with depth
iii) doesn't change with depth
iv) is different in different directions at the same depth**.** **(1 mark)**

c) Archimedes 'principle hold for ……..

i) liquid only
ii) gas only
iii) both liquid and gas
iv) both liquid and solid **(1 mark)**

Q2) State whether each of the following statement is true or false.

a) Paint spraying is an application of electrostatics **(1 mark)**

b) In a thunderstorm accompanied by lightning, it is safest to run near a tree or an open ground rather sitting inside a car. **(1 mark)**

c) The charge distribution is dependent on the shape of the conductor. **(1 mark)**

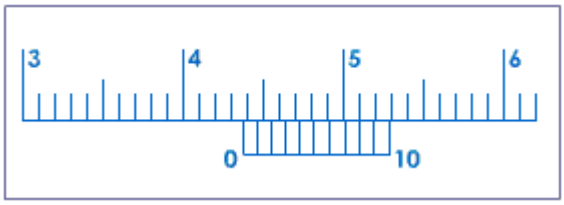
d) Iron at 15^0C feels colder to your hands than wood at the same temperature. **(1 mark)**

Q3. a) Define coefficient of linear expansion of a substance and state its units. **(1 mark)**

b) In an experiment to determine the coefficient of linear expansion, α of a metal, it was found that a rod of 80 cm in length expanded by 1.166 mm when its temperature rose from 20^0C to 110^0C, Calculate the coefficient of linear expansion, α of the metal. **(2 marks)**

Q4) Calculate the magnitude and direction of the electric field at a point P which is 30 cm to the right of a point charge q = -3.0×10^{-6} C. use k =$9x10^9 Nm^2/C^2$ **(3marks)**

Q5) Write down the reading on this vernier caliper. **(3 marks)**



Q6) An 85 kg fisherman jumps from a dock into a 135 kg rowboat at rest on the west side of the dock. If the velocity of the fisherman is 4.3 m/s to the west as he leaves the dock, what is the final velocity of the boat? **(3 marks)**

Q7) Study the table below and suitably match the items given in column I with those in column II. Don't copy the table, answer like this y) corresponds to vi) **(4 marks)**

Column I	**Column II**
a) Stable equilibrium	**i)** When an object is in this state of equilibrium has a disturbing force applied, the centre of gravity remains at the same height and the object does not move when the disturbing force is removed.
b) Isosceles triangle lamina	**ii)** Its centre of gravity lies at point of intersection of medians
c) Rectangular lamina	**iii)** In this state of equilibrium, the centre of gravity of a body is at the lowest point. When gravity of a body is at the lowest point. When the body is slightly tilted, its centre of gravity rises but the body comes back to its original equilibrium position.
d) Neutral equilibrium	**iv)** Its centre of gravity lies at the point of intersection of its diagonals

QQ8) Classify each of the following as either a physical change or a chemical change **(3 marks)**

(a) Melting a piece of wax
(b) Tearing a sheet of paper
(c) Burning a log

Q9) a) Can a stationary magnet induce electromotive force in a coil at rest? Explain. **(2 marks)**

b) The Faraday's law of electromagnetic induction is expressed as follows: $\varepsilon = -\frac{N\Delta\phi}{\Delta t}$

What does N mean? **(1 mark)**

c) How can induced electromotive force from an AC generate be increased? **(2 marks)**

Q10) The mirror is concave; f is positive, curved inward,

The magnification produced by a spherical mirror is -3 (minus 3). What are the four characteristics of the mirror and the image? **(4 marks)**

Q11) You measure a zero value (starting point) of a meter stick as x = (0.10 ± 0.05) cm. You measure the position of the end of an object as being y = (10.34 ± 0.05) cm. Find the length of the object
(3 marks)

Q12) a) Calculate the pressure that water exerts at 8 m below the surface of the water in a lake. The density of water is $1000\ kg/m^3$ and acceleration due to gravity is $9.81\ N/kg$ **(2 marks)**

b) What force must be applied to a surface area of $0.2\ m^2$ to create a pressure of 150 Pa?
(2 marks)

Q13) If the statement is true, write true. If it is false, write false and change the underlined word or words to make the statement true

a) The distance an object travels per unit of time is called **<u>acceleration</u>** **(1mark)**
b) The basic SI unit of length is the **meter** **(1mark)**
c) The SI unit of velocity is **m/s^2** **(1mark)**
d) Both **<u>speed</u>** and displacement include the direction of an object's motion **(1mark)**

Q14) Some of the elements of a house electrical installation are: electric meter. Electrical wires, incandescence light bulb, plug sockets, circuit breaker, fuse, wall switches.

a) Which is more efficient, a circuit breaker or fuse? Explain. **(2 marks)**
b) Electrical resistivity and melting points of some substances at $20\ ^0C$ are given below.

Substance	**Resistivity** / $\Omega \cdot m$	**melting point** / ^oC
silver	1.60×10^{-8}	961.78
copper	1.62×10^{-8}	1084.62
Tungsten	5.20×10^{-8}	3422.00
Nichrome	10.00×10^{-6}	1175.00

What material is used in incandescent light bulb? Justify your answer. (an incandescent bulb works on the principle of incandescence, a general term meaning light produced by heat.) **(2 marks)**

Q15) a) State the principle of equilibrium **(2 marks)**

b) A gate swings freely on its hinge. A force of 500 N is used to push the gate at 1.50 m from the hungers. Another force of 400 N is used to pull the gate at a point 1.0 m from the hinge. If another of 200 N is used to pull the gate such that it doesn't rotate in other directions, at what distance is the 200 N force applied from the hinge? **(3 marks)**

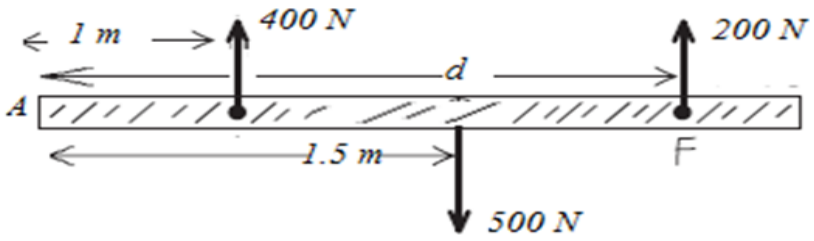


Fig. 1Fig

SECTION B: ATTEMPT ANY THREE QUESTIONS (30 marks)

Q16. a) What is meant by the term "uniform velocity"? (**1mark)**

b) Sketch a graph of a body moving with uniform positive acceleration. Label the velocity on Y –axis and the time on X – axis. (**1.5marks)**

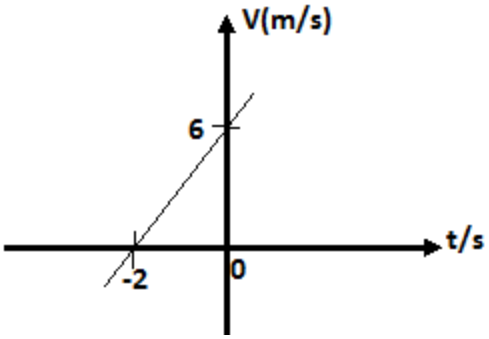
C) What is the dimension of acceleration? Show clearly how you get the answer. (**1.5marks)**

d) The velocity of a body increases uniformly from 100.8km/h at a rate of 0.8m/s^2 in 5s.

i) Calculate the final velocity of the body (**2 marks)**

ii) Calculate the distance moved by the body during the 5s. (**2 marks)**

e) Given the following velocity time graph. Calculate the acceleration of the body. (**2 marks)**



Q17. a) How could you make a resistance of 50 ohms using only 20 ohms resistors? Draw the circuit diagram. (**1.5 marks)**

b) Copy the simple circuit below and insert;

i) A switch,S_1,to control the current flow through the lamp C. (**1 mark)**

ii) A voltmeter to measure the voltage across the lamp B. (**1mark)**

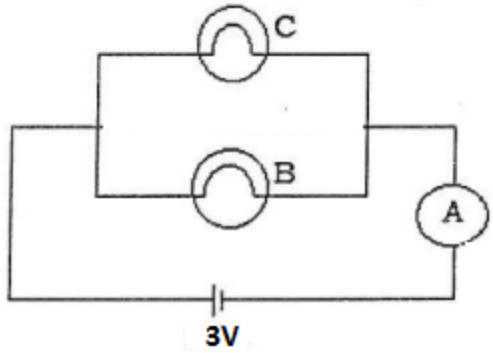


Fig. 2

c) i) Calculate the electric current flow recorded by the ammeter in the circuit, if the resistance of lamp **C** is 2 ohms and that of lamp **B** is 4 ohms. (**3 marks)**

ii) Identify the terminal potential difference of each of the two lamps in closed circuit. (**2 marks)**

d) Electric potential can be defined as the work done in moving a unit charge through a distance d. Use this definition to write an expression of electric potential. (**1.5 marks)**

Q18. Match the term in column **A** with its definition in column **B.** (**10 marks)**

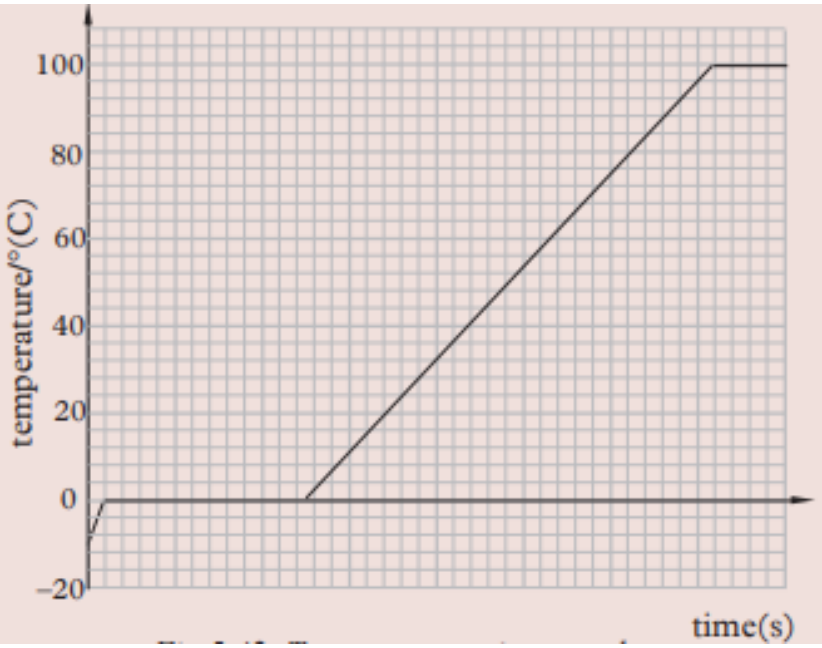
Column A	**Column B**
a. Petroleum	**i.** Brack rock burned to make electricity.
b. Wind	**ii.** Energy from heat inside the Earth.
c. Biomass	**iii.** Energy from flowing water.
d. Uranium	**iv.** Energy from wood, waste and garbage.
e. Propane	**v.** Energy from moving air.
f. Solar	**vi.** Produces energy by splitting of atoms.
g. Geothermal	**vii.** Portable fossil fuel gas often used in grills.
h. Hydropower	**viii.** Fossil fuel for cars, trucks and jets.
i. Coal	**ix.** Fossil fuel gas moved by pipe lines.
j. Natural gas	**x.** energy in rays from the sun.

Q19. a) The heat capacity of water depends on the mass of the water being heated. TRUE or FALSE? Justify your answer. (**2marks)**

b) Distinguish between evaporation and boiling. (**2marks)**

c) The graph in Figure below shows how temperature varies with time when 1 kg of ice at–10 °C is converted into 1 kg of steam at 100 °C under standard atmospheric pressure. Calculate the total heat energy required to convert ice into steam. (**6marks)**

Given: Specific heat capacity of ice is 2.1 J/g K, specific heat capacity of water is 4.2 J/g K, specific latent heat of fusion of ice is 336 J/g, and specific latent heat of vaporisation of water is 2260J/g.



Q20.a) Distinguish between a concave mirror and a convex mirror. Give one application of each type of mirror. (**3marks)**

b) An object is placed vertically at a distance less than the focal length of a concave mirror.

i) Use rays and draw a diagram to show how the image of this object is formed. (**3marks)**

ii) State the characteristics of this image. (**2marks)**

c) A pinhole camera of length 20 cm is used to view the image of a tree of height 12 m which is 40 m away from the pinhole. Calculate the height of the image of the tree obtained on the screen. (**2marks)**

SECTION C: ANSWER ONLY ONE QUESTION (15 marks)

Q21. A student did an experiment to find out how the mass varies with the acceleration when the force used is constant. The table below shows different masses used and corresponding accelerations obtained.

m/kg	$a\,(m/s^2)$	$\frac{1}{a}\,(s^2/m)$
3	4	
4	3	
6	2	
12	1	

a) Copy the table above and complete it. Round off to two decimal places. (**2marks)**

b) What happens to the acceleration as the mass increases? (**2marks)**

c) Plot the graph of mass against 1/acceleration. Draw the best fit straight line. (**8marks)**

d) Use the graph **(in 21. c)** to determine the acceleration when the mass is 5 kg. (**3marks)**

Q22. You are provided with the following apparatus: eureka can, 2 beakers, water, balance, Newton balance and metal. Describe an experiment to verify Archimedes' Principle for a metal in water. **(15 marks)**

END OF EXAM