SENIOR SIX
PHYSICS
Paper 2
2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer any **five** questions.

Any additional question(s) answered will **not** be marked.

Mathematical tables and silent non-programmable electronic calculators may be used.

These values of physical quantities may be useful to you.

Acceleration due to gravity	=	10ms^{-2}
Specific heat capacity of water	=	$4200 \text{ Jkg}^{-1} \text{ K}^{-1}$
Specific heat capacity of ice	=	$2100 \text{ Jkg}^{-1} \text{ K}^{-1}$
Specific heat capacity of copper	=	$400 \text{ J kg}^{-1} \text{ K}^{-1}$
Specific latent heat of fusion of ice	=	336000 J kg^{-1}
Specific latent heat of vaporization of water	=	$2260000 \text{ J kg}^{-1}$
Density of water	=	1000 kgm^{-3}
Density of mercury	=	13600 kgm^{-3}
Speed of sound in air	=	340 ms^{-1}

1. (a) (i) Distinguish between scalar and vector quantities.   (2 marks)
        (ii) Give one example of a vector and one example of a scalar quantity.   (1 mark)

(b)
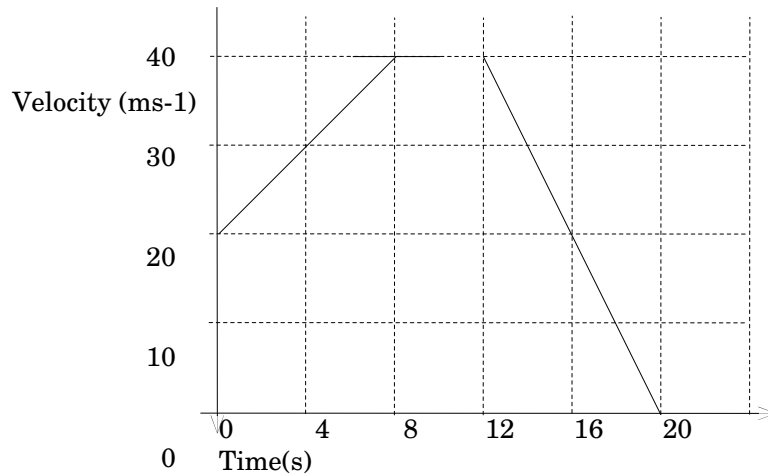
The graph represents a velocity – time graph of a body in motion.
(i)   Describe the motion of the body   (5 marks)
(ii)   Calculate the total distance travelled.   (2 marks)

(c)

12N

10N   ○   15N
                            M

Forces of 10N, 12N and 15N act on a body of mass of M of mass 4kg,
initially at rest. Find the magnitude of the acceleration with which the
body moves.   (6 marks)

2.   (a)   (i)   Define pressure and state its unit.   (2 marks)
             (ii)   Describe an experiment to show that the pressure in a liquid
                    increases with depth.   (4 marks)

      (b)   Find the length of the mercury column in a simple barometer when the
             barometer is raised from sea-level to a height of 2.5km given that the
             average density of air is 1.2kgm^{-3} and the density of mercury is

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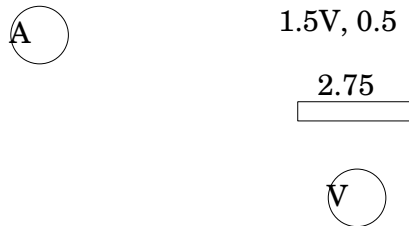$1.36 \times 10^4 kgm^{-3.}$ Atmospheric pressure at sea level is $1.0 \times 10^5 Pa$.

(4 marks)

(c)   A spring balance reads 2.42N when a metal cube of side 3.0cm is suspended in air from the spring balance.
(i)   Find the density of the metal.   (3 marks)
(ii)   What will the spring balance read when the metal is completely submerged in a liquid of density $1200 kgm^{-3}$?   (3 marks)

3.   (a)   Define,
(i)   Specific heat capacity   (1 mark)
(ii)   Specific latent heat of fusion.   (1 mark)

(b)   (i)   Describe an experiment to determine the specific heat capacity of a solid by method of mixtures.   (6 marks)
(ii)   0.2kg of a metal is heated in a flame to a temperature of 600^0C and dropped into a boiling liquid. It is found that 0.002kg of the liquid vaporizes. If the specific heat capacity of the metal is $500 kg^{-1} K^{-1}$ and the boiling point of the liquid is 100^0C, find the specific latent heat of vaporization of the liquid.   (5 marks)

(c)   Explain why water in a lake feels much cooler during daytime than at night.   (3 marks)

4.   (a)   State the laws of reflection of light.   (2 marks)

(b)   (i)   With the aid of a labelled ray diagram, describe the action of a pin-hole camera.   (5 marks)
(ii)   An object of height 2m at a distance of 8m from the pinhole is photographed using the pinhole camera. If the screen is at a distance of 20cm from the pinhole, determine the height of the image formed.   (4 marks)

(c)   Distinguish between total and partial eclipses of the moon.
(5 marks)

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5. (a) State two properties of a magnet. (2 marks)

(b) Briefly describe a process by which one would confirm the polarity of a magnet. (4marks)

(c) Draw a well-labelled diagram showing magnetization by an electrical method. (3 marks)

(d) What is meant by the following terms?
(i) Consequent pole (1 mark)
(ii) Magnetic field (1 mark)
(iii) Neutral point (1 mark)

(e) Draw a well labelled horizontal magnetic flux pattern near a bar magnet in the earth's field with its axis in the meridian and its Northern pole pointing north. (4 marks)

6. (a) Define the freezing point of a substance and state two factors that affect it. (3marks)

(b) (i) State three differences between boiling and evaporation.

(3marks)
(ii) Explain two factors that increase the rate of evaporation of a liquid. (3 marks)

(c) State the differences between saturated and unsaturated vapour.
(3 marks)

(d) Water in a conical flask is heated until it boils. The source of the heat is then removed and the conical flask is tightly corked with a rubber bung. The water stops boiling. A damp cold cloth is placed round the neck of the conical flask and the water is seen to boil again. Explain
(i) Why the water starts to boil again (3 marks)
(ii) What happen if the cold damp cloth is removed? (2 marks)

7. (a) Define the followings:
        (i)   e.m.f   (1 mark)
        (ii) the volt   (1 mark)

    (b) Describe an experiment to verify Ohm's law   (6 marks)

    (c) Two 1.5V cells of internal resistance, 0.5Ω are connected to a resistor of
         2.75Ω.

                              1.5V, 0.5

                                      1.5V, 0.5
         (A)
                                2.75

                                 (V)

         What is the
         (i)   Ammeter reading?   (3 marks)
         (ii) Voltmeter reading?   (2 marks)

    (d) Draw the electric field pattern for two positively charged points a small
         distance apart.   (1 marks)

8. (a) What is thermionic emission?   (1 mark)

    (b) (i)   Explain what you understand by "saturated current" and how it
              is attained.   (6 marks)
         (ii) Draw a sketch graph of current against p.d for a diode valve.
                                                               (2 mark)
    (c) (i)   What are cathode rays?   (1 mark)
         (ii) Draw a well labelled diagram of the cathode rays oscilloscope
              (CRO) and explain how it works.   (6 marks)

END