PHYSICS

TIME: 2 HOURS

SECTION A(20 MARKS)

1. Convert 4.034g/cm^3 into kg/m^3 (1mk)

$4.0349/cm^3 \times 1000 kg/m^3 = 4034 kg/m^3$

2. Define the term "accuracy" and state the accuracy of a metre rule. (2mks)

is the smallest unit an instrument can measure
accuracy of metre rule is 1d.p or 0.1cm.

3. A form one student was attempting an experiment when he got electrocuted. State the first aid measure that should be carried out to help him. (1mk)

Turn off the current at the main switch.
using a non-conducting object such as wooden rod to move the victim away from the object.

4. Water flows steadily along a horizontal pipe at a volume rate of $8.0 \times 10^{-3} m^3/s$. if the cross section area of the pipe is 20cm^2, calculate the velocity of the fluid. (2mks)

Volume rate = A x velocity

velocity = $\frac{\text{volume rate}}{\text{Area}}$

$\frac{8.0 \times 10^{-3} m^3/s}{2 \times 10^{-3} m^2} = 4 m/s$

5. A boy standing in front of a cliff blows whistle and hears the echo after 0.55. He then moves 17metres away from the cliff and blows the whistle again. He now hears the echo after 0.65. Determine the speed of the sound. (3mks)

$V = \frac{2d}{t}$

$\frac{2(17+x)}{0.65} = \frac{2x}{0.55}$

$0.55(34+2x) = 1.3x$

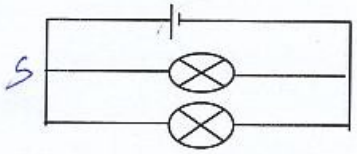
$18.7 = 1.3x - 1.1x$

$x = 93.5$

$V = \frac{93.5}{0.55}$

$= 340 m/s$

6. The circuit below shows lamps in parallel. Indicate on the diagram where you would put a switch to control both lamps together. (1mk)



7. A student observed her face in a concave mirror of focal length 100cm. if the mirror is 80cm away, find the image distance and state two characteristics of the image formed. (3mks)

$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$\frac{1}{100} = \frac{1}{80} + \frac{1}{v}$

$\frac{1}{v} = \frac{1}{100} - \frac{1}{80}$

$\frac{1}{v} = -\frac{1}{400}$

$v = -400\,cm$

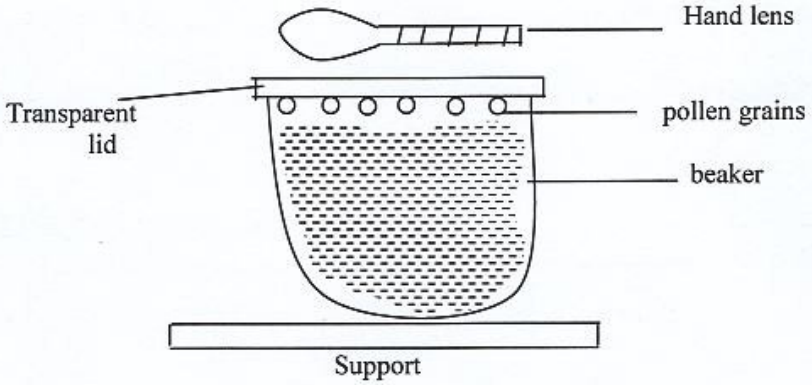
- virtual
- magnified
- upright

8. State two factors that affect the speed of sound in air. (2mks)

Temperature
humidity
direction of wind

9. The figure below shows a conductor carrying current placed in the magnetic field of two magnets. Complete the diagram by showing the field pattern and the diagram of force F that acts on the conductor. (1mk)

10. A student observed some pollen grains on the surface of water in a beaker with a help of hand lens as shown in the figure.



a) State the observation made. (1mk)

It is observed that the pollen grains are in constant random motion

b) Explain the observation in (a) above. (1mk)

The grain are being hit continually by the movement of small invisible particles of water.

c) What conclusion can be drawn from the above experiment. (1mk)

Matter is made up of tiny small particles which are in constant random motion.

SECTION B

1a.Explain the meaning of

i)Streamline flow. It is a flow in which at any given point each and every particles of the fluid travel in the same direction and with same velocity (1mk)

ii) Turbulent flow. it is a flow in which the speed and direction of the fluid particles passing at any given point vary with time (1mk)

b) State three assumptions when deriving the equation of continuity. (3mks)

The fluid is flowing steadily
The fluid is incompressible
The fluid is non - viscous

c) Water flows along a horizontal pipe of cross sectional area 30cm2. The speed of water is 4m/s but it reaches 7.5m/s in a constriction in the pipe. Calculate the area of the constriction. (3mks)

$A_1 v_1 = A_2 v_2$

$A_2 = \frac{30 \times 4}{75} = 16 m/s$

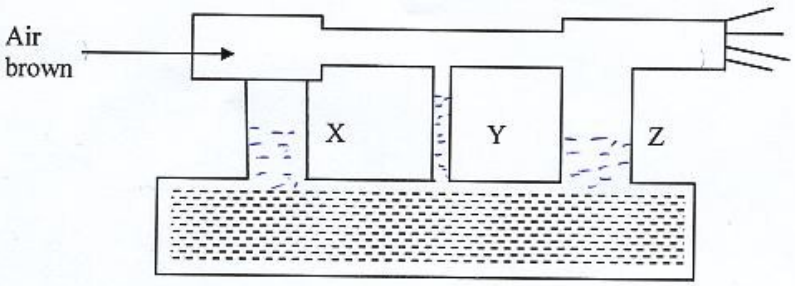
d) It is dangerous to stand too close to a railway line on which a fast moving train is passing. Explain. (2mks)

-/ou can be draped into the moving rail, because high speed creates a low pressure, high pressure pushes the person into the vehicle.

e) Two table tennis balls are in the same level while suspended from threads a short distance apart. A stream of air is blown between the balls in a horizontal direction. Explain what happens to the balls. (2mks)

The Balls come together, High speed of air reduces pressure btn them. Higher Pressure on the other side pushes them together.

f) The figure 12 represents a tube through which liquid is flowing in the direction shown by the arrow. The vertical tubes have oval cross- sectional area,

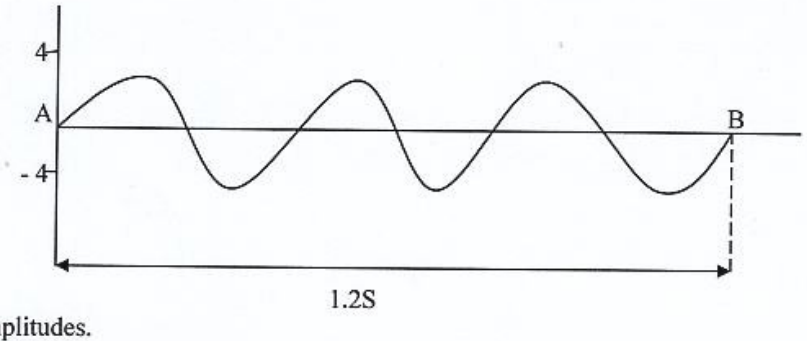


Show on the figure the relative positions of the level of the liquids in section marked X, Y and Z. (1mk)

2a) State the difference between mechanical wave and ~~transverse wave~~ electromagnetic wave (2mks)

mechanical wave require material medium for transmission while electromagnet do not require material medium for transmission.

b) The sketch is a displacement time graph of a wave travelling at 320m/s. the waves takes 1.2 seconds to move from point A to B



Find the i) amplitudes. (1mk)

4 cm

ii)Frequency (3mks)

$T = \frac{1.2}{3} = 0.4s$ | $F = \frac{1}{T} = \frac{1}{0.4} = 2.5Hz$

iii) The wavelength (2mks)

$V = \lambda F \quad \lambda = \frac{V}{F} = \frac{320m/s}{2.5Hz} = 128m$

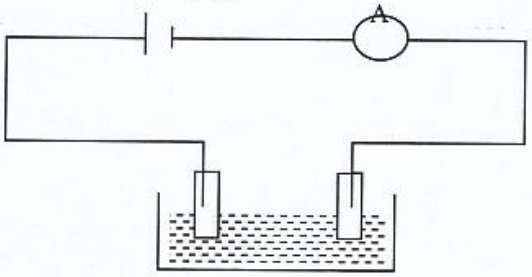
c) Explain the term "~~phase~~ pulse" as used in waves (1mk)

$V = \lambda F$ A pulse is generated when a single vibration is sent through the medium.

ii) Calculate the wavelength of the KBC fm ratio waves transmitted at a frequency of 95.6 mega Hertz (V=3.0 x 10^8m/s) (3mks)

$V = \lambda F \quad \lambda = \frac{V}{F} = \frac{3.0 \times 10^8}{9.56 \times 10^7} = 3.1m$

3. The diagram below shows a series circuit.



a) A current of $2x10^{-3}$A flows around the circuit.

i) State the sub-atomic particles responsible for the flow of current (1mk)

Protons
electrons

ii) How much charge passes through the liquid in 3 minutes (2mks)

$Q = It$

$2 \times 10^{-3} \times 3 \times 60 = 0.36\ C$

b) The capacity of an accumulator is 120Ah. What does this mean (1mk)

120A can be drawn in an accumulator in one hour.

c) Polarization is a defect in a simple coil. Explain the meaning of polarization and suggest how you would minimize its effect in the cell (2mks)

Is the formation of hydrogen bubbles around the Copper Plate. It is minimized by use of a depolarizer such as manganese (IV) oxide

4a) State hooke's law (1mk)

For a helical spring or other elastic material, the extension is directly proportional to the stretching force provided elastic limit is not exceeded.

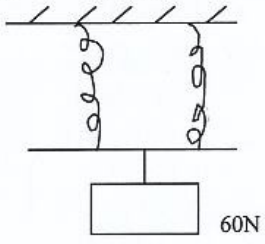
b) It is easier to bend an iron rod than a glass rod of the same dimensions at the same ..... Explain this. (1mk)

Is because of brittle nature of glass

c) State two factors that govern the strength of a spring of a given material (2mks)

Diameter of the spring
number of turns
length of a string.

d) Two identical spring of each spring constant 5.0 N/cm are used to support 60N as shown below



Determine the total extension of the system (3mks)

$K_p = nK_1$

5×2

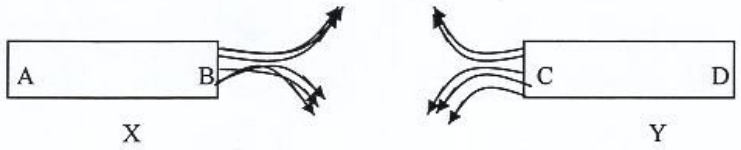
$= 10 N/cm$

$E = F/K_s$

$= \frac{60 N/cm}{10 N/cm}$

$= 6\ cm$

5. The diagram below shows two bar magnets X and Y and the magnetic pattern.



Identify B and C (1mk)

B - North pole C - North pole

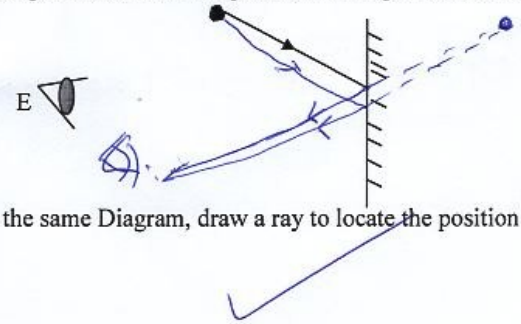
ii) State with a reason which magnet X or Y is stronger (2mks)

X is stronger because magnetic field lines are close compared to that of Y.

iii) State two way magnetizing a magnetic material (2mks)

Stroking method in north-south direction
Hammering method in north-south direction
electrical method using DC current

6. The figure below shows a point obsect O placed in front of a place mirror.



a) On the same Diagram, draw a ray to locate the position of the image I as seen from the eye E (2mks)

b) Explain what is meant by a virtual image (1mk)

The image that cannot be formed on the screen.

c) An object of height 10cm is placed 5cm in front of concave mirror of focal length 3cm. determine position, name and size of the image by scale drawing (3mks)

d) Show the magnification of a convex mirror is given by $m = \frac{v}{f} - 1$ (3mks)

$\frac{1}{f} \times v = \frac{1}{v} \times v + \frac{1}{u} \times v$

$\frac{v}{f} = 1 + \frac{v}{u}$

$\frac{v}{f} = 1 + m$

$m = \frac{v}{f} - 1$