**PRE – MOCK 2015**

**Physics 232/1**

**Paper 1**

**Time: 2 hours**

**NAME…….INDEX NO……**

**CLASS……. DATE……**

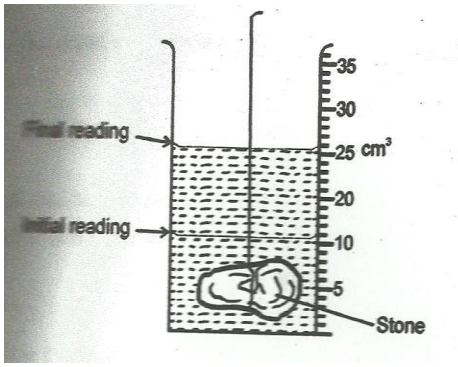
Instructions to candidates

- Write your name and class in the space provided.
- This paper consists of two sections; **SECTION A** and **B**
- Answer **all** the questions in the spaces provided
- **ALL** working **MUST** be clearly shown.
- Mathematical tables and electronic calculators may be used
- Take: Acceleration due to gravity: **g = 10m/s$^2$**

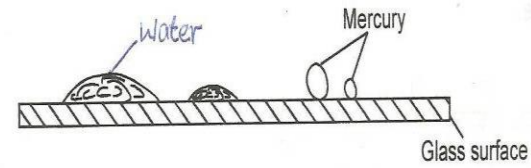
**FOR EXAMINER'S USE ONLY**

| **Section** | **maximum score** | **Candidates score** |
|---|---|---|
| A | 25 | |
| **B** | **55** | |
| **Total score** | **80** | |

1.The figures below shows the level of water before and after a stone was immersed into the measuring cylinder If the mass of the stone is 200g, determine its density. (3mks)




2. The figure below shows the shapes formed when drops of water and mercury are placed on the surface of a clean glass plate




Explain the difference in the shapes.

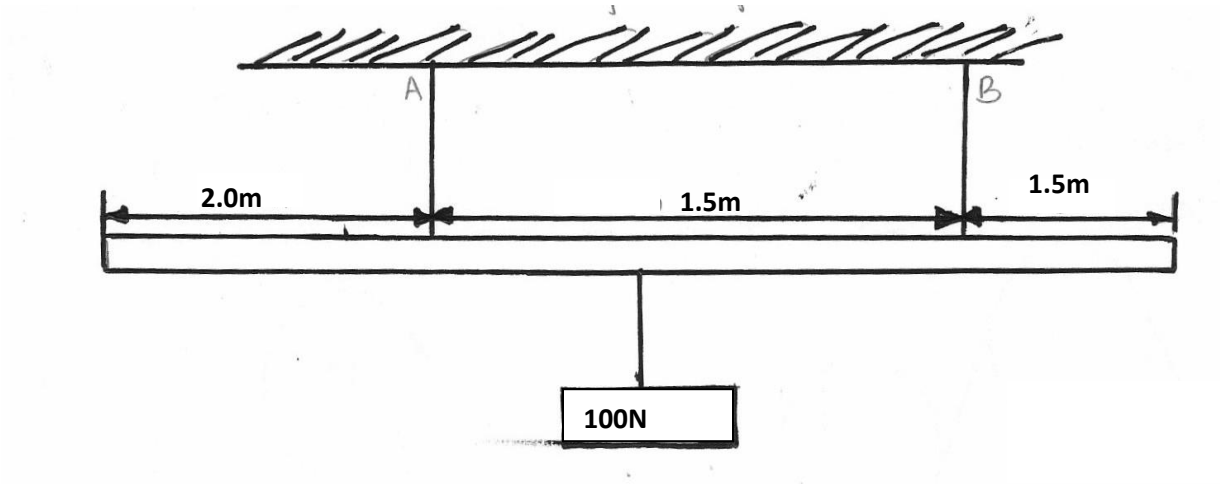
Explain the difference in the shapes. (1mk)

3. Explain why air is not used as a brake fluid. (1mk)

4.) Use kinetic theory to explain pressure law. (1mk)

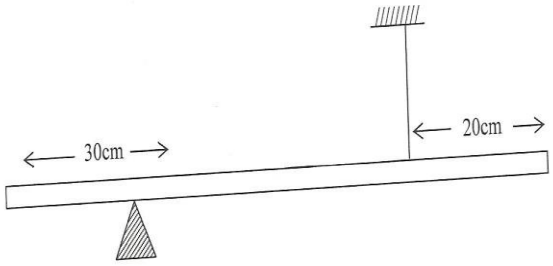
5.) In an oil drop experiment, it was found that one oil drop spread on water to form a patch of diameter 0.8cm and thickness $2.0 \times 10^{-6}$mm. Calculate the radius of the drop. (2mks)

6.)A uniform wooden plank weighing 50N and 5m long is suspended by two ropes A and B, 1.5m apart. A is 2m from one end and B is 1.5m from the other end as shown in figure below. A concrete block of weight 100N is suspended from the centre of the plank




Calculate the tension $T_A$ in string A (2mks)

7. The figure below shows a uniform bar of length 1.4m pivoted near one end. The bar is kept in equilibrium by a string as shown.



Given that the weight of the bar is 1.5N, determine the tension in the string. (3mks)

8. The table below shows results of an experiment carried out to study properties of a spring.

| | | | | | |
|---|---|---|---|---|---|
| Force (N) added | 0 | 5 | 10 | 15 | 20 |
| Length of spring (cm) | 10 | 11 | 12 | 13 | 14 |

State with a reason whether the experiment was done within elastic limit of a spring. (1mk)

9. A beaker is filled completely with water. A spoon full of common salt is added slowly. The salt dissolves and the water does not overflow. State the reason why water does not overflow. (1mk)

10. In a vacuum flask, the walls enclosing the vacuum are silvered on the inside. State the reason for this. (1mk)

11. A bullet is fired horizontally from a platform 15m high. If the initial speed is 300m/s, determine the maximum horizontal distance covered by the bullet. (3mks)

12.A high jumper usually lands on a thick soft mattress. Explain why. (1mk)

13.If the rate of flow of water in the tube is 0.0001 $m^3/s$. Determine the length of tube it will take its flow in 3 seconds through a cross-section area of $5cm^2$. (3mks)

14.The ice and steam points of a certain graduated thermometer are found to be 15cm apart. What is recorded in $^0c$ when the length of the mercury thread is 3cm above the ice point?

(2mks)

15.a) Define heat capacity and state its SI units. (2mks)

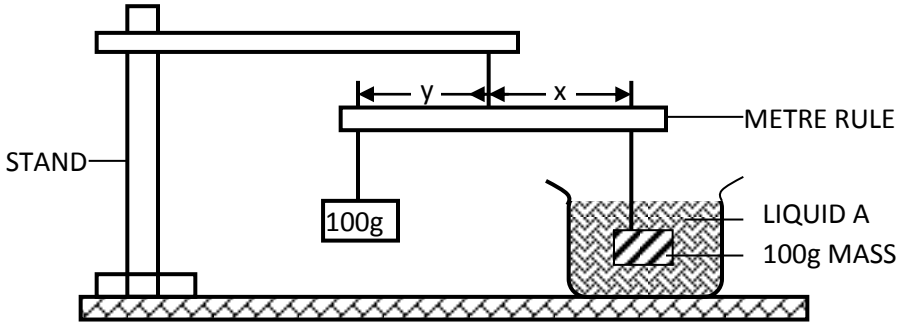
b) i) 200g of ice at $-10^oc$ was slowly heated by an immersion heater rated 200w. The graph below shows how temperature varied with time.

ii)Given that the specific heat capacity for ice is 2100J/kg/k, specific latent heat of fusion for ice 340000J/kg and the specific heat capacity for water is 4200J/kg/k. Calculate the corresponding times for pints B and C. (4mks)

iii) What factors affect the melting point of a solid. (2mks)

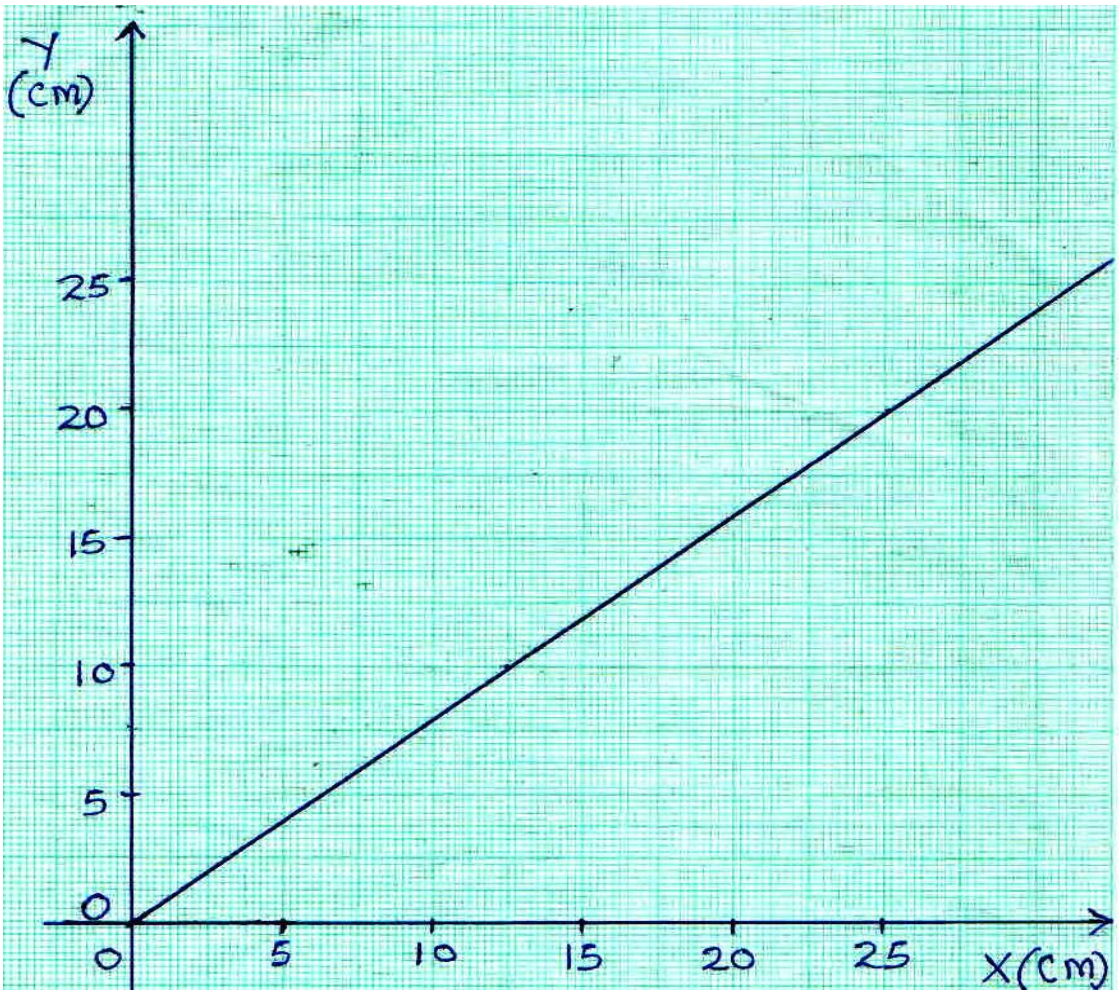
c) i) A sauce pan of mass 0.7kg containing 0.5kg of water is 20oc it takes 5 minutes before the water starts to boil. Find the rate at which heat is supplied to the water by the burner. Take specific heat capacity of the sauce pan as $600Jkg^{-1}k^{-1}$. (3mks)

16. (a) In an experiment to determine the relative density of liquid A, the following set up was used.



The distance x of the mass in liquid A was measured for various length, y of an identical mass of equilibrium and a graph of y against x was drawn as shown in the grid below.

**GRAPH OF Y AGAINST X**




(i) Determine the gradient, S, of the graph. (2 Marks)

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(ii) If S = $\frac{F}{W}$, where F is the apparent weight of mass in liquid A and W is the actual weight of the mass.

Calculate the value of F and the upthrust u. (3mks)

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(iii) Determine the relative density of the liquid a, Given that the weight of the 100g mass in water was 0.9N. (3mks)

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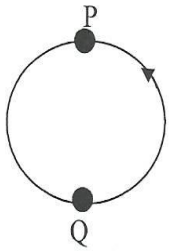
b) A balloon's fabric weighs 10N and has a gas capacity of $2M^3$. If the gas in the balloon weighs 2N and air has density 1.29kg/m3, Find the resultant force on the balloon when it is floating in air. (3marks)

17. a) A body having uniform motion in a circular path always accelerates. Explain. (1mk)

b)the figure below shows the path of an object of mass 200g tied to a string 0.2m and being whirled in a vertical circle at a linear speed of 10m/s.




If the string gets cut when the object reaches point Q,

i) indicate with an arrow on the diagram, the path direction it is likely to move. ( 1mk)

ii) Determine the force that cuts the string at point Q (3mks)

iii) Calculate the minimum tension (3mks)

c) A body is whirled in a horizontal circle at a frequency of 5Hz. Determine its angular velocity. (3mks)

**SECTION B**

18.a) State the law of conservation of energy. (1mk)

b)What energy transformation takes place when a car battery is used to light a bulb? (2mks)

c) A pulley system has two pulleys on the lower block and one pulley on the upper block. In order to raise the load of 6N, an effort of 2N is applied.

i)Draw a sketch to show the pulley system. (2mks)

ii)Calculate the efficiency of the pulley system. (3mks)

iii)If the lower block weighs 0.4N. What friction force oppose the motion. (3mks)

19. a) Define (1mk)

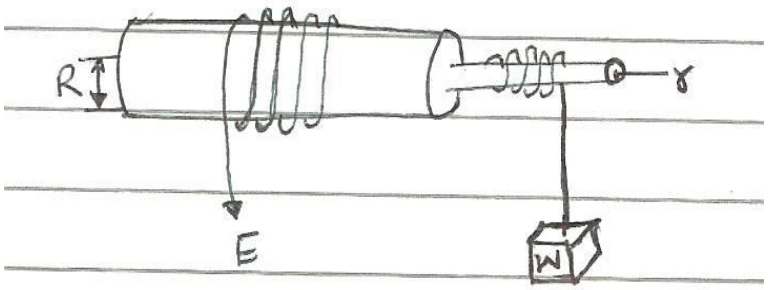
i) Velocity ratio (1mk)

ii)Mechanical advantage (1mk)

iii)Efficiency (1mk)

b)A small pump develops an average power of 80W. It raises water from a borehole to a point 15m above the water level. Calculate the mass of water delivered in one hour. (3mks)

c)The figure shows a wheel and axle being used o raise a load W by applying an effort ‘E’. The radius of a large wheel is ‘R’ and that of a small wheel is ‘r’.




i)Show that the velocity ratio (V.R) of this machine is given by R/r. (2mks)

ii)If r = 5cm and R = 8cm, determine the effort ‘E’ required to raise a load of 40N, given the efficiency of the ma chine is 85%. (3mks)

# SUNSHINE SECONDARY SCHOOL

232 / 2
PHYSICS
PAPER 2
PRE MOCK 1 – MARCH / APIRL 2015
2 HOURS

**NAME: ……..…..INDEX NO: ……...**

**CANDIDATES SIGNATURE:……..DATE:……...**

**INSTRUCTIONS:**

- Answer all questions in the space provided.
- This paper consists of two sections A and B.
- All working must be shown clearly.
- Electronic calculators may be used.

**EXAMINER'S USE ONLY**

| SECTION | QUESTION | MARKS | CANDIDATES SCORE |
|---|---|---|---|
| A | 1 – 13 | 25 | |
| B | 14 | 13 | |
| | 15 | 12 | |
| | 16 | 7 | |
| | 17 | 15 | |
| | 18 | 8 | |

1.State the laws of reflection of light. (2mks)

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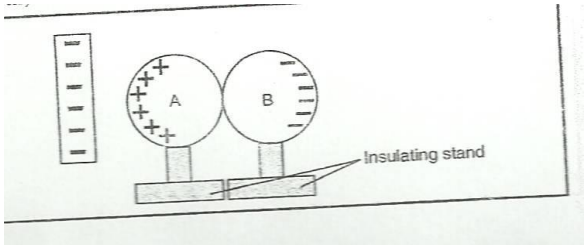
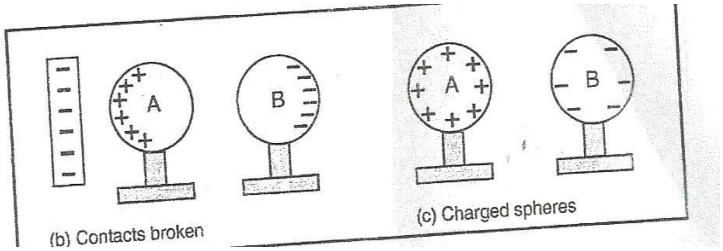
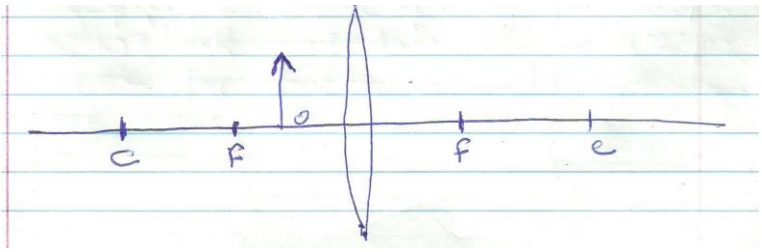
2.The diagram below shows how to charge two spheres simultaneously.




On the diagram indicate the charge acquired by spheres A and B in step two. (2mks)

3.Complete the diagram below to show how the lens forms the image. (1mk)

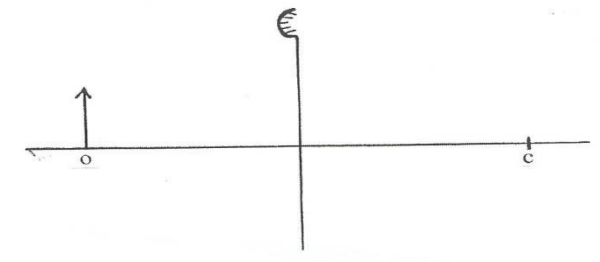


4.)Name one detector of infra-red radiations (1mk)

5) Using a diagram explain how soft iron keepers are used to retain magnetism in stored magnets(2mks)

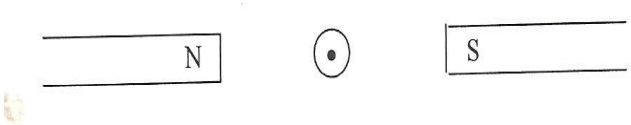
6) A battery is rated 30Ah,determine the amount of current it can supply in 20 minutes (2mks)

7) Sketch rays to show the image formed by the object in the following. (2mks)



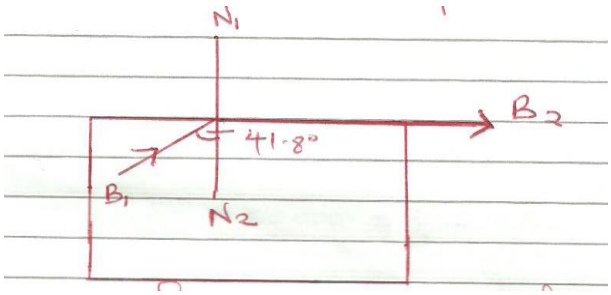

8.Name any one common property of electromagnetic waves. (1mk)

9.The figure below shows a conductor carrying current placed within the magnetic field of two magnets. Complete the diagram by showing the field pattern and the direction of force F that acts on the conductor. (2mk)




10.What is meant by donor impurity in semiconductor. (1mk)

11.The figure below shows ray B, incident through a glass block to air interface.



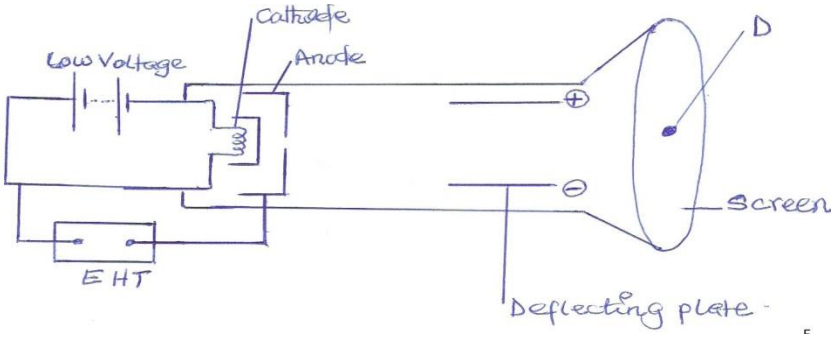

B2 is the emergent ray of B1. Determine the refractive index of the glass block.

12.A pendulum bob takes 0.5 seconds to move from its mean position to a maximum displacement position. Calculate its frequency. (2mks)

13.A potential difference of 50kv is applied across an x-ray tube. Given that the charge of an electron e = $1.6 \times 10^{-19}$ c and the mass of an electron $m_e = 9.1 \times 10^{-31}$ kg, calculate the velocity of the electron. (3mks)

14.An electric heater is rated 3kw and 240v when in operation. Calculate the cost of running the heater for 5 hours if the cost per kwh is ksh.6.70. (2mks)

15.The diagram below shows part of a cathode ray tube.




i)Explain how the cathode rays are produced. (2mks)

ii) On the same diagram draw the path of the cathode rays to the spot produced on the screen at D. (2mks)

iii)Explain the observation made on the spot when the connection to the high voltage supply are interchanged so that the anode is made negative. (2mks)

iv)What behavior of cathode rays shows that they move on a straight line. (2mks)

v)Name the components of an electron gun of a cathode ray oscilloscope. (3mks)

16.a) In a photoelectric effect experiment, a certain surface was illuminated with radiation of different wavelengths and stopping potential determined for each wavelength. The following results were obtained:

| | | | | | |
|---|---|---|---|---|---|
| Wavelength (x $10^{-7}$ m) | 3.77 | 4.05 | 4.36 | 4.92 | 5.46 |
| Stopping potential, ($V_s$), (V) | 1.35 | 1.15 | 0.93 | 0.62 | 0.36 |
| Frequency (x $10^{14}$Hz) | | | | | |

i)complete the table above given that c = 3.0 x $10^8$ m/s (1mk)

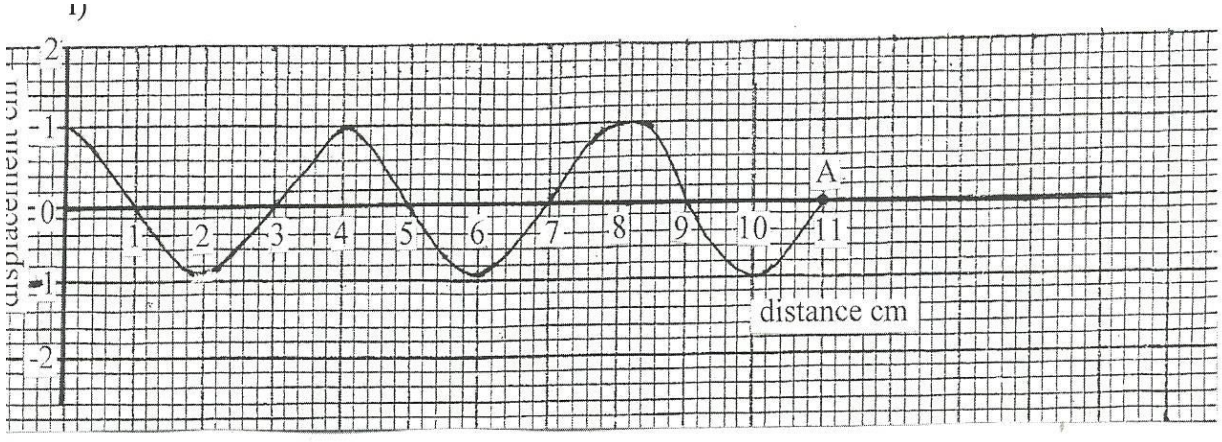
ii)Plot a graph of stopping potential (Y-axis) against frequency (4mks)

iii) Determine plank's constant, h and the work function of the surface given that $eV_s = hf - hf_o$, where $e = 1.6 \times 10^{-19}$ C (3mks)

b) A surface whose work function $Q = 6.4 \times 10^{-19}$ J is illuminated with light of frequency $3.0 \times 10^{15}$ Hz. Find the maximum velocity of the emitted photo electrons (use value of h obtained in **a(ii)** above) (3mks)

17. a) State the difference between longitudinal and transverse waves. (1mk)

b)The figure below shows a transverse wave travelling along X-axis. T he frequency of the vibrations producing the waves is 20Hz.




i)Determine the amplitude in SI unit. (1mk)

ii) If it takes 0.1375 seconds for the wave to move from O to A, determine the speed of the wave.

(2mks)

ii)Calculate the periodic time of the wave. (2mks)

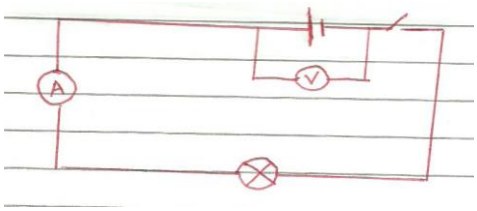
c i)State two factors affecting the speed of sound in air. (2mks)

ii)A man makes a loud sound and hears the echo of the sound after 1.25 seconds. If the speed of sound in air is 330ms-1, calculate the distance between the man and the wall causing the echo. (3mks)

18. Three resistors of resistance 2Ω, 4Ω and 6Ω are connected together in a circuit. Draw a circuit diagram to show the arrangement of the resistor which gives

a) Effective resistance of 3Ω (2mks)

b) In the figure below, the voltmeter reads 2.1v when the switch is open. When the switch is closed, the voltmeter reads 1.8v and the ammeter reads 0.1A.



Determine :-

i) The e.m.f of the cell (1mk)

ii) The internal resistance of the cell. (3mks)

iii) The resistance of the lamp. (2mks)

c. Calculate the length of a wire required to make a resistor of 0.5Ω , if the resistivity of the material is $4.9 \times 10^{-7}$ Ω m and the cross sectional area is $2.0 \times 10^{-6}$ m2. (3mks)

19.ai)Define half-life of a radioactive substance. (1mk)

ii)The following radioactive equation, find the value of N and Z.

b) The half-life of radioactive substance is 4 years. How long will the sample take for the activity to decrease to 1/32 of its original value. (3mks)

c)The diagram below shows the cross section of a diffusion cloud chamber used to detect radiation from radioactive source.

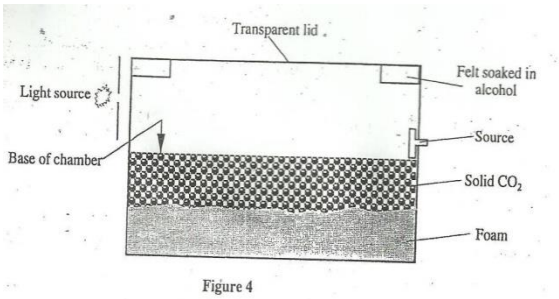



Figure 4

i)State one function of each of the following Alcohol. (1mk)

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Solid carbon dioxide (1mk)

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ii)When radio actions from the source enter the chamber some white traces are observed. Explain how these traces are formed and state how the radio action is identified. (4mks)

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ii)A leaf electroscope can also be used as a detector of radio actions. State two advantages of the diffusion cloud chamber over the leaf electroscope as a detector. (2mks)

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**NAME ---------- ADM NO ----------**

**SIGNATURE ----------**

**DATE ----------**

233/3
PHYSICS PRACTICAL
PAPER 3
MARCH 2015
TIME 2 ½ HOURS

**INSTRUCTIONS TO STUDENTS**

a) Write your name and Adm No in the spaces provided above.
b) Answer ALL the questions in the spaces provided in the question paper
c) You are supposed to spend the first 15 minutes of the 2 ½ hours allowed for this paper reading the whole paper carefully before commencing your work.
d) Marks are given for a clear record of the observations actually made their suitability according and the use made of them
e) Candidates are advised to record their observations as soon as they are made
f) Use of electronic calculators only

**Question 1**

| | |
|---|---|
| Maximum score | 20 |
| Candidate score | |

**Question 2**

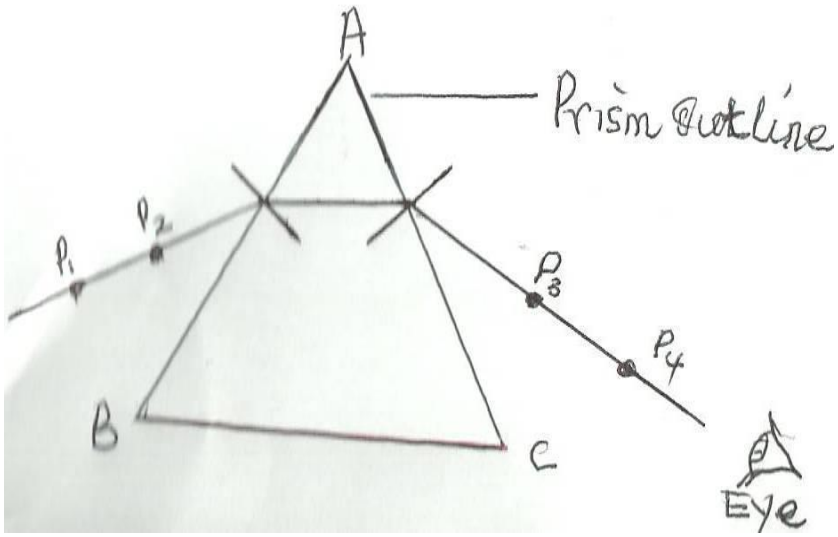
| | |
|---|---|
| Maximum score | 20 |
| Candidate score | |

| |
|---|
| GRAND TOTAL |

1. You are provided with the following
   - A glass prism
   - A soft board
   - 4 optical pins
   - A white sheet of paper
   - 2 thump pins

a) Draw the outline of the glass prism on the plane paper mounted on the soft board. Label the vertices of the triangle as shown in the figure below. Note that AB and AC are sides of the prism that are equal in length. Mark a point O on the outline drawn. Draw a normal to the face AB via point O as shown in the diagram.

b) Measure an angle of incidence of 30o at the point of incidence O. Stick two pins P1 and P2 to mark the incident ray.




Place the glass prism on the outline and view side AC to see the images of pins $P_1$ and $P_2$. Stick pins $P_3$ below side AC as shown in the figure such that it is in a straight line with the images of $P_1$ and $P_2$. Stick the fourth pin $P_4$ so that it has in the same straight line with $P_3$ and the images of $P_1$ and $P_2$.

ii) Remove the prism and pins. Join points $P_3$ and $P_4$ in a straight line to meet AC at E. Join points E to 0. Measure the angle of refraction r.

r = ---------- ( 1mk)

c i) Repeat the experiment for different angles of incidence and complete the table.

| Angle of incidence ( $i^o$) | 35 | 40 | 45 | 50 | 55 | 60 |
|---|---|---|---|---|---|---|
| Angle of refraction ($r^o$) | | | | | | |
| Sin i | | | | | | |
| Sin r | | | | | | |

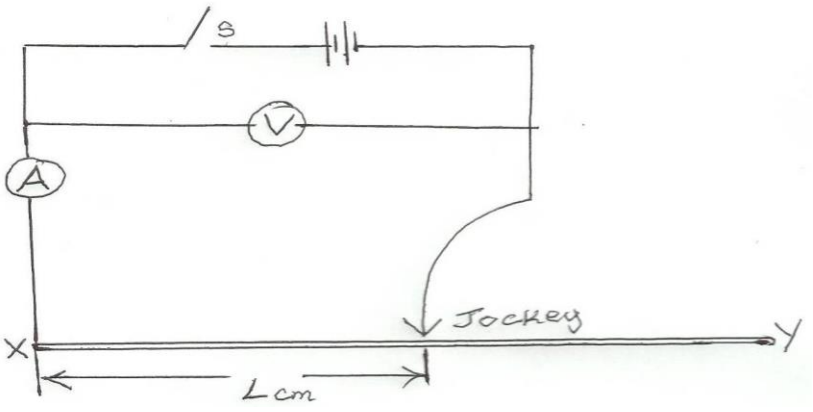
ii) Plot a graph of sin r against sin i. (5mks)

iii) Calculate the slope of graph. (4mks)

2.You are provided with

- A voltmeter
- An ammeter
- Connecting wires
- 2 dry cells
- A switch
- A cell holder
- A jockey
- A resistance wire mounted on a scale
- Micrometer screw
- Gauge

a) Set up the apparatus as in the diagram below



i) Move the jockey to point Y and close the switch. Record the ammeter and voltmeter readings.

V ---------- ( ½ mk)

I ---------- ( ½ mk)

ii) Calculate the resistance of the wire

R = V/I---------- ( ½ mk)

iii) Hence determine the resistance per unit length I of the wire from

K = R/100 ---------- (1/2 mk)

iv) Use the micrometer screw gauge provided to measure the diameter D of the resistance wire.

D ---------- (1/2 mk)

b) i) Using the same circuit in (a) above vary the length of the resistance wire L by adjusting the position of the jockey to correspond with the length shown in the table and complete the table-given that the e.m.f of the cell is 3v.

c)

| Length (cm) | 70 | 60 | 50 | 40 | 30 | 20 |
|---|---|---|---|---|---|---|
| Current (A) | | | | | | |
| P.D (v) | | | | | | |
| E – V | | | | | | |

ii) Plot a graph of ( E - V) y –axis against current. (5mks)

iii) Calculate the gradient of the graph. (1mk)

iv)Which does the slope stand for? (1mk)