EDUCATOR EXAM SERIES

NAME……ADMISSION NO.……..…DATE……

FORM 3 END OF YEAR EXAM
232/1
PHYSICS PAPER 1
TIME: 2 HOURS.

INSTRUCTIONS TO CANDIDATES

- Write your name and your index number in the spaces provided above.
- This paper consists of **two** sections **A** and **B**
- Answer **all** questions in section **A** and **B** in the space provided

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Section	Question	Max. score	Candidate's score
A	1-13	25	
B	14	10	
	15	13	
	16	8	
	17	13	
	18	11	
TOTAL SCORE		80	

SECTION A (25 MARKS)

1. Explain why displacement method is unsuitable for determining the volume of solids such as charcoal, ice, wood blocks and bricks. (2mks)

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2. The density of mercury is 13.6g/cm3. What does this mean? (1mk)

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3. a) State the principle of moments. (1mk)

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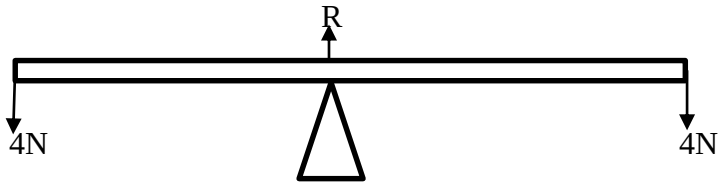
b) The diagram below shows a uniform piece of wood pivoted at its mid-point. It is kept in equilibrium by two forces of 4N hung from its ends.



Determine the value of force R. (1mk)

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4. Most buses carry their cargo in the space below the passenger level instead of the rack. Explain. (2mks)

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5. What is meant by the term streamline? (1mk)

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6. A liquid flows along a horizontal pipe of cross section area 24cm^2 with a speed of 3m/s. the speed increases to 9m/s where there is a constriction. Calculate diameter of the constriction. (2mks)

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7. Differentiate between mechanics and geometrical optics. (1mk)

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8. Name the most appropriate tool to measure the depth of test-tube in the laboratory. (1mk)

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9. In the experiment to estimate the diameter of one molecule; a drop of oil was carefully allowed to spread on them on water surface. State two reasons why oil was used in this experiment . (2 mks)

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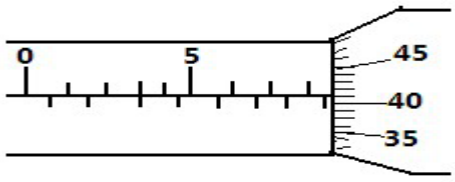
10. Calculate the amount of heat required to raise the temperature of 200g of oil from 25^{0}C to 34^{0}C. (specific heat capacity of oil = 640Jkg^{-1}K^{-1}). (2mks)

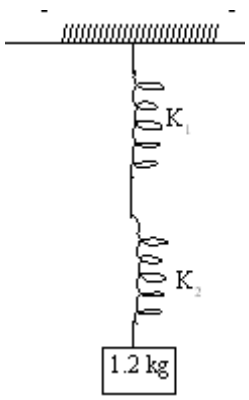
11. State diameter of the object if reading shown by the scale below was obtained after using the instrument to measure the diameter of the object. The instrument had a zero error of 0.005cm. (2mks)



12. A body of mass 3.0kg starts from rest. Find its Kinetic energy after travelling through a distance of 5m with a uniform acceleration of $2m/s^2$. (3mks)

13. a) On the axes below sketch the graph of extension e against force F when an elastic material is stretched beyond its elastic limit. (2mks)

b) Two springs of negligible weight of spring constant K_1 = 24 N/m and K_2 = 48 N/m respectively are connected end to end and suspended from a fixed point as shown below.



Determine the total extension when a mass of 1.2 kg is hung from the lower end.(2 marks)

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Section B 55marks.

14. a) State two reasons why heat from the sun cannot reach us by convection. (2mks)

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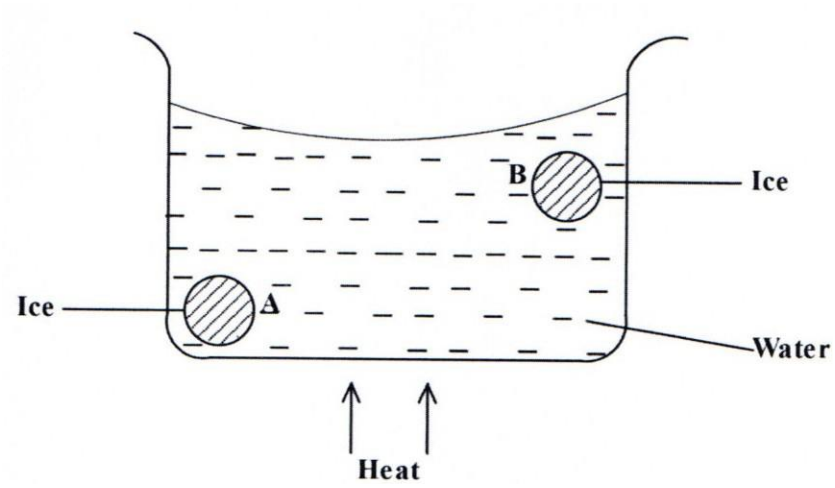
b) The figure below shows two pieces of ice A and B trapped using wire gauze in a larger beaker containing water.



Heat is supplied at the center of the base of the beaker as shown. State with a reason which ice melted earlier. (2 mark)

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c) i) State the meaning of the term "*specific latent heat of fusion*" .(1 mark)

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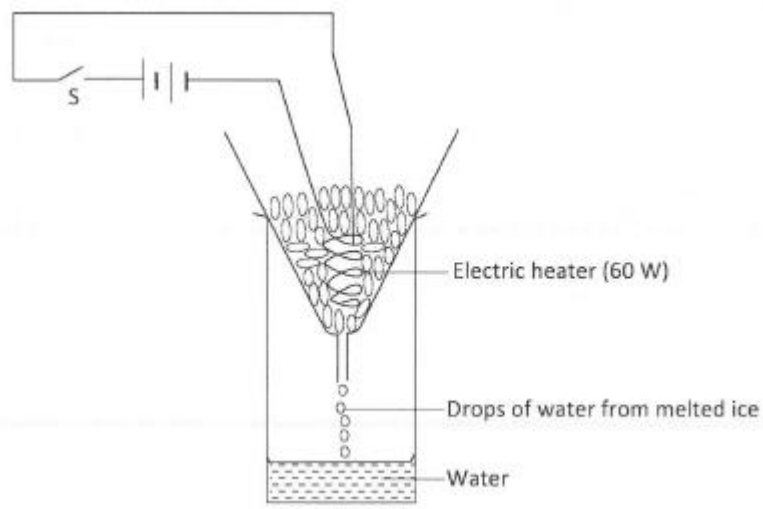
ii)The figure below shows a set up of apparatus used in an experiment to determine the specific latent heat of fusion of ice.



The following readings were noted after the heater was switched on for 5 minutes:

- mass of beaker= 130 g
- mass of beaker + melted ice = 190 g

Determine the:

(I) energy supplied by the 60 W heater in the 5 minutes. (2 marks)

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(II) specific latent heat of fusion of ice. (2 marks)

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(iii) It was observed that some of the crushed ice melted even before the heater was switched on. State a reason for this observation. (1mk)

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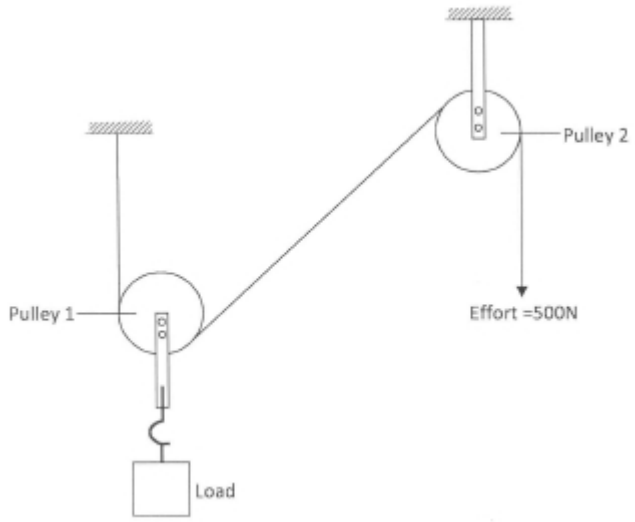
15. .a)Thefigurebelow shows a pulley system used to raise a load by applying an effort of 500 N.



State the:

(i) velocity ratio of the system. (1 mark)

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(ii) purpose of pulley 2. (1 mark)

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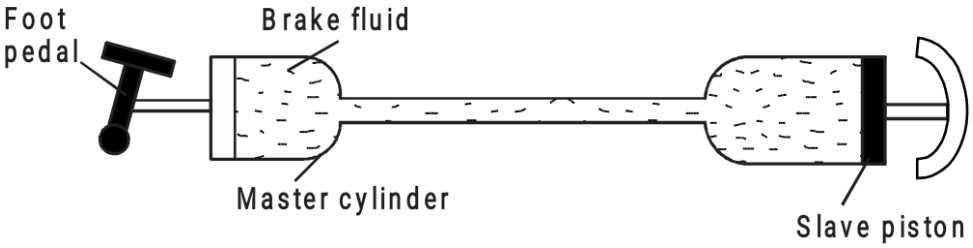
(iii) Given that the machine has an efficiency of 80%, determine the maximum load that can be raised. (3 marks)

b) The figure below represents a hydraulic brake system.



A force of 20N is applied on the foot pedal connected to a piston of area 0.0005m² and this causes a stopping force of 5000N. Calculate

i) The pressure in the master cylinder. (2 marks)

ii) The area of the slave piston. (2 marks)

c) State two reasons why mercury is preferred to water in making a barometer. (2mks)

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d) Some water in a tin can was boiled for some time. The tin can was then sealed and cooled. After sometime it collapsed. Explain this observation. (2mks)

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16. a) State two factors that affects surface tension. (2mks)

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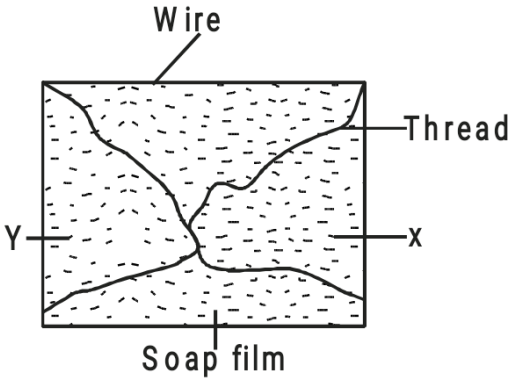
b) The diagram below shows a rectangular wire with loose thread tied in it and dipped in a soap solution to form a film.



Draw a diagram showing what will be observed when the film is broken at points X and Y (1mark)

c) i) State one assumption for the experiments carried out to verify the gas law. (1mark)

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ii) A gas occupies a volume 4000litres at a temperature of 37^0C and normal atmospheric pressure. Determine the new volume of the gas if it heated at constant pressure to a temperature of 67^0C (Normal atmospheric pressure P=1.01×10^5Pa) (4marks)

17. a) Differentiate between kinetic and static friction. (1marks)

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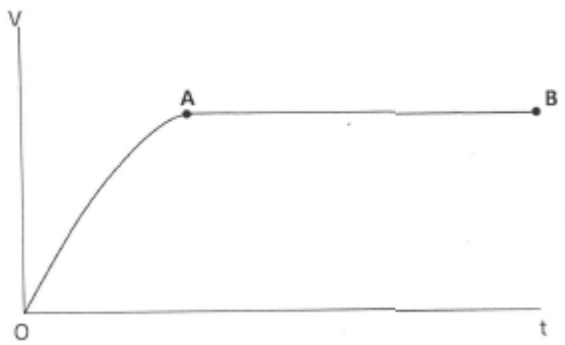
b) The Figure below shows a graph of velocity against time for a ball bearing released at the Surface of viscous liquid.



Explain the motion of the ball bearing for parts

(i) OA (2 marks)

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(ii) AB (2 marks)

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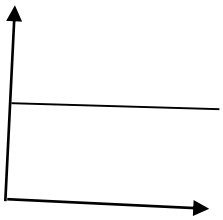
c) The figure below shows the acceleration –time graph for a certain motion.

(I)

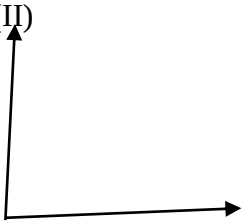
a (m/s^2)



Time

(II)

displacement(m)



time

on the same axis provided in (II) sketch the displacement - time graph for the same. (1mark)

d) A stone thrown vertically upwards reaches a height of 100 m. (Neglect air resistance and take g = 10 ms-2) Determine the:

(i) Initial velocity of the stone. (2 marks)

(ii) Total time the stone is in air. (2 marks)

e) Two balls of masses 4kg and 6kg are moving at velocities of 8m/s and 6m/s respectively. The two ball collide head on inelastically. What will be their velocity after collision? (3marks)

18. a) Apart from the definitions, distinguish between temperature and heat. (1 mark)

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b) Figure below shows variation of volume of water and temperature as water is heated from 0^oC to 40^oC

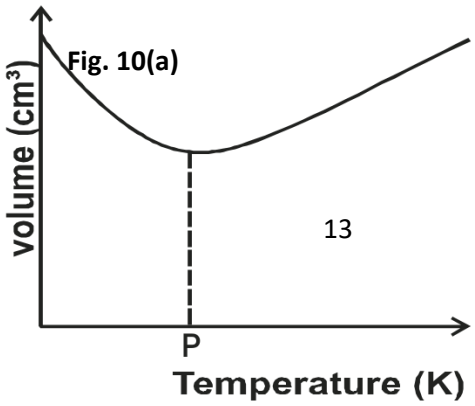

Fig. 10(a)

i) State the value of P (2 marks)

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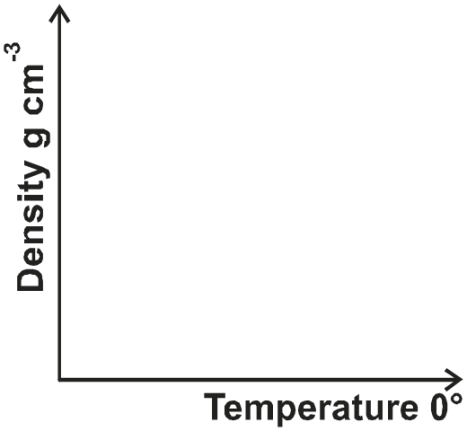
ii) In figure 10(b) below, sketch the graph of density of water against temperature upto $10^{o}C$. (1 mark)



c) State one way of improving the sensitivity of a liquid in glass thermometer. (1mk)

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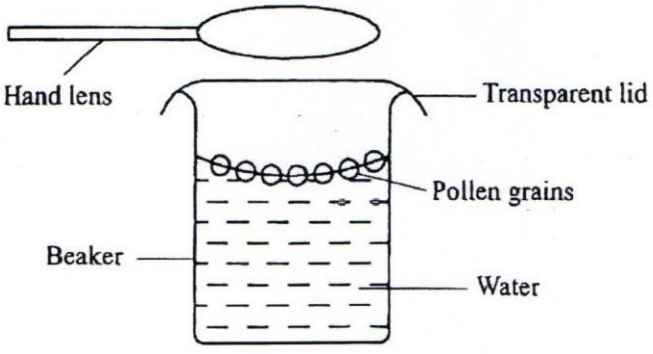
d) The figure below shows a setup to study Brownian motion in liquids.



i) State the function of the hand lens. (1mk)

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ii) State what is observed on the pollen grains. (1mark)

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iii) Explain the observation made in (ii). (2marks)

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iv) State and explain what would be observed on the pollen grains if the water was heated.

(2mks)

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EDUCATOR EXAM SERIES

FORM 3
232/2
PHYSICS PAPER 2
TIME: 2 HOURS.

INSTRUCTIONS TO CANDIDATES

- Write your name and your index number in the spaces provided above.
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- Answer **all** questions in section **A** and **B** in the space provided

FOR OFFICIAL USE

Section	Question	Max. score	Candidate's score
A	1-11	25	
B	12	12	
	13	09	
	14	07	
	15	10	
	16	10	
	17	07	
TOTAL SCORE		80	

SECTION A (25 MARKS).

1. Other than temperature, state any other factor that affect resistance of an Ohmic conductor. (1mark)

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2. Repulsion is the only sure test for polarity of magnet. Explain. (2marks)

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3. State two defects of a simple cell and how each can be minimized. (2marks)

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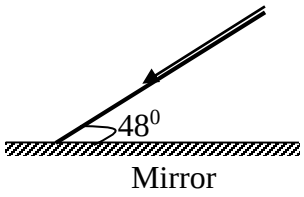
4. The fig 1 below shows a ray of light incident on a mirror.

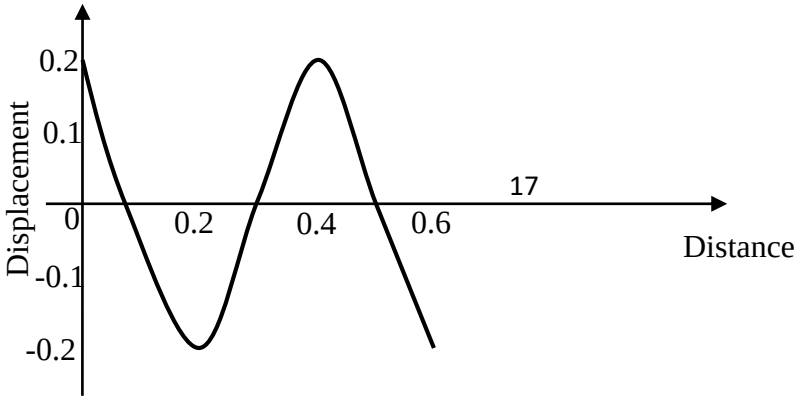
Fig 1



Determine the angle of reflection when the mirror is rotated 10^0 anti-clockwise (2marks)

5. The fig 2 below shows a displacement – distance graph of a wave profile.

Fig 2.



a) State the amplitude of the wave. (1mark)

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b) Given that the period of the wave is 0.255s, determine the velocity of the wave. (2marks)

6. The figure below shows two parallel current carrying conductors A and B placed close to each other. Current flows in the opposite direction.

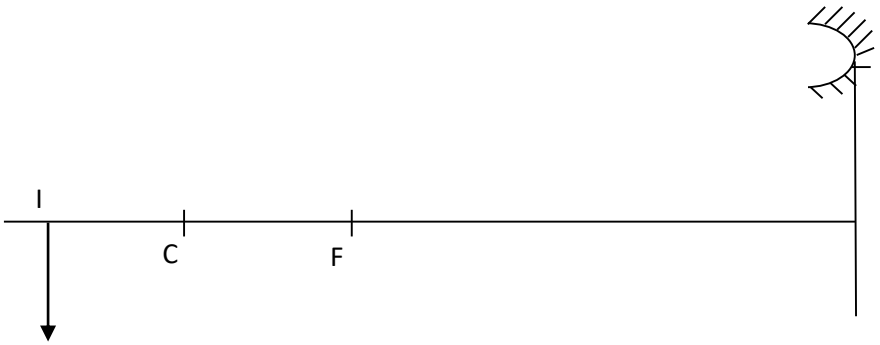
Sketch on the figure the magnetic field pattern by the two conductors. (2marks)

7. A soldier standing some distance from a wall blows a whistle and hears its echo 1.8seconds later. How far is the wall from the soldier? (Speed of sound in air = 330m/s) (3marks)

8. a) A pin is placed below the surface of a transparent water of depth 10cm and refractive index 1.33. Calculate the vertical displacement of the pin (3marks)

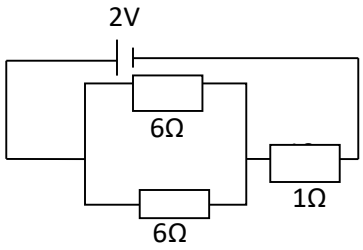
9. The fig.3 below shows the image, I formed by a concave mirror. Locate using ray diagrams the position of the object. (2 Marks)

Fig. 3.



10. The figure below shows an arrangement of resistors in a circuit

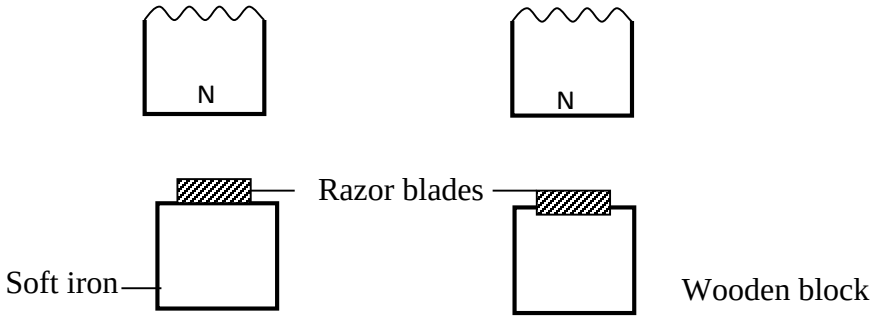
Fig. 4



Calculate the effective resistance in the circuit hence the current in the 6Ω resistor. (3marks)

11. Two similar razor blades are placed one on a wooden block and the other on a soft iron block as shown below

Fig. 5



It was observed that the razor blade on the wooden block was attracted to the magnet while the one on the soft iron block was not. Explain the observation. (2marks)

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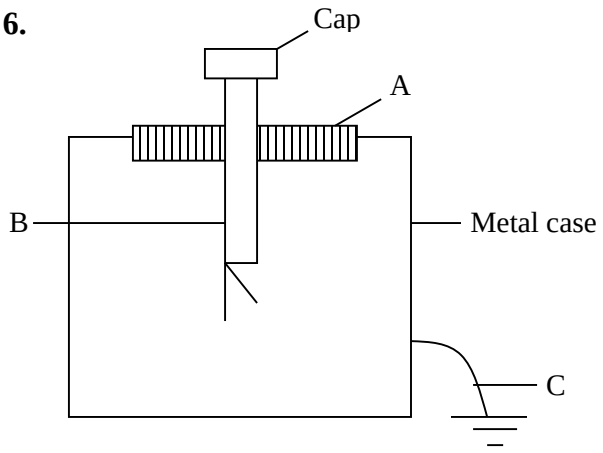
SECTION B (55MARKS)

12. The figure below is of a gold leaf electroscope.

Fig. 6.



a) Name the part labelled C (1marks)

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b) State the function of parts A (1marks)

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c) Describe how you can charge an electroscope by induction method (3marks)

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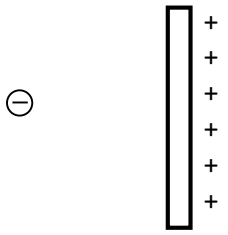
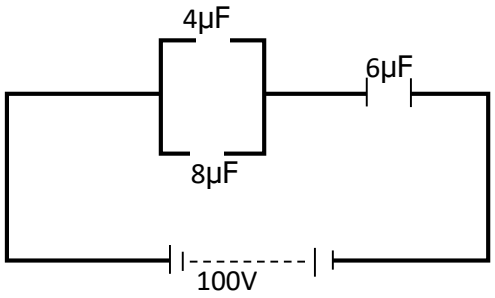
Draw the electric field pattern in the fig.7 below. (2marks)

Fig. 7



d) The figure below shows a system of capacitor connected to R 100v supply.

Fig. 8



Determine:

i) The effective capacitance of the circuit. (2marks)

ii) The charge through the 6μf capacitor (2marks)

e) State one factor that affect the capacitance of a parallel plate capacitor (1marks)

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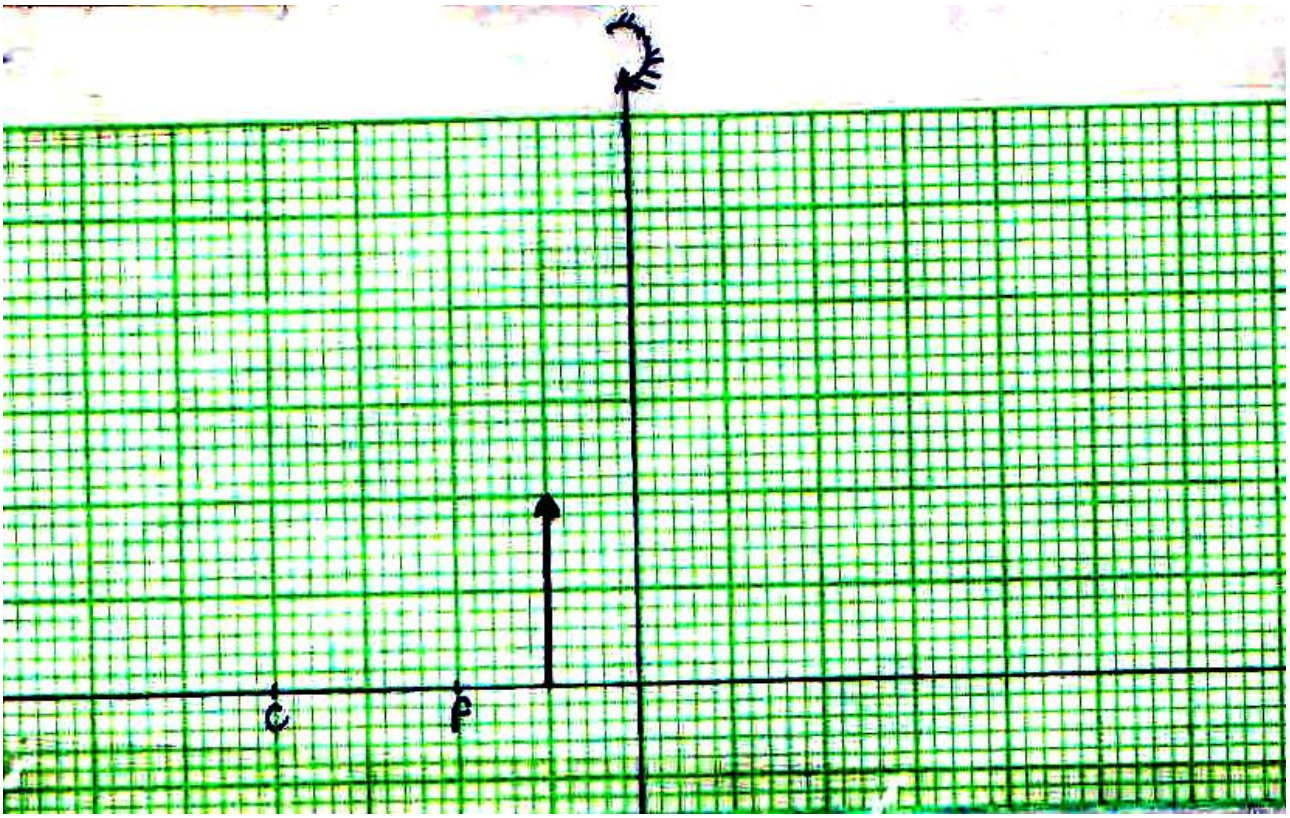
13. The figure below shows an object placed in front of a concave mirror of focal length 10cm. C is the center of curvature.

Fig. 9.



a) On the same figure, draw a ray diagram showing the position of the image. (2marks)

b) Use the ray diagra in (a) above to determine:

i) The image distance. (1mark)

ii) Magnification. (1mark)

iii) State one characteristics of the image. (2marks)

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c) A building standing 20m from a pinhole camera produces on the screen of the camera an image 2.5cm high, 5cm behind the pinhole. Determine the actual height of the building. (3marks)

14. a) Name the property of light that shows it is a transverse wave. (1mark)

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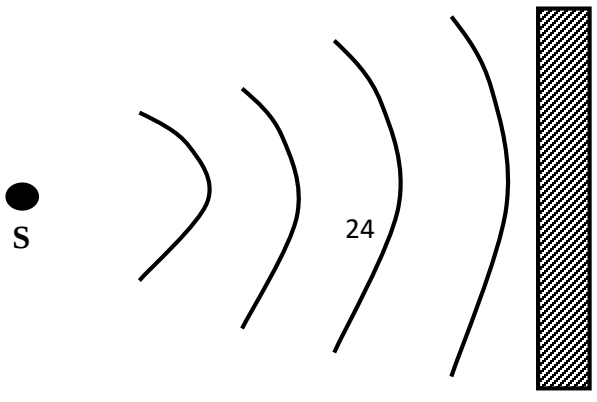
b) The figure below shows circular waves approaching a plane barrier in uniform medium.

Fig. 10



On the figure sketch the reflected waves. (2marks)

c) Distinguish between stationary and progressive waves. (1mark)

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d) State the condition for a minimum to occur in an interference pattern.
(1mark)

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e) State one way by which the frequency of a note produced by a given guitar may be increased.
(1marks)

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f) State one observable change on water waves when passed from deep to shallow water.
(1mark)

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15. a) State the Snell's law. (1mark)

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b) A coin is placed beneath a transparent block of thickness 10cm and refractive index 1.56. Calculate the vertical displacement of the coin. (2marks)

c) The speed of free light in a prism is 1.94×10^8 m/s.

i) Determine the refractive index of the prism material.(speed of light in air = 3.0×10^8 m/s)

(2marks)

ii) Determine the critical angle of the prism material. (2marks)

d) State one advantage of using optical fibre in communication. (1 mark)

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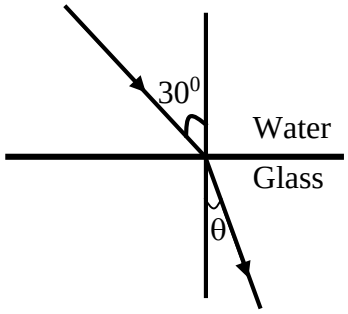
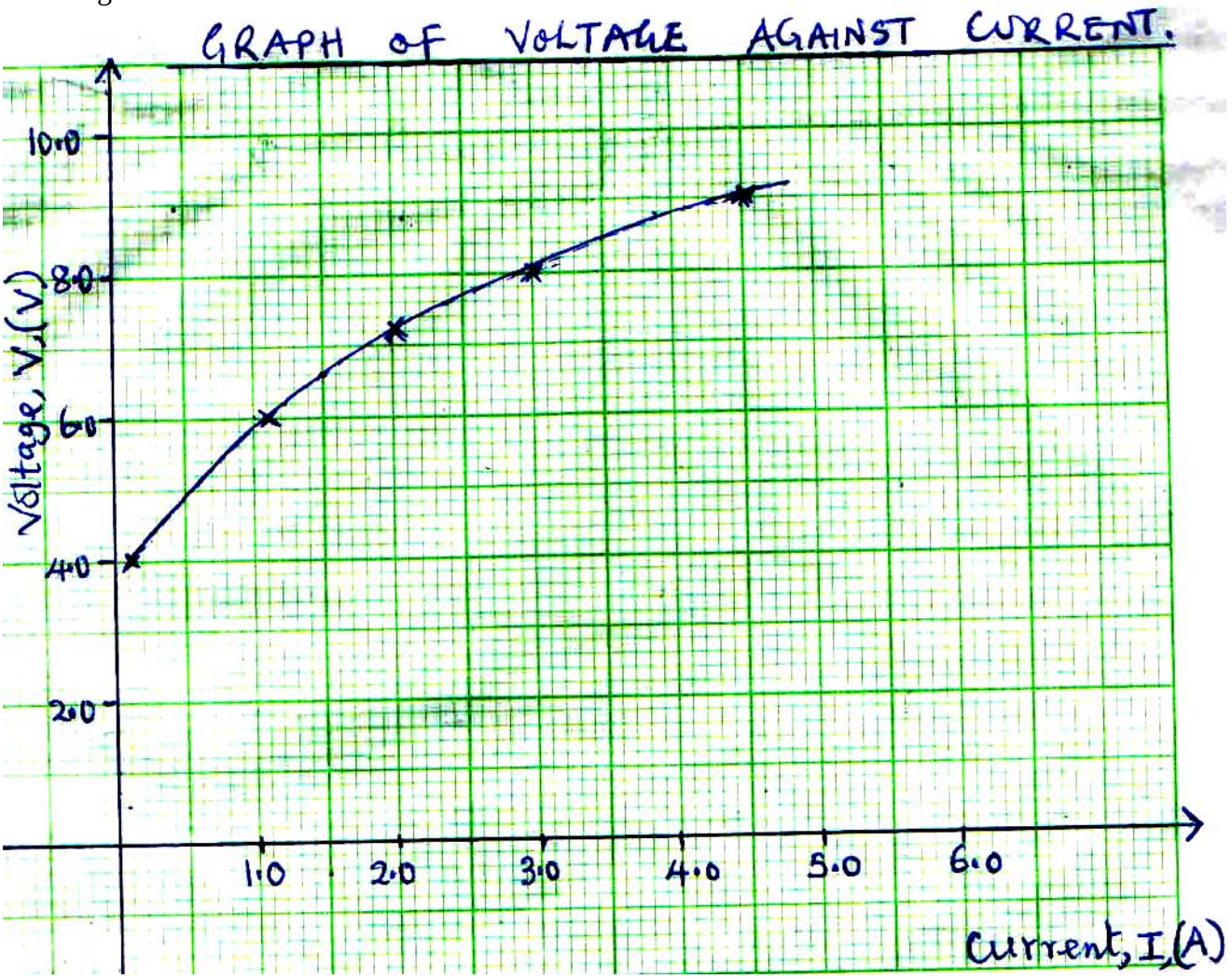
e) The refractive indices of water and floss are $\frac{3}{2}$ and $\frac{4}{3}$ respectively. Find the value of θ in the fig. below. (2marks)

Fig. 11.



16. Figure below shows a graph of potential difference .v(volts) against current , I (amperes) for a certain device.

Fig. 12.



From the graph:

a) State with a reason whether or not the device obeys ohm's law.

(2marks)

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b) Determine the resistance of the device at.

i) I=1.5 A (2marks)

ii) I= 3.5 A (1marks)

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iii) From the results obtained in (b) above, state how the resistance of the device varies as the current increases.

(1mark)

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iv) State the cause of this variation in resistance. (1mark)

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c) Three identical dry cells each of e.m.f 1.6v are connected in series to a resistor of 11.4Ω. a current of 0.32a flows in the circuit. Determine:

i) The total e.m.f of the cells. (1mark)

ii) The internal resistance of each cell. (2marks)

17. a) What is a ferromagnetic material? Give an example. (2marks)

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b) Using a diagram. Explain how you can obtain consequent poles by stroking method (3marks)

c) Explain how keepers help in maintaing the strength of a magnet during storage (2marks)

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