

**FORM 3 TERM 2 NOVEMBER 2021
PHYSICS PAPER 2**

Section A (25 marks)

1. Give one difference between luminous and non-luminous sources of light. (1mk)

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2. When a negatively charged rod is brought near the cap of a leaf electroscope, the leaf rises.
Explain this observation, (2mks)

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3. **Figure 2** represents a displacement-time graph for a wave.

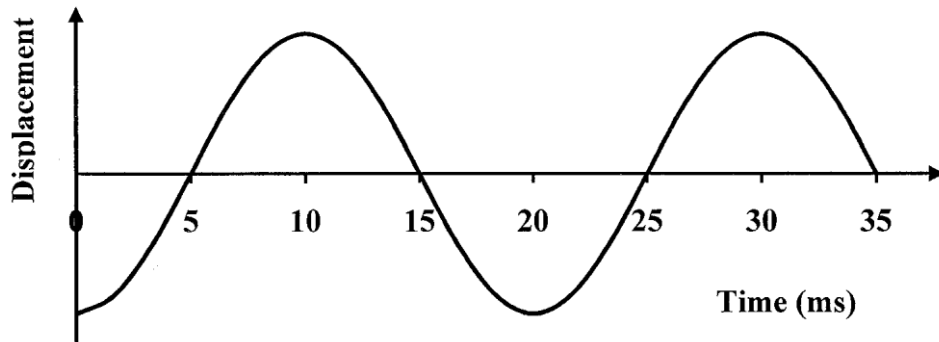


Figure 2

- Determine the frequency of the wave. (2mks)

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4. **State** the conditions necessary for a wave incident on a slit to be diffracted. (2mrks)

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5. In an experiment to determine the focal length of a concave mirror, magnification M was determined for various image distances v . Figure 3 shows a graph of magnification M against image distance v for the results from the experiment.

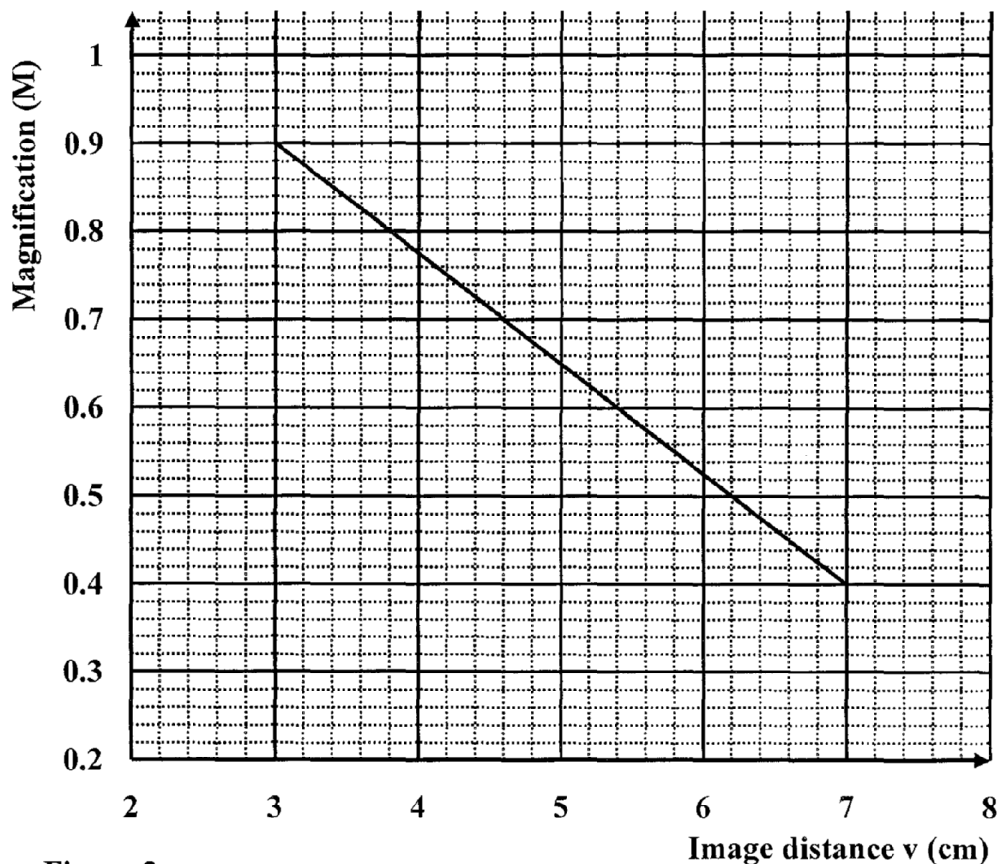


Figure 3

Given that $M = 1 - \frac{v}{f}$, determine the focal length f of the mirror. (3mks)

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6. A hair dryer is rated 2500W, 240V. Determine its resistance. (2mks)

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7. **Figure 4** shows the magnetic field pattern round a current-carrying conductor. Indicate on the conductor the direction of the current. (1mk)

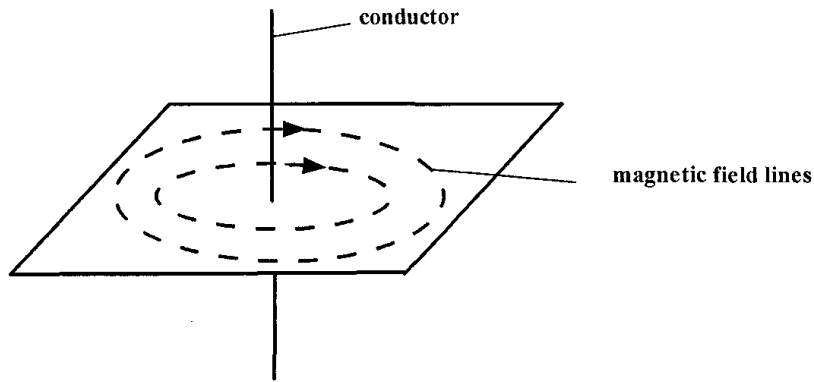


Figure 4

8. Why is repulsion the sure test for a magnet? (1mk)

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9. **Figure 5** shows a ray of light incident on an air bubble which is inside water,

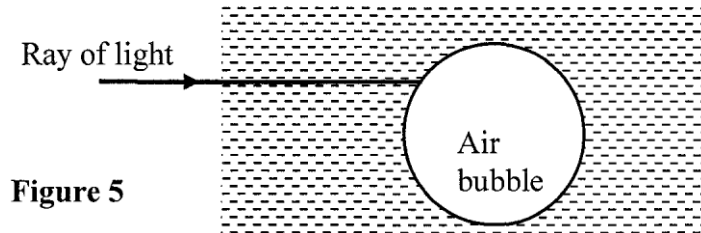


Figure 5

Complete the ray to show the path it follows through the air bubble. (1mk)

10. Explain how polarization of a cell increases the cell's internal resistance. (2mks)

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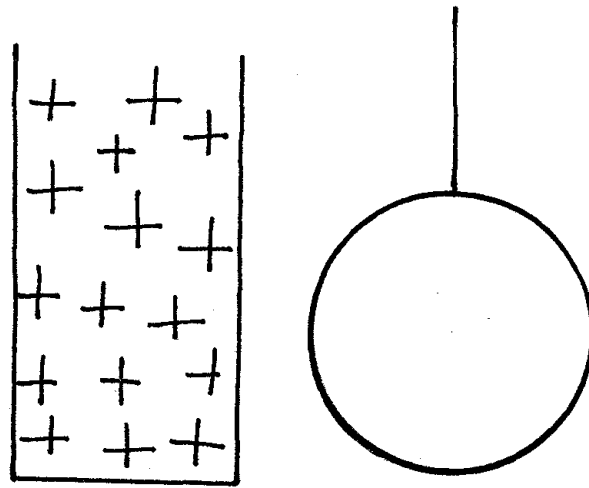
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11.

1. A positively charged material was brought close to an insulated metallic ball as shown in Fig 4. State and explain the distribution of charge in the ball (2mks)

Fig. 4



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2. Explain why sound cannot be heard from far when one shouts in a forest (1mk)

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12. Using the variation of resistance with temperature, differentiate between a conductor and a semiconductor. (1mk)

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13. A cell of internal resistance $0.5\ \Omega$ is in a circuit containing a $10\ \Omega$ resistor. A current of 2A flows in the circuit. Determine the emf of the cell. (2mks)

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Section B (55 marks)

14. (a) (i) State Snell's law of refraction of light (1mk)

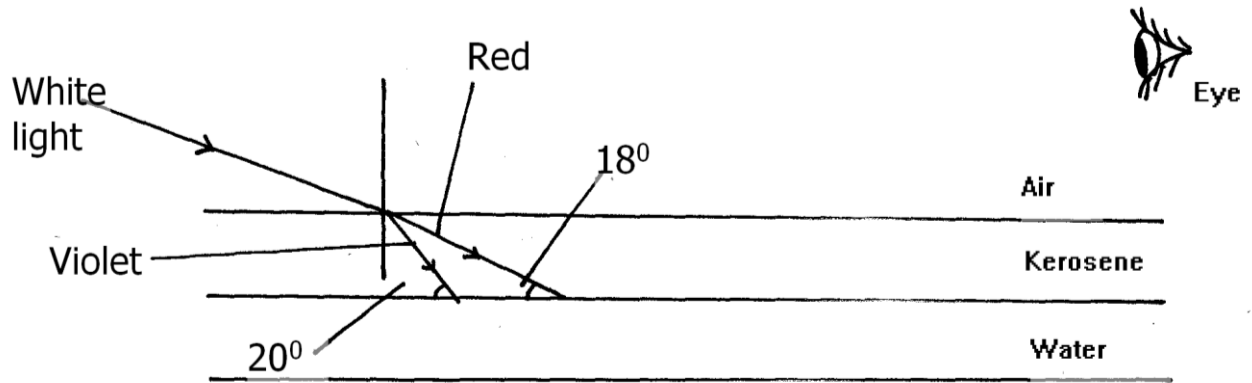
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(ii) Give two advantages of totally internally reflecting prisms over plane mirrors. (2mks)

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(b) A ray of light is incident on a kerosene water interfaces as shown in figure 7

Fig. 7



Given that the refractive index of water and kerosene are 1.33 and 1.44 respectively,

Determine

- (i) the refractive index for the kerosene – water interface (3mks)

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- (ii) determine and show on the figure the path of the rays of light between the Kerosene-water surface (3mks)

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- (iii) Why does the colours of the light separate at the kerosene layer. (1mk)

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- (iv) State and explain the observation that the eye above the two surfaces would see (2mks)

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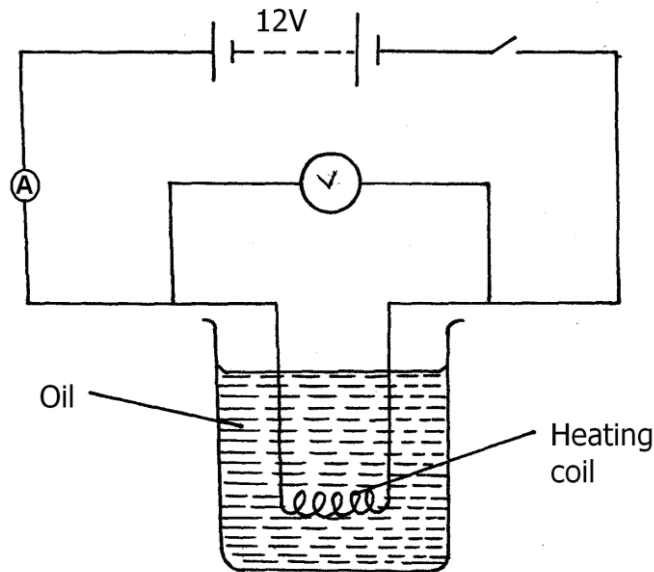
15. (a) State Ohm's law

(1mk)

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(b) The figure 8 below shows a circuit with a coil used to warm oil in a beaker.

Fig. 8



(i) Explain how heat is produced in the coil

(2mks)

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(ii) Given that the reading of the ammeter is 2.4A determine the resistance of the coil.

(3mks)

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(iii) How much heat is produced in the coil in a minute?

(3mks)

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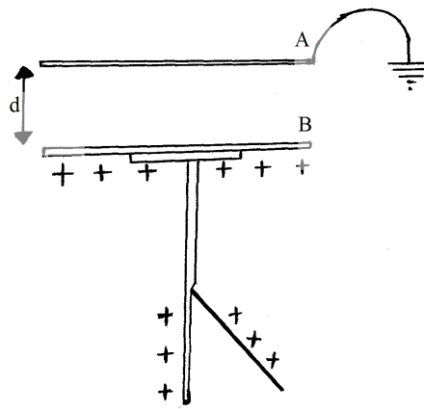
- (iv) Give two changes that can be made in the set up in order to produce more heat per minute. (2mks)

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16. (a) Define capacitance of a capacitor (1mk)

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The figure below shows a charged electroscope two aluminium plates A and B arranged as shown



State and explain the observations made when:

- (i) d is reduced (2mks)

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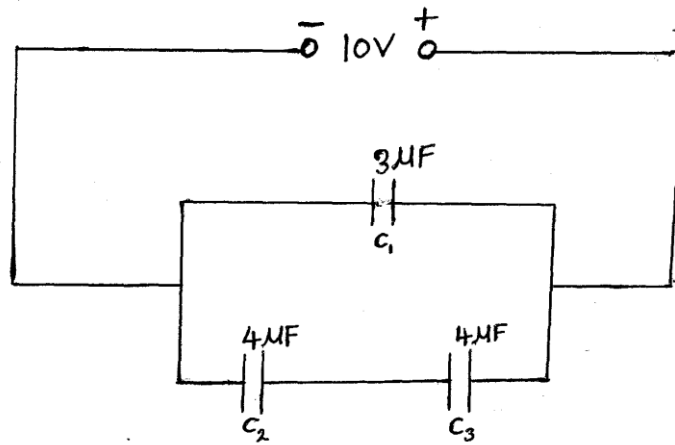
- (ii) the plate A is more horizontally (2mks)

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- (iii) a sheet of polythene is placed between A and B (2mks)

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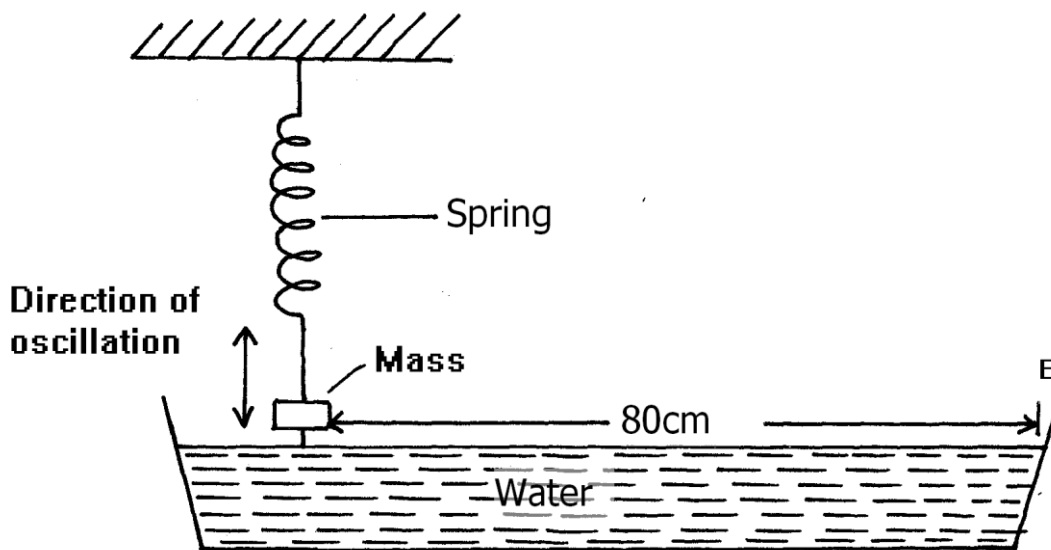
- (b) Three capacitors are connected to a 10V battery as shown below.



- (i) Calculate the combined capacitance (3mks)
- (ii) What is the charge on the $3\mu F$ capacitor (3mks)

17. Students set up a mass attached to spring such that when it oscillates it taps on water surface in a wide shallow tank.

Fig. 6



The students measured time for 20 oscillations and found that the mass takes 36 seconds.

(i) Determine the periodic time of the mass (2mks)

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(ii) Calculate the frequency of the waves produced on the water surface (3mks)

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(iii) Given that the student counted four ripples between the mass and end B of the tank, Determine the speed of the waves. (3mks)

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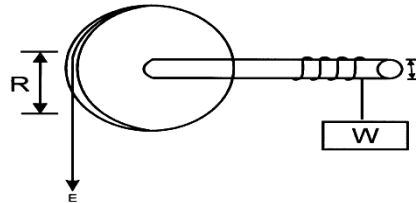
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18. a. A machine is a device that enables work to be done more easily and conveniently. State any two ways in which a machine makes work easier. (2 marks)

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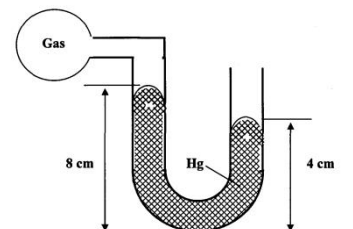
- b. Figure 7 shows a wheel and axle being used to raise a load W by applying an effort E . The radius of the wheel is R and of the axle is r .



- i) Show that the velocity ratio (V.R) of this machine is given by $\frac{R}{r}$ (3 Marks)

- ii) Given that $r = 5\text{cm}$ and $R = 50\text{cm}$, determine the effort required to raise a load of 200N if the efficiency of the machine is 90% . (3 mks)

- c. An airtight flask containing a gas is connected to a mercury manometer. The levels of mercury in the two limbs of the manometer are as shown in the diagram below.



Calculate the pressure of the gas (Density of mercury = $1.36 \times 10^4 \text{ kg/m}^3$ and atmospheric pressure = $1.0 \times 10^5 \text{ N/m}^2$) (3mks)

