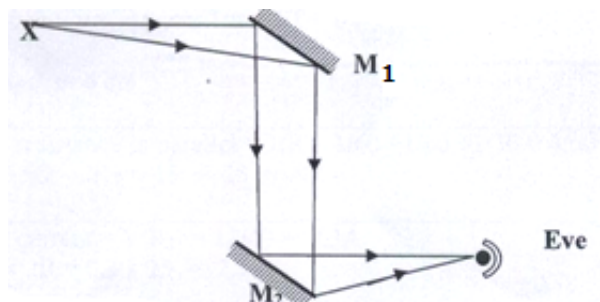


SECTION A (25 Marks)

1.



2. Hammering causes the dipoles to vibrate making them to be aligned with the earth's magnetic field hence the magnetization.
3. A change in temperature causes a change in the tension/ length of the wire which in turn causes a change in the frequency of vibration of the string/sound produced.

4. $f = 1/T = 1/10 \times 10^2 = 1.0 \times 10^{-3} \text{ Hz}$

5. Wavelength $\lambda = c/f = 340/16000 = 2.125 \times 10^{-2} \text{ m}$

6. i) A is positive and B negative

ii) C is Ammonium chloride jelly.

D is A mixture of carbon and manganese dioxide

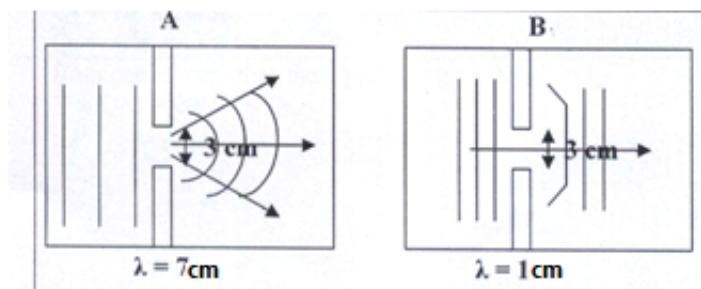
7. Reduce the area of overlap

Increase the distance of separation 'd'

8. When the switch is closed, the nails are attracted.

When the switch is opened the nail on the iron side drops first.

9.



10. $f=10\text{cm}; v=-15\text{cm}; 1/u=1/f+1/v=1/10+1/15=5/30$
 $u=30/5=6\text{cm}$

SECTION B (55 Marks)

11. a)

Total resistance in parallel $=1/R=1/60+1/60+1/30=4/60$
 $R=15\Omega$ $R_T=15+25=40\Omega$

b)

Total current $=V/R_T=12/40=0.3A$

P.d $=IR=0.3 \times 25=7.5V$

c)

P.d across each resistor in parallel $=12-7.5=4.5V$

Current $=V/R=4.5/30=0.15A$

d)

Resistivity $=RA/l=25 \times 5 \times 10^{-6}/0.4=3.125\Omega m$

12. a) Suspend the bars independently away from magnetic materials using the string and allow them to settle. The bar magnet will settle in a N- S direction in line with the earth's magnetic field while the iron bar can rest facing in any direction.

b)

i) During magnetization using an electric current, the dipoles in the materials get aligned in one direction as the current increases. After sometime, all dipoles align themselves and a further increase in the magnetizing current ceases to have an effect on the degree of magnetization hence magnetic saturation is achieved.

ii) Q is easier to magnetize compared to P since it achieves magnetic saturation with a lower current than P.

13. a) The ratio of the charge stored by a capacitor to the voltage across the plates. $C=Q/V$

b)

i)

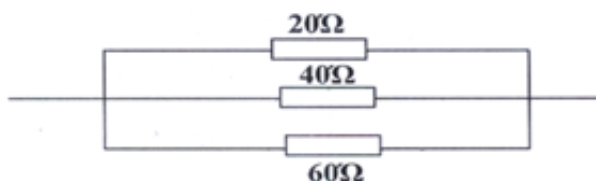
Both capacitors store the equal charge $=20\mu F$

$V=Q/C=20/10=2V$

c i)



ii)



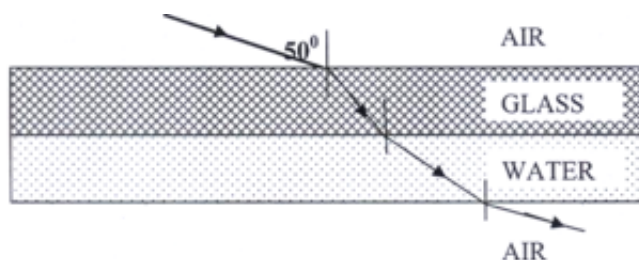
14. a)

i) See graph paper

ii) $M=v/u$ Or $H/h=2$ (Use student diagram)

b)

i)



ii)

$$\frac{3}{2} = \frac{\sin 50^\circ}{\sin r_1} \text{ therefore, } r_1 = 30.71^\circ$$

$$V_a/V_g = 3/2 \text{ and } v_a/v_w = 4/3. \text{ Therefore } v_g/v_w = 8/9$$

$$8/9 = \frac{\sin 30.71}{\sin r_2}$$

$$r_2 = 35.07^\circ$$

c)

Used in optical fibres and prism periscopes

15. a) It is that point on the principal axis from which rays parallel and close to the principal axis appear to diverge after refraction by the lens.

b)

$$m=v/u=4$$

$$V=4u: u+4u=100 \text{ and } u=20\text{cm}$$

$$1/f=1/v+1/u=1/20+1/80$$

$$f=16\text{cm}$$

c)

i) See graph

ii) Intercept on the V axis = focal length Reading = 10cm

