SECTION A (25 Marks)

1. Rectilinear propagation/light travels in a straight line;√

2. (a) $Speed = 2d/t$

$$= \frac{400 \times 2}{2.5} \surd$$

$$= 320m/s \surd$$

(b) $$320 = 2\frac{\times -400}{4.5} \surd$$

$$\times -400 = \frac{320 \times 4.5}{2}$$

$$X - 400 = 720 \quad \surd$$

$$X = 1120m$$

3. To concentrate the magnetic field.

4. $n_1 \sin Q = n_2 \sin Q_2$

$\frac{6}{3} \sin 30^0 = \frac{3}{2} \sin Q_2$

$= \sin Q_2 = 0.0667$ (3mks)

$= Q_2 = 41.813^0$

5. (a) A- Zinc√

B-Copper√

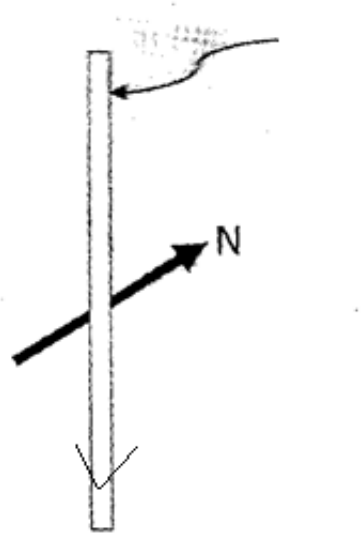
(b) Because of increased resistance caused by polarization / local action

6. -More information can be transmitted at the same time/ no loss of energy during transmission

7. The object attracted then repelled. √

8. In B more current due to lower / reduced effective resistance or in A less current flows due higher effective resistance √

9.

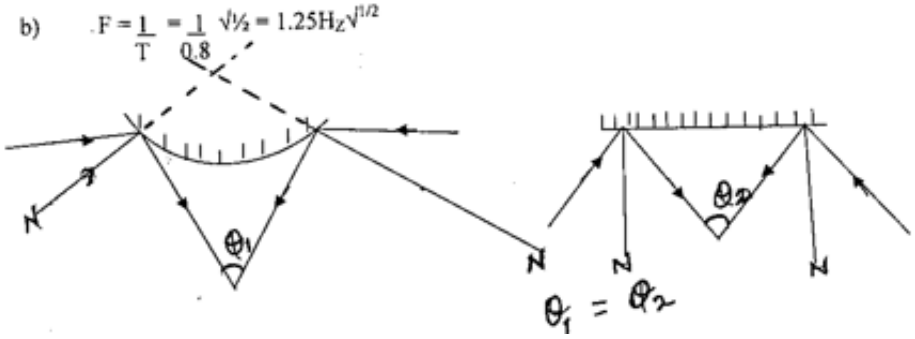


(b) Soft magnetic material is easily magnetized and demagnetized while a hard magnetic material is difficult to magnetize and demagnetize.√1

10. (a) Period time T=time for one √½ oscillation= 0.80√½

(b) $f = \frac{1}{T} = \frac{1}{0.8}$ √½=1.25Hz √½

11.

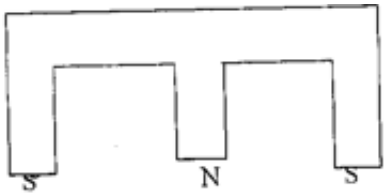


Answer all the questions in this section

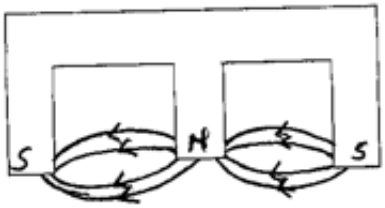
12. (a) Like poles repel, unlike poles attract.√

(b) A-North.√ B-North√

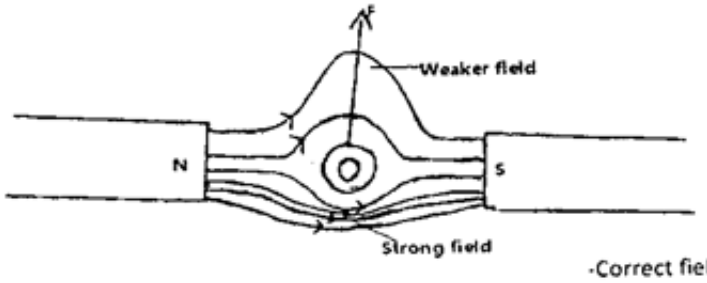
(c) (i)



ii)



(iii) -number of turns.√ -magnitude of current



-Correct field;

13. (a) (i) Total capacitance in the Parallel connection $= 5\ \mu F$

Total capacitance: $\frac{1}{C_T} = (\frac{1}{5} + \frac{1}{4} + 1)$

$C_T = \frac{20}{29} = 0.6897\ \mu F$

(ii) Total charge =CV=0.6897 x3=2.069μC

Charge stored by 3μF capacitor

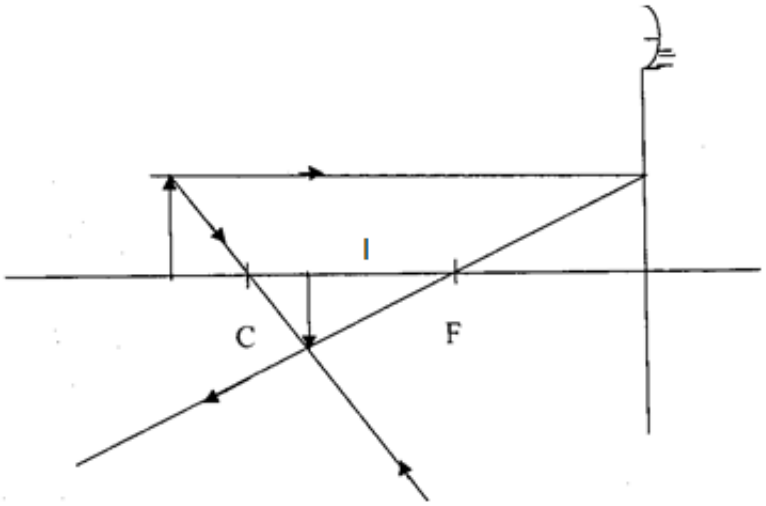
$= \frac{3}{5} \times 2.069 = 1.241C$

-bring a negatively charged strip near the cap of the electroscope

-Touch the cap of the electroscope momentarily/ earth the cap

-Remove the finger with the strip near the cap;/ disconnect the earthing -Remove the rod

14.



Location of F .√
Correct rays.√
Image position.√

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

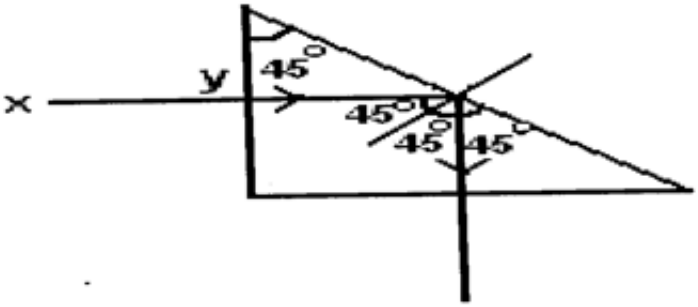
$\frac{1}{u} = \frac{1}{5} - \frac{1}{10}$

$\frac{1}{u} = \frac{1}{10}$

$u = 10cm$

(c) (i) -light must travel from an optically denser medium to optically less dense medium;

-the angle of incidence must be greater than the critical angle;



15. (a) Current flowing through a conductor is directly proportional to the p.d across the conductor provide a temperature and other physical conditions are kept constant. (b)

$E = QV \qquad -V = \frac{E}{Q}$

$= \frac{30}{20}\sqrt{}$ (1mark) (2marks)

$= 1.5V\sqrt{}$ (1mark)

(ii) $Q = It$

$20 = I \times 5\sqrt{}$ (1 mark) (2marks)

I=4A√ (1mark)

(iii) V=IR

1.5=4 x R√ (1mark)

R=0.375 Ω√ (1mark) (2marks)

(iv) P=VI

=1.5x 4√=6 W (2marks)

(c) (i) $\frac{1}{V} = \frac{r}{E}(\frac{1}{R}) + \frac{1}{E}$

$y = M \times + C$

$\therefore \frac{1}{V}\text{int } ercept = \frac{1}{E} = 0.65\sqrt{}$ (1mark) $\therefore E = \frac{1}{0.65}$

(ii) $E = 1.538V\sqrt{}$ (1 mark)

$slope = \frac{r}{E}$ $slope = (\frac{2.25 - 0.65}{2.0 - 0})\sqrt{}$ (1 mark)

$= 0.8\Omega$

16. (a) (i) Diffraction –spreading of waves beyond openings/obstacles. 1mark

Refraction –is the bending of waves when they change medium.

(ii) change in velocity

constant wavelength ✓1
Curving fronts ✓1

(b) (i) Constant loud sound√1; due to constructive interference√1

(ii) The soft sound is due to destructive interference√1when a rarefaction merge with a compression; the loud is due to constructive interference√1 of compressions/rarefactions;

(c) - same wavelength

-same frequency

-same/nearly same amplitude