FORM FOUR CLUSTER KCSE MODEL1

PHYSICS PAPER 2 ANSWERS

SECTION A (25 Marks)

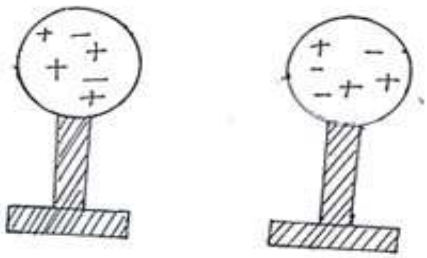
Answer all questions in this section

1. To earth

2. (i) 2 x 15= 30^0

   (ii) Angle of incidence increases by 15= 40+15=55^0

   Angle of reflection= 55^0 Total angle = 55+55=110^0

3. 

4. c -would read 2 x 2.1V=4.2V;

   d- would read 0.35A;

5. P - South

   Q - North

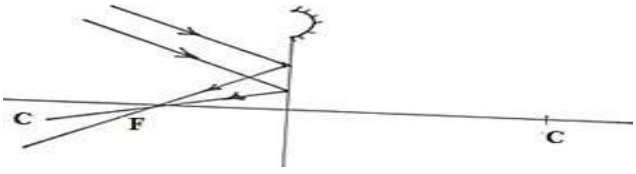
6. $2.5+2=4.5\,\mu F$

   $\frac{1}{x}+\frac{1}{4.5}=\frac{4.5+x}{4.5x}=\frac{1}{3};$

   $13.5+3x=4.5x;$

   $13.5=1.5x$

   $x=9\,\mu F$;

7. 

8. a) Repulsion- Both ends acquire similar polarities making them to repel each other.

   No attraction or repulsion. AC supply do not have a constant direction of flow of current. It does not create a magnet force due to rapid magnetization and demagnetization;

9.

$$V = f\lambda \quad ;$$
$$= \frac{1}{0.06} \times 0.4 \; ;$$
$$= 6.667 ms^{-1} \; ;$$

10. (i) Alpha

    (ii) Beta

11. Sound waves require medium for transmission while electromagnetic waves does not require material medium for transmission.

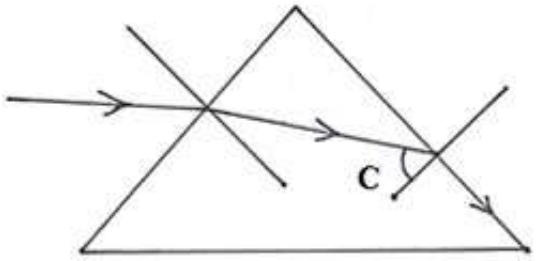
12. (a) Macro wave

    (b) By crystal detectors or solid state diodes.

SECTION B (55 Marks)

Answer all questions in this section

13.



(a) $\eta = \frac{speed\ of\ light\ in\ air}{Speed\ of\ light\ in\ glass}$;

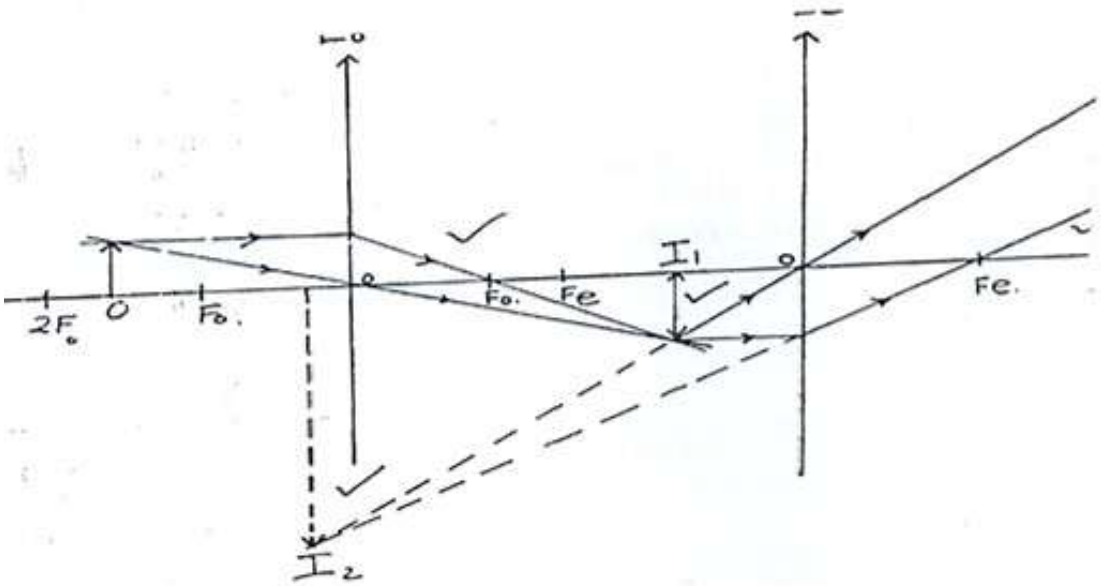
$= \frac{3 \times 10^8}{2 \times 10^8}$; $= 1.5$;

b) $\text{Sinc} = \frac{1}{\eta}$;

$\text{Sinc} = \frac{1}{1.5}$

$c = 41.81^0$;

c)



d) (i) $\frac{1}{F}=\frac{1}{U}+\frac{1}{V}$ √

$\frac{1}{15}=\frac{1}{25}+\frac{1}{V}$ √

V=37.5cm√

(ii) U=52.5-37.5

=15cm√

14. a) The current flowing through a conductor is directly proportional to potential difference across its ends provided temperature and other physical conditions are kept constant.

b) p.d across parallel network =1R

=0.2 x 4=0.8V

Current through 1 Ωresistor $= \frac{V}{R}$

$1 = \frac{0.8}{1}$

=0.8A;

Total current in the circuit =0.8+0.2=1A

Total resistance $= R_p + 2 + r$

$= \frac{4}{5} + 2 + 1$

$= 0.8 + 3 = 3.8\Omega$;

$V = 1R$

$2E = 1 \times 3.8$

$E = 1.9V$;

c) Resistance =slope of graph;

$= \frac{2.2 - 1.4}{0.3 - 0.2} = 8\Omega$

d) E= Pt; N^0 of KiloWatts $= \frac{V}{1} = \frac{60}{1000} = 0.06KW$

Kilowatt hour= $0.06 \times 36 = 2.16\,Kwh$

15. a)(i) High voltage maintains low current which decreases power loss;

(ii) Thick aluminium has big cross sectional area which lowers resistance; of aluminium decreasing power loss.

(iii) Ac current can be stepped up or stepped down unlike dc current.

b) Y - Earth wire- It has not been used to complete the circuit.

X -Live wire- It has been connected to the heating element.

c) (i) lenz's law of electromagnetic induction states that the direction of induced e.m.f is such that the current which it causes to flow causes magnetism which opposes the change causing it.

d)(i) Induced current flows in the clockwise direction.

(ii) Pointer of the galvanometer moves anticlockwise when South Pole moves inward; End becomes South to oppose the motion of magnet; Pointer moves clockwise when South Pole moves outward; End becomes north to oppose the outward motion of the magnet.

e)(i) $\text{Power} = I_P V_P = 240 \times 0.5 = 120 Watts$;

$\frac{95}{100} \times I_P V_P = I_S V_S ; P_S = 0.95 p_I$

$p_S = \frac{95}{100} \times (240 \times 0.5) = 114 Watts$;

(ii) -For quick magnetization and demagnetization;

-To reduce eddy currents;

16. 6. a)(i) -To prevent energy losses of x-rays from colliding with air particles. (1 mark)

(ii) -Increasing p.d across R and S; (1 mark)

b) $ev = ½ M_e V^2$

$1.6 \times 10^{-19} \times 300 = ½ \times 9 \times 10^{-31} V^2$;

$2 \times 1.6 \times 10^{-19} \times 300 = 9 \times 10^{-31} V^2$

$V = \sqrt{\frac{2 \times 1.6 \times 10^{-19} \times 300}{9.1 \times 10^{-31}}}$ $= 1.027 \text{ x } 10^7 \text{ M/s}$

c) Voltage on the anode which accelerate the electrons;

d) Properties of X-rays

-They are not deflected by

-Both magnetic field and electric field;

-They have high penetrating powers;

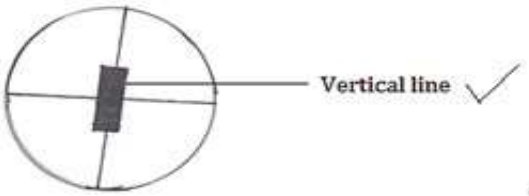
e) (i) -√Conducting electrons to the earth.

-√Shielding the bean from external electric field.

-√Accelerating electrons towards screen. Any one √ (1)

f (i) The greater the p.d the greater the electric field intensity, the greater the focusing of the spot.√(2 mks)

(ii)



(1 mark)

17. a) Radioactivity is the spontaneous random emission of particles from the nucleus of an unstable nuclide;

b) (i) To allow all radiation to penetrate.

(ii) On entering the tube, the radiation ionizes argon gas. The positive ions flows towards the cathode and negative ions towards the anode. This creates potential differences that results to flow as a pulse current.

(iii) To absorb the energy of positive ions before they cause secondary ionization.

$hf = hf_0 + \frac{1}{2} mv^2$

But work function $w_0 = hf_0$

$$f = \frac{w_0}{h} = \frac{6.4\times10^{-19}}{6.4\times10^{-34}}$$

$$= 1.0\times10^{-15}$$

$\therefore ke = hf - hf_0$

$= h(f - f_0)$

$= 6.4\times10^{-34}(3.0\times10^{-15} - 1.0\times10^{-15})$;

$= 6.4\times2\times10^{-19} J$

$= 12.8\times10^{-19} J$

$= 1.28\times10^{-18} J$;