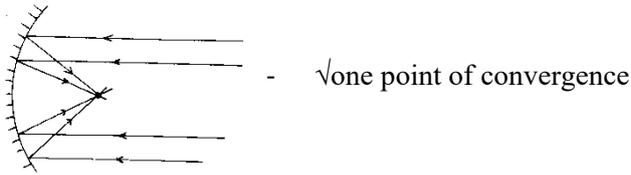
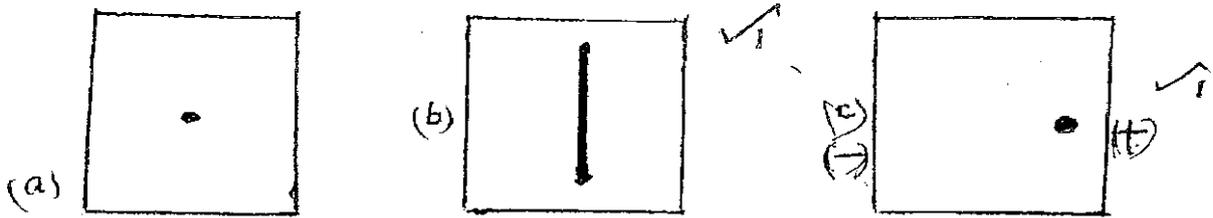


**PHYSICS MID TERM FORM 4**  
**TERM 2 2024**  
**MARKING SCHEME**  
**PHYSICS PAPER TWO**  
**232/2.**

1.



2. The flame ionizes air producing positive and negative ions. Air ions oppositely charged ions as the electrons are attracted, and neutralizing charge on the electroscope
3. Motion is out of paper or moves up.
- 4.



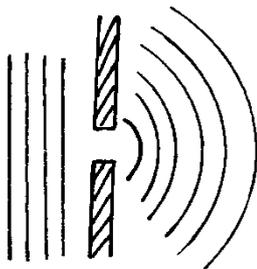
5a). Is the time taken for half life of the of the radioactive substance to decay.

b).  $1/32 = (1/2)^{T/t}$

$2^{-5} = -T/4$       OR      Use of logs

$T = 20 \text{ yrs}$

5. image formed in a plane mirror is virtual while image formed in pin-hole camera is real or image formed in plain mirror is upright while image formed in a pin hole camera is inverted (any 1 correct)
6.  $C = \frac{C_1 C_2}{C_1 + C_2} = \frac{2 \times 2}{2 + 2} \mu\text{F}$   
 $1 \mu\text{F}$   
 $Q = cv = 1 \mu\text{F} \times 12 \text{ V}$   
 $= 12 \mu\text{C}$
7. It minimizes echoes
8. Microwaves, infrared, visible light, gamma rays
- 9.

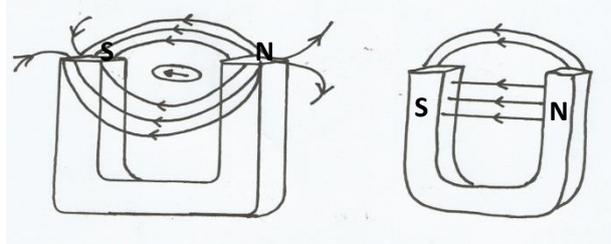


1 mk – pattern – circular waves  
 1 mk – constant wavelength

10. A = brown or red, B = yellow/green, C = Blue

Purpose of fuse: Break the circuit in case of excess current: thus protecting an appliance from damage

11. Figure



12. In parallel  $\frac{1}{R_T} = \frac{1}{4.2} + \frac{1}{4.2}$

$R_T = 2.1$

Total resistance  $2.9 + 2.1 = 5\Omega$

Using Ohm's law  $V = IR$

$$I = \frac{2}{5} = 0.4A$$

14. Brass rod rolls towards the switch – motor effect.

**Section B (55 marks)**

(a)

- Threshold frequency – minimum frequency of light required for photoelectric effect to occur
- Threshold wavelength – maximum wavelength of light required for photoelectric effect to occur
- 

(b)(i) x-intercept =  $10.5 \times 10^7$

$$\Rightarrow 1.05 = \frac{1}{\lambda_0}$$

$\lambda = 9.524 \times 10^{-9} \text{ m}$

$$\begin{aligned} \text{but } f_0 &= \frac{C}{\lambda_0} \\ &= \frac{3 \times 10^8}{9.5 \times 10^{-9}} \\ &= 3.157 \times 10^{16} \text{ Hz} \end{aligned}$$

a)(i)  $C = \lambda f$

$$f_0 + \frac{C}{\lambda_0}$$

$$= \frac{3.0 \times 10^8}{8.5 \times 10^{-7}}$$

$f_0 = 3.75 \times 10^{14} \text{ Hz}$

(ii)  $K.E = \frac{1}{2} MV^2$

$= hf - hf_0$

$6.62 \times 10^{-34} (8.5 \times 10^{14} - 3.75 \times 10^{14})$

$= 3.149 \times 10^{-19} \text{ J}$

15.(i) The charge of an electron ( $e^-$ )

Y-intercept =  $\frac{w}{e}$

$13 \times 10^{-1} = \frac{2.08 \times 10^{-10} - 10^{-19}}{e}$

$$e^- = \frac{2.08 \times 10^{-19}}{1.3} = 1.23 \times 10^{-19} \text{ C}$$

$$\text{slope} = \frac{\Delta V_s}{\Delta \frac{1}{x}} = \frac{2.1 - 0.5}{(27.5 - 14.5)}$$

$$= \frac{1.6}{13 \times 10^7} = 1.23 \times 10^{-8} \text{ vm}$$

(iv) The value of planks constant

$$\text{Slope} = \frac{hc}{e}$$

$$= 1.23 \times 10^{-8}$$

$$= \frac{h \times 3 \times 10^8}{1.6 \times 10^{-19}}$$

$$h = \frac{1.23 \times 10^{-8} \times 1.6 \times 10^{-19}}{3.0 \times 10^8} = 6.56 \times 10^{-36} \text{ JS}$$

16. (a) (i) In ( $\frac{12}{6}$  C), the Newton to proton ratio is one thus stable, while in ( $\frac{14}{6}$  C) N/P > 1 thus unstable

(ii) Actual rate =  $82 - 10 = 72 \text{ C/s}$ ,  $19 - 10 = 9 \text{ C/s}$

72                      1                      2                      3                      9

2/0sec                      →                      3 Half lives

$$t_{1/2} = \frac{210}{3} = 70 \text{ sec.}$$

(b) The radiation ionize argon gas 1- along their path. The alcohol vapour condenses on the ions formed creating tracks. 1

(c) (i) Lower the temperature in the chamber thus making it possible for the alcohol vapour to condense

(ii) The nature of radiation can be identified.

(d) (i) The impurity atom forms only 3 bonds creating a hole that acts as a +ve charge carrier.

(ii) Causing current to flow through a diode

(iii) Bulb does not light because diode is reverse biased

c - cathode

16. a) i) A - Grid..... Controls the brightness of the spot ✓  
 B - Y- plates..... deflects the electron beam vertically. ✓

iii) When the cathode is heated, electrons are emitted from it through thermionic emission which are then accelerated and focused by ✓ 1 the anode to the fluorescent screen.

iv) Low work function ✓ 1

b) i)  $T = 4 \times 100$

$$= 400 \text{ MS} \checkmark 1$$

$$f = \frac{1}{T} = \frac{1}{400 \times 10^{-3}} = 2.5 \text{ Hz} \checkmark 1$$

ii)  $= n \times Y\text{-gain}$

$$= 2 \times 120 \checkmark 1$$

$$= 240 \text{ V} \checkmark 1$$

17. source of electrons

(ii) A-copper a node to conduct heat away

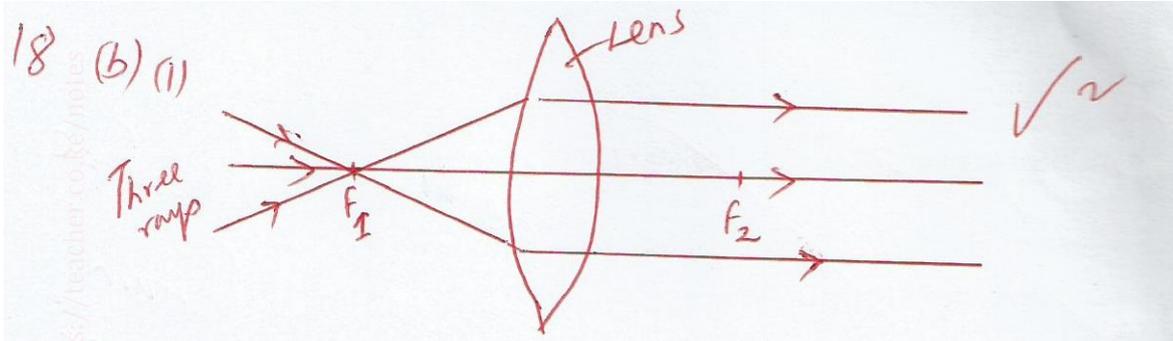
B- tungsten- have a high melting point

(iii) To remove/ conduct away the heat generated.

(iv) By increasing the accelerating voltage E.H.T the energy of the moving electrons increased, hence the energy of x- rays produced is also increased

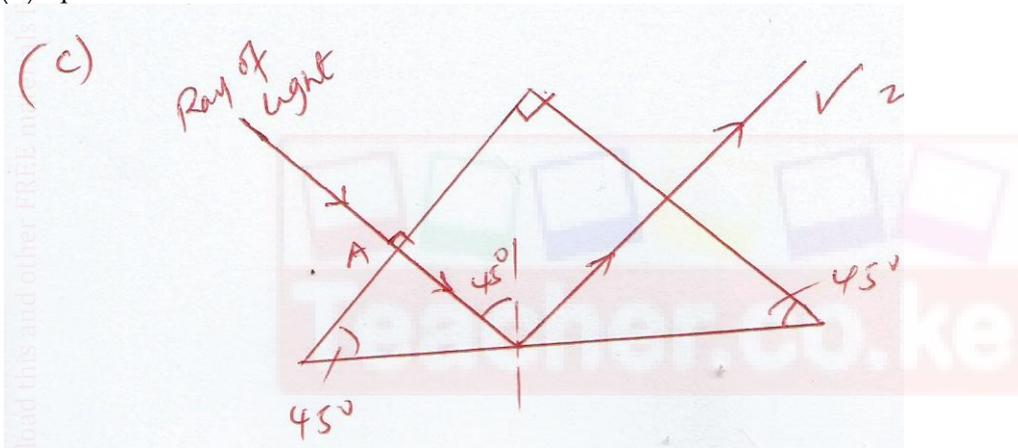
(c)  $Q=IT$   
 $= 1.6 \times 10^{-19} \times n = 0.2 \times I$   
 $N = \frac{0.2 \times 1}{1.6 \times 10^{-19}}$   
 $= 1.25 \times 10^{18}$  electrons

18. (a) (i) 10cm  
(ii)  $m = \frac{V}{u} = \frac{18}{24} = 0.75$



Three rays of light pass through  $F_1$  to the lens.

- (1) On the figure continue the three rays through the lens and into the air. (2 marks)  
(ii) Speed is reduced.

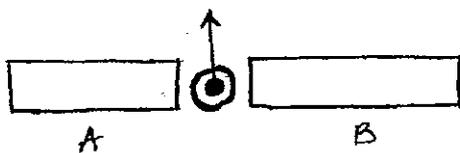


d)  $\frac{i}{f} = \frac{1}{u} + \frac{1}{v}$   
 $\frac{1}{20} = \frac{1}{30} + \frac{1}{v}$

$v = \frac{60}{-5} = -12 \text{ cm}$

- (e)(i)
- Short eye ball
  - Long focal length
  - converging / convex lens

19.(i)



(ii) The magnetic field due to the magnet and that due to current interact producing a resultant force on the wire upwards.

(b)(i) Sparks are produced in an induction coil but not a transformer

(ii) The soft iron armature vibrates to and fro switching on and off the current. The changing magnetic flux induces e.m.f in secondary coil. The secondary coil has more turns and a higher w.m.f is induced.

(i)  $\frac{N_s}{N_p} = \frac{V_s}{V_p} \frac{5000}{4} 1250:1$

$$\frac{N_s}{N_p} = \frac{15000}{12}$$

- (ii) Back e.m.f is induced during make and break  
(iii) By reducing the rate of fall(dying) of magnetic field

