

232/2 PHYSICS (2017)
PAPER 2

MARKING SCHEME

1) the divergence increases.

$$2) \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$-1/12 = 1/u - 1/4$$

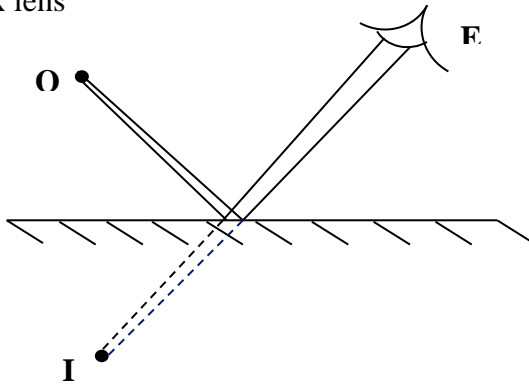
$$1/u = -1/12 + 1/4$$

$$1/u = 2/6$$

$$U = 3 \text{ cm}$$

3) Convex lens

4)



5) Radio waves

Microwaves

yellow light

gamma rays

$$6) E = I^2 RT$$

$$= 13^2 \times 8.5 \times 1.5 \times 60$$

$$= 1.293 \times 10^5 \text{ J}$$

7)

$$V = f\lambda$$

$$V = 1/0.5 \times 0.25$$

$$V = 5 \text{ m/s}$$

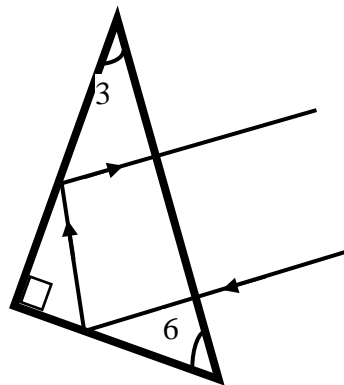
amplitude = 2m

8) (a) Constant voltage

$$(b) 3 \times 20$$

$$= 60 \text{ V}$$

9)



10)

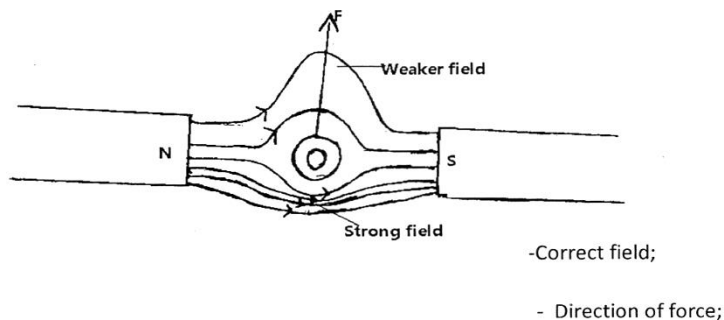
$$n = \frac{\text{Real Depth}}{\text{Apparent depth}}$$

$$1.47 = \frac{R.d}{6.8 \text{ cm}}$$

$$R.d = 6.8 \text{ cm} \times 1.47$$

$$= 9.996 \text{ cm}$$

11)



12) (i) Charge per unit voltage OR Charge storing ability of a capacitor

(ii) - Area of overlap decreases

- Hence capacitance decreases.

(iii) Upper wing:

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4} = 1.333 \text{ uF}$$

Lower wing

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4} = 1.333 \text{ uF}$$

$$\text{Combined capacitance} = 1.333 + 1.333 \text{ MF}$$

$$= 2.667 \text{ uF}$$

(b) (i) Galvanometer deflects.

(ii) The U.V radiations dislodge electrons from metal Y √ the electrons are then attracted to the positively charged plate X √ Causing a current to flow.(iii) $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$

$$W_0 = 2.0 \text{ eV}$$

$$= 2 \times 1.6 \times 10^{-19} \text{ J}$$

$$= 3.2 \times 10^{-19}$$

$$W_0 = hf_0 = \frac{h(c)}{\lambda_0}$$

$$3.2 \times 10^{-19} \text{ J} = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{\lambda_0}$$

$$\therefore \lambda_0 = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{3.2 \times 10^{-19}}$$

$$= 6.2 \times 10^{-7} \text{ m.}$$

13)

a) Atomic number = $Z + 1$

b) i Time taken for half of the radioactive material to disintegrate.

ii time = 28 minutes (give allowance of 2 minutes)

c) i) The radiations ionize argon gas along their path. The alcohol vapour condense on the ions formed creating tracks.

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

iii) Alpha

Reason very high ionizing effect

$$\begin{aligned} \text{d) } N &= N_0(1/2)^N \\ N/N_0 &= (1/2)^{21/5.25} \\ &= (1/2)^4 \\ &= 1/16 \end{aligned}$$

alternatively

$$\begin{aligned} \text{No of } t \frac{1}{2} &= 21/5.25 \\ &= 4 \\ \text{Fraction remaining} &= (1/2)^4 \\ &= 1/16 \end{aligned}$$

- 14) a)i) The galvanometer will be deflected to one side and then back to zero,
ii) The galvanometer pointer vibrates about point zero.

$$\begin{aligned} \text{(b) i) } N_S / N_P &= V_S / V_P \\ V_S &= \frac{2000 \times 240}{1000} \\ &= 480\text{V} \end{aligned}$$

$$\begin{aligned} \text{ii) Efficiency} &= \frac{\text{power output}}{\text{power input}} \times 100 \\ &= \frac{48 \times 0.8}{240 \times 0.2} \times 100 \\ &= 80\% \end{aligned}$$

(c) i) An a.c generator (dynamo)

ii) A – armature

B – slip rings

iii) The voltage of the induced e.m.f doubles

15. (a) (i) To focus the electron beam produced onto the target.

(ii) To accelerate the electrons to give them enough K.E. to produce X-rays at the anode

(iii) To absorb stray X-rays.

(iv) To withstand the high temperature (immense heat) preventing the target from melting since most of the K.E of the electrons is converted into heat .

(b) Hard X rays

Or -X-rays of higher frequency

-X - ray are more penetrative

-X - rays of shorter wavelength.

$$\text{c) I } V_1 = 2\text{V}$$

$$\text{II } V_2 = 1.6 \text{ V}$$

$$\text{III } V = IR$$

$$1.6 = 0.05R$$

$$R = 32 \Omega$$

$$\text{d) } P = \frac{V^2}{R} = \frac{6^2}{4}$$

$$= \frac{36}{4} = 9\text{W}$$

16. a) in the region of compressions the pressure is higher hence energy is propagated in the regions of rare factions where pressure is low.

b) i) Time taken for the first echo to be heard

$$20 \text{ bangs (echoes)} = 18.5 \text{ sec}$$

$$1 \text{ echo} = \frac{18.5}{20} = 0.925 \text{sec}$$

$$\begin{aligned} \text{ii) Speed} &= \frac{2d}{t} \\ &= \frac{3000}{0.925} = 324.32 \text{m/s} \end{aligned}$$

iii) The bang will not coincide with the echo i.e echo is heard before the next bang.