PHYSICS PAPER 2

ANSWERS

KCSE 2010

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30.5.2 Physics Paper 2 (232/2)

1.

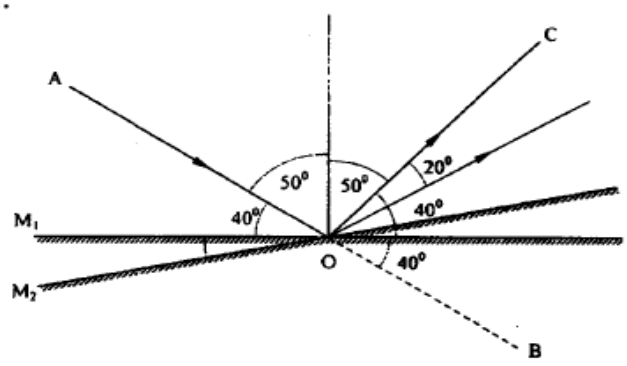
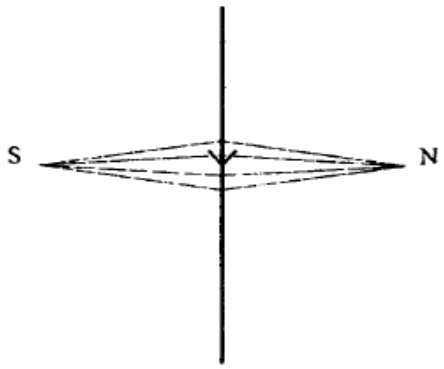


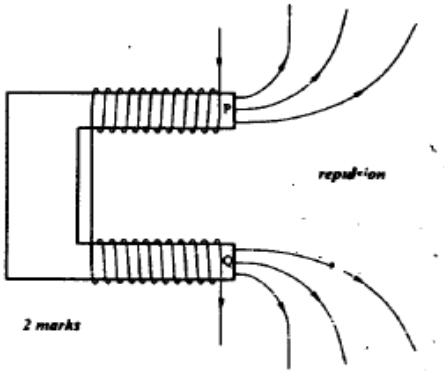
Figure
Initial deviation = 80°
Reflected ray rotates 2 x 10 = 20° (1 mark)
Final deviation = (80 + 20)° = 100° (1 mark)

2.



(1 mark)

3.



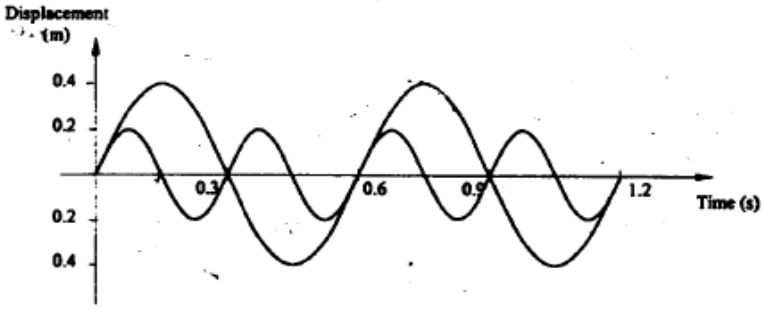
(2 marks)
Correct pattern – 1 mark
Arrow – 1 mark

4. Initially attracted because it is of opposite charge.
Then neutralised and charged positive and hence repel. (2 marks)

5. Distance = 2f = 2 x 25 = 50 cm (1 mark)

6. High voltages implies low current so reduces heat losses. (2 marks)

7.



(2 marks)
Amplitude 1
Frequency 1

8. $v_1 = f\lambda_1$ (1 mark)
$v_2 = f\lambda_2$ (1 mark)

Refractive index

$$= \frac{v_1}{v_2} = \frac{f\lambda_1}{f\lambda_2}$$

$$= \frac{\lambda_1}{\lambda_2} = \frac{18}{14.4} = 1.25$$

(1 mark)

9. 20g ⟶ 10 g ⟶ 5g ⟶ 2.5g ⟶ 1.25g

Mass remaining = 1.25g (1 mark)

Half-lives (idea) (1 mark)

10. I_o - Initial current
P $= I^2R = I^2_oR$;
$I_2 = 7I_o$
P $= (7I_o)^2R = 49I^2_oR$;
Power is 49 times initial value. (3 marks)

11. Motion out of paper. (1 mark)

12. Increase the acceleration voltage by setting a higher value. (1 mark)

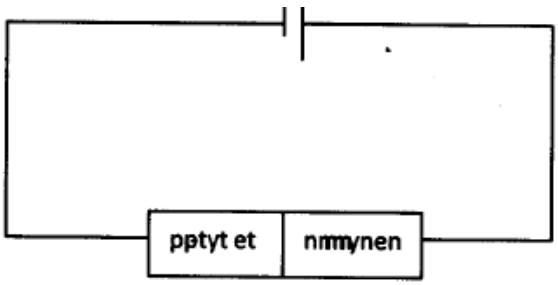
13.

$$f = \frac{v}{\lambda} = \frac{c}{\lambda} = \frac{3.0\times10^8}{1\times10^3} Hz$$

$$= 3.0\times10^5 Hz$$

(2 marks)

14.



(1 mark)

15. (a) (i) High current which falls off to zero. (1 mark)

(ii) Current flows when the capacitor is charging. When fully charged current stop (no current) and p.d. is equal to charging voltage.

(2 marks)

(b) (i) $V_R = 0$ volts (1 mark)

(ii) $V_c = 5$ volts (1 mark)

(c) (i) $\frac{1}{C_s} = \frac{1}{4} + \frac{1}{5} = \frac{5+4}{20} = \frac{9}{20}$ (1 mark)

$C_s = \frac{20}{9}\mu F$

$C_T = \frac{20}{9} + 3.0 = 5\frac{2}{9}\mu F$ (1 mark)

$= 5.22\ \mu F$ (1 mark)

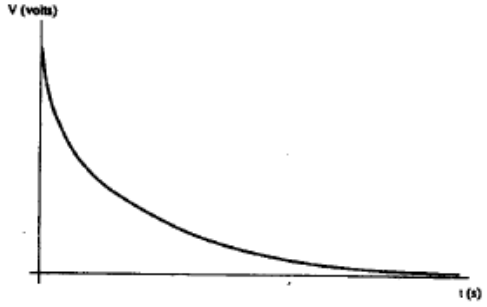
(ii) Charge on series section

$Q = CV = \frac{20}{9} \times 10\,\mu C$ (1 mark)

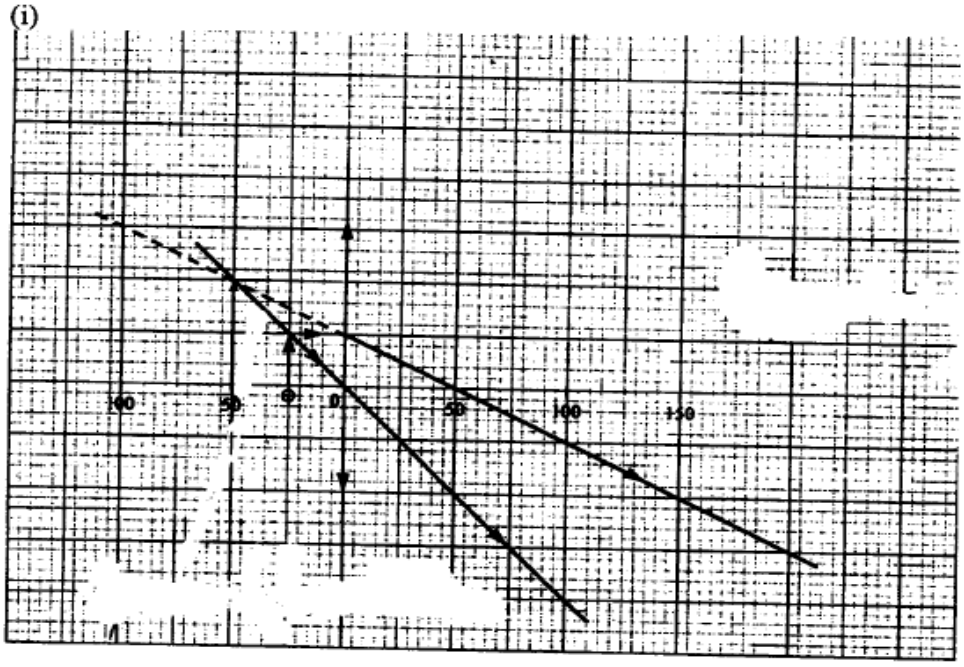
$= \frac{200}{9}\mu C = 22.2\mu C$ (1 mark)

Same charge on each phase (series)
Charge on 5.0μF is 22.2μC (1 mark)

(iii)



16. (a) (i)



(ii) (I) V = 50 cm (1 mark)

(II) $m = \frac{v}{u} = \frac{h_i}{h.} = \frac{50}{25} = 2$ (2 marks)

(iii) Reduce the object distance. (1 mark)

(iv) Simple microscope (magnifying glass) (1 mark)

(b) U = 80 mm

f = 50

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

$\frac{1}{80} + \frac{1}{v} = \frac{1}{80}$ $\frac{1}{v} = \frac{1}{50} - \frac{1}{80} = \frac{3}{400}$ (1 mark)

$v = \frac{400}{3}$

When u = 80 + 60 mm = 140 mm (1 mark)

$\frac{1}{v} = \frac{1}{50} - \frac{1}{140} = \frac{9}{700}$

$v = \frac{700}{9} mm$ (1 mark)

Length of image = $\frac{400}{3} - \frac{700}{9} = 55.5$

= 55.6 mm (1 mark)

(b) (i) Total resistance

$R_1 = 3 + 0.75 + R$

$R_T = R + 3.75$

$E = (IR_T)$ (1 mark)

$1.5 = I(R + 3.75) = 0.15\,(R + 3.75)$

$R + 3.75 = \frac{1.5}{0.15} = 10$ (1 mark)

$R = 10 - 3.75\Omega$

$= 6.25\Omega$ (1 mark)

17. (a) (i) Lamps L_1 and L_2 (1 mark)

(ii) Brighter (1 mark)

(iii) Total resistance is less now. (1 mark)

(b) (i) (I) E.m.f = 1.5V (1 mark)

(II) $1.5 = IR + Ir$

$IR = 1.2$

$3I = 1.2$

$I = 0.4$ A (2 marks)

(III) $Ir = 1.5 - 1.2 = 0.3$

$0.4r = 0.3$

$r = \frac{0.3}{0.4}\Omega = 0.75\Omega$ (2 marks)

18. (a) (i) Deflected towards the positive plate. (1 mark)

(ii) E.m.f. increased deflection will be greater. (1 mark)

(iii) (I) Spot moves back and forth. (1 mark)

(II) there will be a horizontal line. (1 mark)

(b) Electrons are given off as a result of heat produced by the current. (2 marks)

(c) By increasing the filament current so that more electrons are released. (2 marks)

(d) $P = V1 = 100 \times 1.5 \times 10^{-3} J = 1.5\ Js^{-1}$ (2 marks)

19. (a) Intensity of radiation. (1 mark)

(b) (i) The negative potential sufficient to just stop the ejection of the electron. (1 mark)

(ii) (I) Gradient

$= \frac{3}{(12 - 4.4) \times 10^{14}} = 3.95 \times 10^{-15}$ (1 mark)

$$\frac{h}{e} = 3.95\times10^{-15}$$

$$\therefore h = 3.95\times10^{-15}\times1.6\times10^{-19} \quad \text{(1 mark)}$$

$$= 6.32\times10^{-34}\,Js$$

(iii) $$-\frac{w}{e} = -1.75 \quad \text{(1 mark)}$$

$$w = 1.75\times e$$

$$= 1.75\times1.6\times10^{-19}\,J \quad \text{(1 mark)}$$

$$= \frac{1.75\times1.6\times10^{-19}}{1.6\times10^{-19}}\,ev$$

$$= 1.75 \text{ ev} \quad \text{(1 mark)}$$