# K.C.S.E YEAR 2010 PAPER 2 MARKING SCHEME

1. - Reflected ray rotates 2 x 20 = 20°. ✓1
   - Find deviation = (80° + 20°) = 100°✓1
2. - Any slight deviation of the N-pole to the right✓1

3. - Correct poles. ✓1 Correct direction + pattern✓1

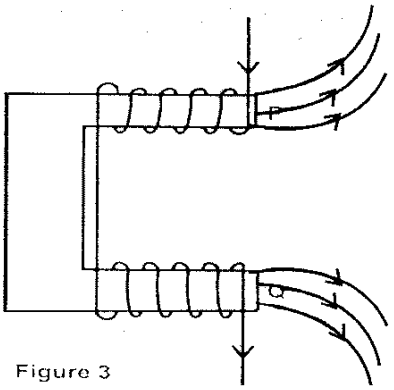


Figure 3

4. Initially attracted because of opposite charge. ✓1 (+ve or –ve)
   Then neutralised and charged positive and hence repel✓1.
   Charging by contact and law of electrostatics. ✓1

5. - Distance = 2f = 2 x 25✓½ = 50cm. ✓½
   *Alternative*
   Just 50cm✓1
   Or
   2 x 25 = 50cm✓½
   Or

6. Implies low current✓1 So reduces✓1 heat losses/ power loss. Or
   $I^2R$ loss reduced.
   $P = I^2R$ should be accompanied by power loss
   NB: Heat losses/ Power Loss

7. - More practice/ relationship between f and t.

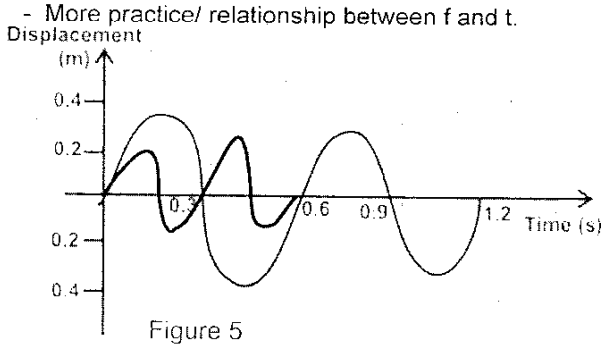


Figure 5

8. $V_1 = fT_1$ or $\eta = \frac{T_1}{T_1}$ ✓1
   $V_2 = fT_2$ $\eta = \frac{18}{14.4}$ ✓1 = 1.25✓
   Accept all expression.

9. $20g \xrightarrow{5} 10g \xrightarrow{5} 5g \xrightarrow{5} 2.5g \xrightarrow{5} 1.25g$ ✓2
   Mass remaining

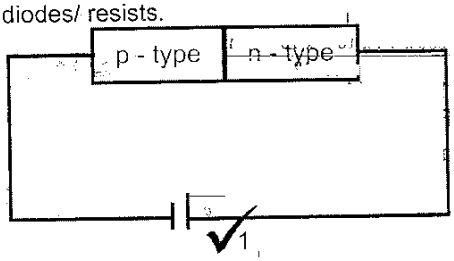
10. $I_O$ – Initial current $I_2 = 7I_O$
    $P = I^2R = I_O^2R$✓1 $P = (7I_O)^2R = 49I_O^2R$ ✓1
    Power is 49 times the initial value✓1
    Apply the power formula.

11. Motion out of paper/ moves upwards. ✓1
    Or Increases in p.d increases heating effect.

12. Increasing the accelerating voltage✓1 OR
    Increase the P.d between anode and cathode.
    Accept extra high tension increased.

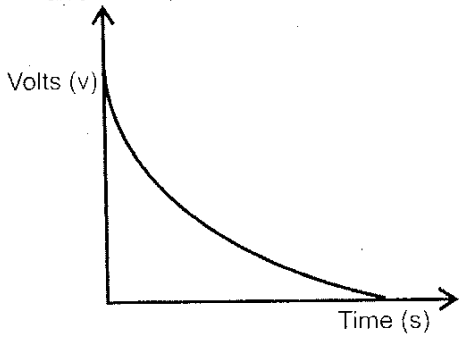
13. $f = \frac{V}{\lambda} = \frac{C}{\lambda}$
    $= \frac{3.0 \times 10^8}{1000}$ ✓1 $3.0 \times 10^5$ Hz

14. Look for biasing only. (any other device that does not affect the working should be ignored) e.g diodes/ resists.



✓1

15. (a) (i) Current falls off to zero✓1/ falling to zero/ deflects to max. then zero.
    Reducing gradually or after sometime.
    (ii) Current flows when the capacitor is charging✓1
    When fully charged current stops (No current) and P.d is equal to charging voltage✓1.
    (b) $V_C = 5V$✓1
    (c) Touch both axis, Award for no labelled axis



(d) (i) $\frac{1}{C_s} = \frac{1}{4} + \frac{1}{5} = \frac{5+4}{20} = {}^{9}/_{20}$

$C_S = \frac{20}{9}$✓1

$C_1 = \frac{20}{9} + 3$✓1 = 5.22 μF✓1

Accept 5.22μF only

(ii) Change on series section = Q = Cv✓1

$= \frac{20}{9}$ x 10✓1μC

= 22.2μC or

Q series = $Q_T - Q_{3\mu F}$✓1

= (5.22 – 3) x 10✓μC1

= 22.2✓μC1

Charge is the same on series section

hence charge on 5.0μF is 22.2μC✓1

Accept 22.2μC only.

16. (a) (i) Each ray ½mk (Indipendent) 1mk for dotted extrapelation

1mk for dotted image

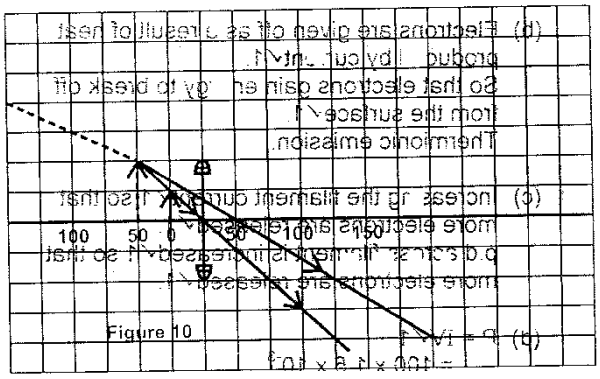



Figure 10

(ii) I. 50mm✓1 ±5mm

II. $M = \frac{V}{h} = \frac{h_1}{h_o}$✓1 $= \frac{50}{25}$ = 2mm✓1±0.2

(iii) Move the object towards F but not beyond✓1

Move object away from lens.

(iv) No answer

(b) $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$✓1

$\frac{1}{50} = \frac{1}{80} + \frac{1}{V}$✓1

V = 400/3✓1

17. (a) (i) $L_2$ (ii) Brighter

(iii) Total resistance is less/ reduced✓1

(b) (i) 1.5V✓1

(ii) Ir = 1.5 – 1.2 = 0.3✓1

0.4r = 0.3

V = 0.75R✓1

P.d and E.M.F/ more practice and practical approach.

(c) $R_T = 3 + 0.75 + R$✓1, $R_T = R + 3.75$

$E = IR_T$

$1.5 = I(R + 3.75)$

$0.15(R+3.75) = 1.5$✓1

$R+3.75 = \frac{1.5}{0.15} = 10$

$R = 10 - 3.75$

$= 6.25\Omega$✓1

Or

$R = \frac{E}{I} = \frac{1.5}{0.15} = 10$✓1

$R = R_T - (V + 3)$ ✓1 + 3.75

$R = 6.25\Omega$✓1

$1.5 - 0.75 \times 0.15 = I(3 + R)$ ✓1

$1.5 - 0.1125 = 0.15(3 + R)$

$\frac{1.3875}{0.15}$✓1 = 3 + R

R = 6.25Ω✓1

18. (a)

(i) Deflected towards +ve plate (N)✓1

(ii) Deflection will be greater. ✓1

(iii) I. Spot moves back and forth✓1.

To and fro (Not along across)

II. There will be a horizontal line✓1.

(b) Electrons are given off as a result of heat produced by current✓1.

So that electrons gain energy to break off from the surface✓1.

Thermionic emission.

(c) Increasing the filament current✓1 so that more electrons are released✓1.

p.d across filament is increased✓1 so that more electrons are released✓1.

(d) P = IV✓1

$= 100 \times 1.5 \times 10^{-3}$

= 1.5J/s✓1

Accept J, W, J/s

19. (a) Intensitty of radiation✓1.

(b) (i) (Min p.d)

Negative potential sufficient to just stop the movement of electrons.

(ii) I. Gradient = $\frac{h}{e}$✓1

$h = \frac{3.0-0\checkmark 1}{(12-4.4)\,x\ 7.6 x 10^{14}} = \frac{3}{7.6 x 10^{14}}$

Gradient = 0.3947 x $10^{-14}$

h = 0.3947 x $10^{-14}$ x 1.6 x $10^{-19}$

= 0.6316 x $10^{-33}$ = 6.316 x $10^{-34}$

II. $\frac{w}{e}$ = 1.75✓1,

$W_O$ = Y intercept x e

$= \frac{1.75 x 1.6 x 10^{-19}}{1.6 x 10^{-19} J}$✓1

= 1.75ev✓1

Alternative

$W_O = hf_O$✓1

$= \frac{6.32 x 4.6 x 10^{14} x 10^{-34}\checkmark 1}{1.6 x 10^{-19}}$

= 1.74ev✓1

OR

Range 1.7 ⟶ 1.8ev $\frac{W_o}{e}$ = Y intercept

$\frac{W_o}{e}$ = 1.75 $\frac{-W_o}{e}$ = -1.75 or $\frac{W_o}{e}$ = 1.75

$W_O$ = 1.75ev OR $W_O$ = 1.75v x e

OR = 1.75ev

$\frac{-W_o}{e}$ = -1.75ev

OR

$W_O$ = 1.75✓2½ ⟶ Reject 1.75v = $W_O$

Penalise –ve and units in

$W_O$ = Y intercept

= -1.75