G.C.E. (A.L.) Support Seminar - 2015
Physics - Paper I
Answer Guide

Question No	Answer	Question No	Answer
(1)	2	(26)	3
(2)	2	(27)	1
(3)	5	(28)	1
(4)	3	(29)	5
(5)	3	(30)	4
(6)	5	(31)	3
(7)	2	(32)	3
(8)	1	(33)	2
(9)	1	(34)	1
(10)	4	(35)	5
(11)	1	(36)	2
(12)	2	(37)	2
(13)	5	(38)	2
(14)	3	(39)	2
(15)	4	(40)	5
(16)	5	(41)	2
(17)	4	(42)	4
(18)	3	(43)	2
(19)	3	(44)	3
(20)	2	(45)	4
(21)	4	(46)	1
(22)	2	(47)	2
(23)	5	(48)	4
(24)	2	(49)	2
(25)	4	(50)	1

[See page 2

Physics - Paper II
Answer Guide

Part A - Structured Essay

Additional Instructions.

(i) Although it is not mentioned in the marking scheme, give the marks if a student has provided correct answers.

(ii) Relevant marks should be given when $g = 9.8\ \text{m s}^{-2}$ is substituted instead of $g = 10\ \text{m s}^{-2}$

(iii) When $\pi = 3$ has been used instead of $\pi = 3.14$, give relevant marks.

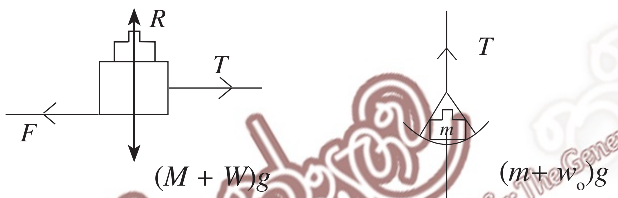
(iv) Marks should be given only for the substitution, when a wrong numerical value that is obtained in a problem is substituted in a another part of the same question.

(v) The direction must be marked in a ray of light. (at least two marks of directions should be there)

---

1. (*a*) $\mu = \dfrac{F}{R}$ **(01 Mark)**

(*b*) (i)



For both (01 Mark)

(ii) $F = (m + w_o)\,g$ **(01 Mark)**

(iii) (1) Keeping the strings horizontally.
(2) Keeping the wooden block in the same place on the table. **(01 Mark)**

(iv) Obtaining the corresponding weights of the scale pan and the weights, when the wooden block starts to move slightly. **(01 Mark)**

(v) $(m + w_o)g = \mu\,(M + W)g$

$m = \mu M + \mu W - w_o$

$m = \mu M + (\mu W - w_o)$ **(01 Mark)**

$\uparrow \qquad \uparrow \qquad \uparrow$

$y = m\,x + c$

(vi) (1) $\mu = 0.4$ **(01 Mark)**

(2) $\mu W - w_o = 0.25$ $\qquad W = \dfrac{0.25 + 0.025}{0.4} = \dfrac{0.275}{0.4}$

$W = 0.69$ kg (with the units) **(01 Mark)**

(0.68 – 0.69) kg

[See page 3

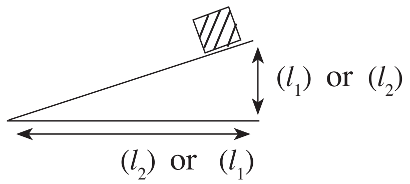
(c) (i) Instance : To slide the wooden block slightly on the wooden plate towards down.

Measurements : l_1 - Vertical height, l_2 - Horizontal distance

or

l_1 - Horizontal distance, l_2 - Vertical height

or



(01 Mark)

(ii) $\mu = \frac{l_2}{l_1}$ or $\mu = \frac{l_1}{l_2}$ **(01 Mark)**

2. (*a*) (i) (1) Surface area (A)

(2) Excess temperature ($\theta - \theta_R$)

(3) Nature of the surface (Emissivity of the surface) **(01 Mark)**

(ii) For any value of excess temperature under forced convention. (For small values of excess temperature under natural convention less than 30°C) **(01 Mark)**

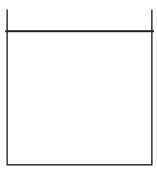
(*b*) (i) Thermometer

(ii) Triple beam balance / Electronic scale

(iii) Stop watch **(01 Mark)**

(*c*) (i) Agreed
Temperature in the liquid, can not be considered as the temperature of the external surface, because conductivity of glass is low. **(01 Mark)**

(ii)



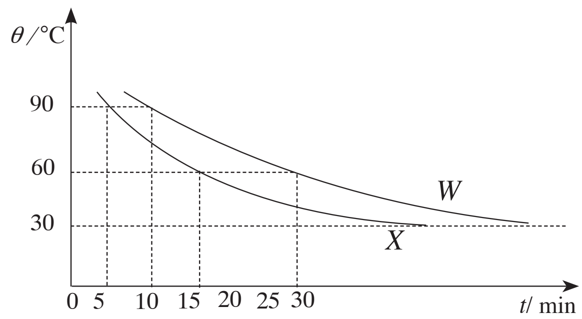
(Should be more than $\frac{2}{3}$ of the height of the container) **(01 Mark)**

(iii) To reduce the internal surface area, of the container that does not contact with the liquid. (To reduce the surface area, that does not come to the equilibrium with the liquid or for a close idea) **(01 Mark)**

(iv) To equalize the effective surface areas which dissipates the heat. **(01 Mark)**

[See page 4

(*d*) (i)



For labeling (01 Mark)

(ii) (1) Mean rate of cooling of the liquid $\frac{90-60}{10\times 60} = \frac{30}{600} = 0.05\ °C\ s^{-1}$

(2) Mean rate of cooling of the Water $\frac{90-60}{60\times 20} = \frac{30}{1200} = 0.025\ °C\ s^{-1}$ **(01 Mark)**

(iii) $$\frac{[400 + 240\times 10^{-3}\times 4200]}{20\times 60} = \frac{[400 + 190\times 10^{-3}\times S]}{10\times 60}$$

$$S = 1600\ J\ kg^{-1}K^{-1}$$ **(01 Mark)**

3. (*a*) (i) On the sonometer box **(01 Mark)**
Because the energy transmission is maximum, when it is on the box.

(ii) At the middle of the bridges
Because of the antinodes produced between the bridges mount obtains a maximum energy, when the amplitude is maximum **(01 Mark)**

(iii) Having kept the vibrated tunning fork on the somometer box, Obtaining the corresponding length for the instance that the paper mounts move away. When the distance between the bridges are gradually increased from a smaller value.
(01 Mark)

(*b*) (i) $f = \frac{1}{2l}\sqrt{\frac{Vs\rho_w g - V\rho_w g}{m}}$ $\quad f = \frac{1}{2l}\sqrt{\frac{Vsg - Vg}{As}}$

$f = \frac{1}{2l}\sqrt{\frac{Vg}{A}\left(1-\frac{1}{s}\right)}$ **(01 Mark)**

(ii) $l^2 = \frac{Vg}{4A}\left(1-\frac{1}{s}\right)\frac{1}{f^2}$ **(01 Mark)**

(*c*) (i) Obtaining the gradient using 2 ordered pair which can be read easily. **(01 Mark)**
Gradient = $10^7 cm^2\ s^{-2}$ **(01 Mark)**

(ii) $\frac{Vg}{4A}\left(1-\frac{1}{s}\right) = 10^7 cm^2\ s^{-2}$ **(01 Mark)**

$\frac{400\times 10^{-6}\times 10}{4\times 0.8\times 10^{-6}}\left(1-\frac{1}{s}\right) = 10^7\times 10^{-4}$ **(01 Mark)**

$s = 5$

[See page 5

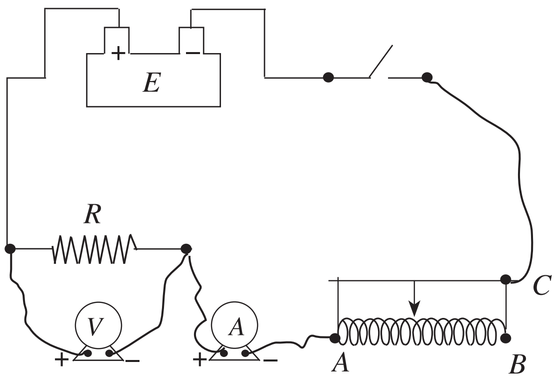
(*d*) $\quad dB = 10 \log_{10}\left(\frac{I}{I_0}\right)$ (Here I_0 = Threshold intensity of hearing)

$$40 = 10 \log_{10}\left(\frac{I}{10^{-12}}\right)$$

$$I = 10^{-8}\,\mathrm{W\,m^{-2}}$$ **(01 Mark)**

4. (*a*) $V = IR$ **(01 Mark)**

(*b*) (i)



(01 Mark)

(ii) Voltmeter : Extreamely higher

Ameter : Extreamely lesser **For both (01 Mark)**

(iii) Independent variable : Current

Dependent variable : Potential difference **(01 Mark)**

(iv) Inability to change the resistance, that is corresponding to each current required. **(01 Mark)**

(v) To minimize the heating of resistor *R* **(01 Mark)**

(*c*) (i) $R_{50} = \frac{4.5}{0.05} = 90\ \Omega \qquad R_{200} = \frac{6.0}{0.04} = 150\ \Omega$ **For both (01 Mark)**

$$\frac{90}{150} = \frac{(1 + 50\,\alpha)}{(1 + 200\,\alpha)}$$ **(01 Mark)**

$$\alpha = \frac{2}{350}$$

$$= 5.71 \times 10^{-3}\ ^{\circ}\mathrm{C}^{-1}$$ **(01 Mark)**

(ii) (1) Having a higher boiling point.

(2) Insulator for electricity **For both (01 Mark)**

5. (*a*) (i) $P + \frac{1}{2}\rho V^2 + h\rho g = k$ (constant) **(01 Mark)**

P = Pressure of the gas (energy of pressure)

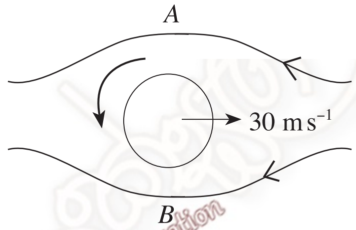
$\frac{1}{2}\rho V^2$ = Kinetic energy of unit volume of the gas

$h\rho g$ = Potential energy of unit volume of the gas **(01 Mark)**

(ii) Streamline flow
incompressible
Non viscous **(01 Mark)**

(*b*) (i) 30 m s^{-1} $\longleftarrow$ **(01 Mark)**

(ii) $V = r\omega = 3.5 \times 10^{-2} \times 2\pi \times 10 = 2.1\ \text{m s}^{-1}$ **(01 Mark)**



(iii) (1) Velocity of air at point A = 30 – 2.1 **(01 Mark)**

= 27.9 m s^{-1}

(2) Velocity of air at point B = 30 + 2.1

= 32.1 m s^{-1} **(01 Mark)**

(iv) (1) $P_A + \frac{1}{2}\rho V_A^2 = P_O$ **(01 Mark)**

$P_B + \frac{1}{2}\rho V_B^2 = P_O$

$P_A + \frac{1}{2}\rho V_A^2 = P_B + \frac{1}{2}\rho V_B^2$

$P_A - P_B = \frac{1}{2} \times 1.3\,[(32.1)^2 - (27.9)^2]$ **(01 Mark)**

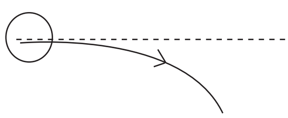
= 163.8 Pa (162 – 165)

(2) $F = (\Delta P)\,A$

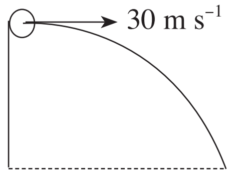
$= 163.8 \times \pi r^2$

$= 171.6 \times 3 \times (3.5 \times 10^{-2})^2$

= 0.6 N (0.58 – 0.61) **(01 Mark)**

(3)  **(01 Mark)**

(v) ↓ $s = ut + \frac{1}{2}at^2$



$1.8 = \frac{1}{2} \times 10 \times t^2$ **(01 Mark)**

$t = \sqrt{0.36}\ \text{s} = 0.6\ \text{s}$

$\longrightarrow$
$s = ut$

$= 0.6 \times 30$

$= 18\ \text{m}$ **(01 Mark)**

(vi) Horizontal acceleration $F = ma$

$a = \frac{0.6}{150 \times 10^{-3}}\ \text{m s}^{-1}$ **(01 Mark)**

$s = ut + \frac{1}{2}at^2$

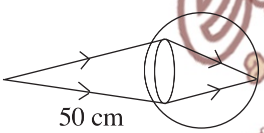
$d = 0 + \frac{1}{2} \times \left(\frac{0.6}{150 \times 10^{-3}}\right) \times (0.6)^2$ **(01 Mark)**

$d = \frac{4}{2} \times 0.36$

$d = 2 \times 0.36$

$d = 0.72\ \text{m}$

6. (*a*) (i)



(01 Mark)

(ii) $\frac{1}{V} - \frac{1}{U} = \frac{1}{f}$

$-\frac{1}{2.5} - \frac{1}{50} = \frac{1}{f}$

$f = \frac{-50}{21}$

$P = \frac{1}{f}$

$= \frac{21}{50} \times 100$

$= +42\ \text{D}$ **(01 Mark)**

(*b*) (i) $+\frac{1}{400} - \frac{1}{\infty} = \frac{1}{f}$

$+\frac{1}{400} = \frac{1}{f}$

$P = -0.25\ \text{D}$ **(01 Mark)**

[*See page* 8

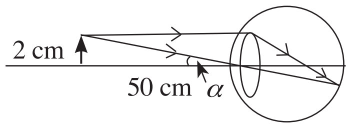
(ii) $\frac{1}{V} - \frac{1}{U} = \frac{1}{f}$

$+\frac{1}{50} - \frac{1}{25} = \frac{1}{f}$

$-\frac{1}{50} = \frac{1}{f}$

$P = +2D$ **(01 Mark)**

(*c*) (i)

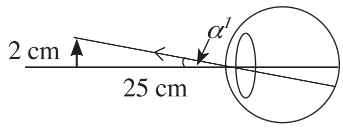


(Image should be shown in the retina) **(01 Mark)**

(ii) $\alpha = \frac{2}{50}$

$\alpha = \frac{1}{25}$ rad (= 0.04 rad) **(01 Mark)**

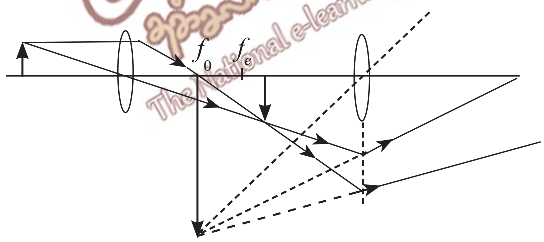
(iii)



$\alpha^{l} = \frac{2}{25}$ rad (= 0.08 rand) **(01 Mark)**

(iv) Agreed. According to the calculation $\alpha < \alpha^{l}$. Therefore healthy person can see the images with a higher magnification. (person with the defect can see images with a lower magnification) **(01 Mark)**

(*d*) (i)



Ray diagram corresponding to objective **(01 Mark)**

Ray diagram corresponding to eyepiece **(01 Mark)**

(ii) ⟶ Towards **(01 Mark)**

$\frac{1}{V} - \frac{1}{U} = \frac{1}{f}$ Applying for eyepiece

For healthy eye

$+\frac{1}{25} - \frac{1}{U} = \frac{1}{-10}$ **(01 Mark)**

$\frac{1}{U} = \frac{1}{25} + \frac{1}{10}$

$U = \frac{50}{7}$ cm

[See page 9

For the eye with the defect

$$+\frac{1}{50} - \frac{1}{U^{1}} = -\frac{1}{10}$$

$$U^{1} = \frac{50}{6} \text{ cm}$$ **(01 Mark)**

The distance that must be moved $(U^{1} - U) = \frac{58}{6} - \frac{50}{7}$

$$= 50\left(\frac{1}{6} - \frac{1}{7}\right)$$

$$= 50 \times \frac{1}{42}$$

$$U^{1} - U = \frac{50}{42} = 1.19 \text{ cm}$$ (1.2 cm / 12 mm) **(01 Mark)**

(iii) $M^{1} = \left(\frac{V}{f_0} - 1\right)\left(\frac{D}{f_e} + 1\right)$

$$= \left(\frac{24}{8} - 1\right)\left(\frac{50}{10} + 1\right)$$

$$= (3 - 1) \times 6$$

$$= 12$$ **(01 Mark)**

7. (*a*) (i) Young Modulus $= \frac{\text{Tensile stress}}{\text{Tensile strain}}$ **(01 Mark)**

$F_{cu} + F_{s} = 2000$ or $Y = \frac{F/A}{e/L}$ **(01 Mark)**

$$Y = \frac{F}{A} \cdot \frac{L}{e}$$

$$\frac{A_1 Y_{cu} e}{L} + \frac{A_2 Y e}{L} = 2000$$ **(01 Mark)**

$$\left[\left(\frac{\pi \times 1 \times 10^{-6} \times 1.2 \times 10^{11}}{2}\right) + \left(\frac{\pi \times 4 \times 10^{-6} \times 2 \times 10^{11}}{2}\right)\right] e = 2000$$

$$\left[\left(\frac{3 \times 1 \times 10^{-6} \times 1.2 \times 10^{11}}{2}\right) + \left(\frac{3 \times 4 \times 10^{-6} \times 2 \times 10^{11}}{2}\right)\right] e = 2000$$ **(01 Mark)**

$$(1.8 \times 10^{5} + 12 \times 10^{5})\, e = 2000$$

$$13.8 \times 10^{5}\, e = 2000$$

$$e = \frac{2000 \times 10^{-5}}{13.8}$$

$$e = 1.45 \times 10^{-3} \text{ m}$$ $(144.93 \times 10^{-3}$ m) **(01 Mark)**

$$F_{cu} = \frac{3 \times 1 \times 10^{-6} \times 1.2 \times 10^{11}}{2} \times 1.45 \times 10^{-3}$$

$$= 2.60 \times 10^{2}$$

$$= 260 \text{ N}$$ (260 – 261) **(01 Mark)**

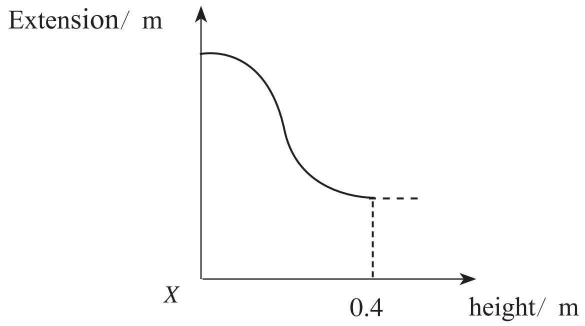
[See page 10

(ii) $F_{steel} = \dfrac{3 \times 4 \times 10^{-6} \times 2 \times 10^{11}}{2} \times 1.45 \times 10^{-3}$

$= 17.4 \times 10^{2}$

$= 1740$ N (1739 – 1740) **(01 Mark)**

(*b*) (i)



(01 Mark)

(*c*) $U = V\rho g$

$= \dfrac{4}{3} \times 3 \times (20 \times 10^{-2})^{3}\ 10^{3} \times 10$ **(01 Mark)**

$= 4 \times 8 \times 10^{-3} \times 10^{4}$

$= 32 \times 10^{1}$

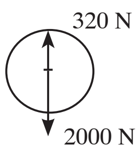
$= 320$ N

$\dfrac{A_1 Y_{cu} e}{L} + \dfrac{A_2 Y_5 e}{L} = 13.8 \times 10^{5} \times e = 2000 - 320$

$e = \dfrac{1680}{13.8 \times 10^{5}}$

$e = 1.22 \times 10^{-3}$ m (= 1.22 mm) **(01 Mark)**

(*d*) (i) $F = 6\pi \eta r v_0$



$6\pi \eta r v_0 = 2000 - 320$ **(01 Mark)**

$6 \times 3 \times 0.1 \times 20 \times 10^{-2} V_0 = 1680$

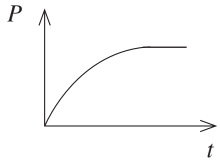
$V_0 = \dfrac{1680}{6 \times 3 \times 0.1 \times 20 \times 10^{-2}}$

$= 4666$ m s^{-1} (4666 – 4667) **(01 Mark)**

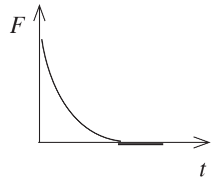
(ii) The sphere should more a larger distance to obtain a terminal velocity of 4666 m s^{-1}, a pond with such a depth is not exist. **(01 Mark)**

[See page 11

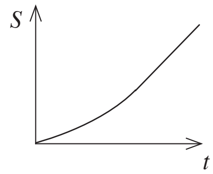
(*e*) (i)



(ii)



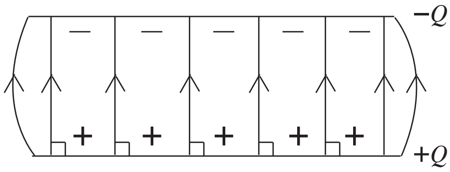
(iii)



(02 Marks or 01)

If all three are correct two marks
If only two are correct one mark

8. (*a*) (i)



(01 Mark)

(ii) $E = \dfrac{V}{d}$ **(01 Mark)**

$V = Ed = -2 \times 10^3 \times 2 \times 10^{-2}$

$V = -40\,\text{V}$ (− mark is essential) **(01 Mark)**

(iii) $E = \dfrac{\sigma}{\varepsilon} = \dfrac{Q}{A\varepsilon_0}$ **(01 Mark)**

$2 \times 10^3 = \dfrac{Q}{10 \times 10 \times 10^{-4} \times 9 \times 10^{-12}}$ Substitution **(01 Mark)**

$Q = 2 \times 9 \times 10^{-11}$

$= 1.8 \times 10^{-10}\,\text{C}$ **(01 Mark)**

(*b*) (i) ↓ $Eq = ma$

$a = \dfrac{Eq}{m}$ **(01 Mark)**

↑ $V^2 = u^2 + 2as$

$0 = (V_0 \sin 60)^2 - \dfrac{2\,Eq}{m}\,d_2$ **(01 Mark)**

$$d_2 = \frac{\left(6 \times 10^6 \times \dfrac{\sqrt{3}}{2}\right)^2 9 \times 10^{-31}}{2 \times 2 \times 10^3 \times 1.6 \times 10^{-19}}$$

$d_2 = 3.79 \times 10^{-2}\,\text{m}$ **(01 Mark)**

$= 3.79\,\text{cm}$

[*See page* 12

(ii) $C = \frac{\varepsilon_O A}{d}$

$\Delta C = \varepsilon_O A \left[\frac{1}{d_1} - \frac{1}{d_2} \right]$ **(01 Mark)**

$= 9 \times 10^{-12} \times 100 \times 10^{-4} \left[\frac{1}{2} - \frac{1}{3.79} \right] \times \frac{1}{10^{-2}}$

$= 2.12 \times 10^{-12}$ F **(01 Mark)**

(iii) work done $= \frac{1}{2} \frac{Q^2 d_1}{\varepsilon_O A} - \frac{1}{2} \frac{Q^2 d_2}{\varepsilon_O A}$ **(01 Mark)**

$= \frac{1}{2} \frac{Q^2}{\varepsilon_O A} (d_1 - d_2)$

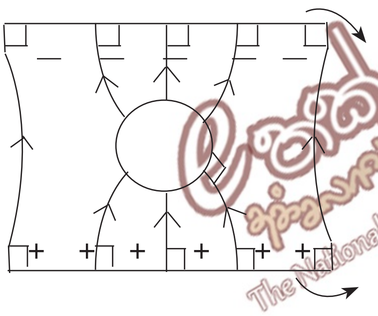
$= \frac{1}{2} \times \frac{(1.8 \times 10^{-10})^2 (3.79 - 2) 10^{-2}}{9 \times 10^{-12} \times 10^{-2}}$

$= 3.22 \times 10^{-9}$ J

$= 3.22$ nJ **(01 Mark)**

(iv) Yes, $(3.79 - 2) \times 10^{-2} \times 2 \times 10^{3}$ V $= 35.8$ V **(01 Mark)**

(*c*)



equpotential surfaces **(01 Mark)**

9(A). (*a*) (i) $(150 - 60) = 1.5 (3 + R)$ **(01 Mark)**

$\frac{90}{1.5} = 3 + R$

$R = 57\ \Omega$ **(01 Mark)**

(ii) $\frac{150 \times 1.5 \times 40 \times 3600}{3600 \times 10^{3}}$ kWh $= 9$ kWh **(01 Mark)**

(iii) Rs. $12.50 \times 9 =$ Rs. 112.50 **(01 Mark)**

(iv) $\frac{I^2 R + I^2 r}{EI} = \frac{1.5^2 \times 57 + 1.5^2 \times 3}{150 \times 1.5}$ **(01 Mark)**

Percentage $= \frac{1.5\,[60]}{150} \times 100\ \%$

$= 60\ \%$ **(01 Mark)**

[See page 13

(*b*) (i) A minimum current flows, when connected to *A*

$$(500 + 1000)\ I_{min} = 60$$

$$I_{min} = 0.04\text{ A}$$ **(01 Mark)**

A minimum current flows, when connected to *B*

$$500\ I_{max} = 60$$

$$I_{max} = 0.12\text{ A}$$ **(01 Mark)**

(ii) Potential difference

$$V_{max} = 497 \times 0.12$$
$$= 59.64\text{ V}$$

$$V_{min} = 497 \times 0.03$$
$$= 14.91\text{ V}$$ **(For both 01 Mark)**

(*c*) (i) **Minimum**

current when connected to *A* = 0

Potential difference = 0 **(For both 01 Mark)**

(ii) **Maximum**

Potential difference when connected to *B* = 59.46 V

Current = 0.12 A (0.119 A)

Effective resistances of *AB* and *X* $= \dfrac{497 \times 1000}{1497}\ \Omega = 332\ \Omega$ **(For both 01 Mark)**

- ⋆ There is no considerable difference in current at two instances (or the currents are equal) Having a very small internal resistances, is the reason. If it is perfect cell with no internal resistance the currents at two situations should be equal. **(01 Mark)**

(*d*) (i) Current = 0.58 A **(01 Mark)**

(ii) $62 - 2I_1 = 100 \times 0.58$

$I_1 = 2\text{ A}$

Current flows in to the battery *E* = 2 – 0.58
= 1.42 **(01 Mark)**

$E + 1.42 \times 3 = 58$

$E = 53.74\text{ V}$ **(01 Mark)**

9(B)(*a*) (i) $(10 - 1.4) = 2 \times 10^3\ I$

$$I = \frac{8.6}{2 \times 10^3}$$

$$I = 4.3\text{ mA}$$

Potential difference = 10 – 1.4
= 8.6 V **(For both 01 Mark)**

(ii) Current = 0 **(01 Mark)**

[See page 14

(*b*) (i) X - Collector
Y - Base
Z - Emitter **(All three are correct 01 Mark)**

(ii) $V_i = 0$ when $V_{max} = 5V$ **(01 Mark)**

$V_i = 5V$ when $I_B = \dfrac{4.3}{300 \times 10^3}$

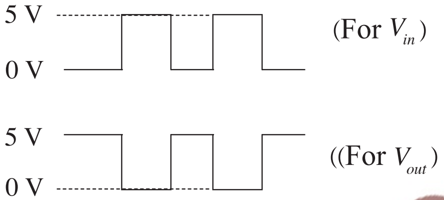
$I_B = 1.43 \times 10^{-3}$ A **(01 Mark)**

$I_C = 1.43$ mA

$R_C I_C = 1.43 \times 10^{-3} \times 5 \times 10^3$
$= 7.15$ V **(01 Mark)**

According to this $V_0 = 0$

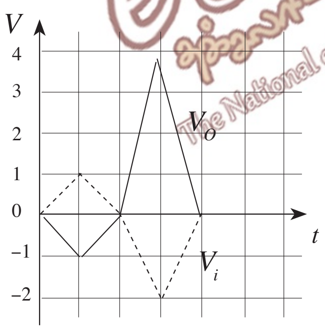
(iii)



(01 Mark)

Gate NOT **(01 Mark)**

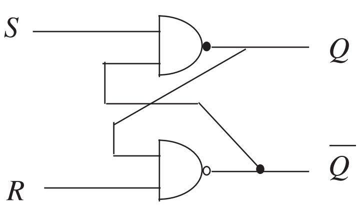
(*c*) Gain $= \dfrac{V_0}{V_i} = -\dfrac{30}{15} = -2$ **(– Mark is essential 01 Mark)**



For the shape **(01 Mark)**
For the magnitude **(01 Mark)**

(*d*) (i) In sequentral logic circuits - Because of the ability to memorize it gives the out puts considering the previous and present inputs.
In combinational logic circuits - gives the out puts, suitable the inputs at that time moment.
(01 Mark)

(ii)



S	R	Q
0	0	Not changed
0	1	0
1	0	1
1	1	Invalid

(01 Mark)
For circuit **(01 Mark)**
For Labelling **(01 Mark)**

[See page 15

10(A) (*a*) (i) Total heat obtained by water and the pressure cooker $= 1 \times 4200\,(80 - 30) + 200\,(80 - 30)$ **(01 Mark)**

$= 2.1 \times 10^{5} + 0.1 \times 10^{5}$

$= 2.2 \times 10^{5}$ J **(01 Mark)**

(ii) Mean rate of heat loss $= \dfrac{1500 \times 80}{100} - \dfrac{2.2 \times 10^{5}}{200}$ **(01 Mark)**

$= 100$ W **(01 Mark)**

(iii) Rate of heat loss at 80 °C $= \dfrac{Q_{30} + Q_{80}}{2} = 100$ W

$Q_{80} = 200$ W (Because $Q_{30} = 0$) **(01 Mark)**

(*b*) $1200\,t = 320\,t + 2.2 \times 10^{6}$ **(02 Marks)**

$t = \dfrac{2.2 \times 10^{6}}{880} = 2500$ s

(01 Mark)

(*c*) (i) $\dfrac{P_1}{T_1} = \dfrac{P_2}{T_2}$ **(01 Mark)**

For dry air $\dfrac{(101 - 54)}{273 + 30} = \dfrac{P_{dry}}{273 + 105}$ **(01 Mark)**

$P_{dry} = 58.63$ kPa **(01 Mark)**

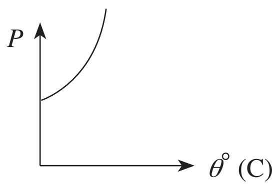
Total pressure $= (110 + 58.63)$ kPa

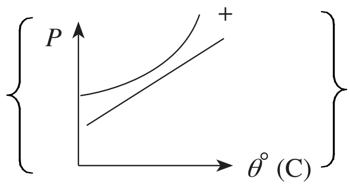
$= 168.63$ kPa **(01 Mark)**

(ii) Because the pressure inside the container is greater than the atmospheric pressure

(01 Mark)

(iii)





Addition of the two graphs

(01 Mark)

(iv) At a top of a mountain

Boiling point of the water at top of a mountain is lower than sea level **(01 Mark)**

10(B)(*a*) (i) *A* - Filament (Anode)

B - Vacuumed type photo electric cell

C - As the target (Cathode) **(01 Mark)**

(ii) To obtain the higher energy to accelerate electrons by applying a higher voltage between *A* and *C* **(01 Mark)**

(iii) Metal tungsten - to withstand the large amount of heat when the electrons are decelerate (higher melting point) **(01 Mark)**

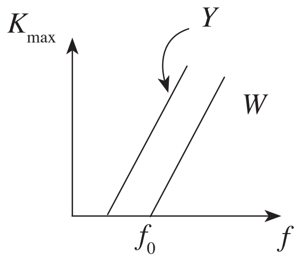
(iv) Increasing the voltage of the source **(01 Mark)**

(v) $E = \frac{hc}{\lambda}$ **(01 Mark)**

$= \frac{6.6 \times 10^{-34} \times 3 \times 10^{8}}{5 \times 10^{-12} \times 1.6 \times 10^{-19}}$ **(01 Mark)**

$= 2.48 \times 10^{5}$ ev **(01 Mark)**

(*b*)



(i) **(01 Mark)**
(ii) **(01 Mark)**
(iii) **(01 Mark)**

(*c*) (i) $hf = \varnothing + K_{max}$

$6.6 \times 10^{-34} \times 7 \times 10^{14} = \varnothing + 1.65 \times 10^{-19}$

$\varnothing = 46.2 \times 10^{-20} - 1.65 \times 10^{-19}$

Work function of the metal $\varnothing = 2.97 \times 10^{-19}$ J (1.85 *eV*) **(01 Mark)**

(ii) $eV_s = K_{max}$ **(01 Mark)**

$V_s = \frac{1.65 \times 10^{-19}}{1.6 \times 10^{-19}}$

$= 1.03$ V **(01 Mark)**

(iii) $\varnothing = hf_0$ **(01 Mark)**

$f_0 = \frac{2.97 \times 10^{-19}}{6.6 \times 10^{-34}}$

$= 0.45 \times 10^{15}$

$= 4.5 \times 10^{14}$ Hz **(01 Mark)**

* * *