G.C.E A/L Examination July - 2019

Field Work Centre

FWC

Grade - 12 (2020) **Physics** **Marking Scheme**

M.C.Q

01) 3	06) 3	11) 2	16) 4	21) 5
02) 1	07) 4	12) 1	17) 1	22) 4
03) 5	08) 2	13) 2	18) 2	23) 1
04) 5	09) 4	14) 2	19) 5	24) 5
05) 2	10) 1	15) 3	20) 5	25) 3

$25 \times 2 = 50$

Structured Essay

01.

a) i. 610g —— ①

ii. 0.1g —— ①

b) i. Screw should be adjusted tomake indicator to show zero reading —— ①

c) i. M_R —— ①

ii. M_P / M_Q. —— ①

d) i) 156.6g —— ①

ii) $100 \times 4 = M_2 \times 2$ —— ①

$M_2 = 200g$

e) i) $500 + 610 = 1110g$ —— ①

ii) 500g —— ①

iii) $500 \times 4 = M \times 20$ —— ①

$\therefore M = 100g$.

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02.

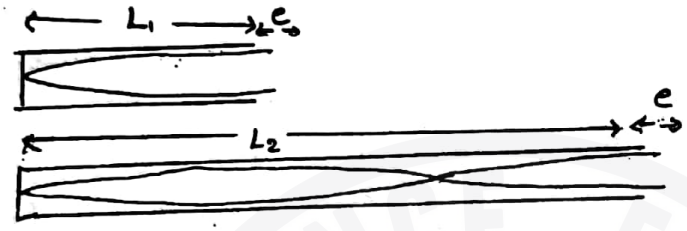
i. standing wave ——— ①

ii. 512 Hz

Resonance length found as smaller

Pare resonance state can be obtained. ——— ①.

Can hear sound with high amplitude

iii. 

——— ①

——— ①

1) $V = f\lambda$ $\quad \frac{\lambda}{4} = l_1 + e$ ——— ①

$V = 4f(l_1 + e)$

2) $V = \frac{4f}{3}(l_2 + e)$ $\quad \frac{3\lambda}{4} = (l_2 + e)$ ——— ①

3) $\frac{V}{4f} - \frac{3V}{4f} = l_1 - l_2$

$V = 2f(l_2 - l_1)$ ——— ①

iv. a) In A, high amount of water vapour may found in the air when compared with B.

$v \propto \frac{1}{\sqrt{M}}$ ∴ Relative molecular mass decrease. ——— ①

b) To ensure whether tuning fork vibrates with its own freguency OR to make free and random vibration ——— ①

c) It can vibrate continiously ——— ①

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03.

a) i) Mass of air
   ii) Volume of air } —— (1)

b) To decrease the volume of air not in the temperature of water —— (1)

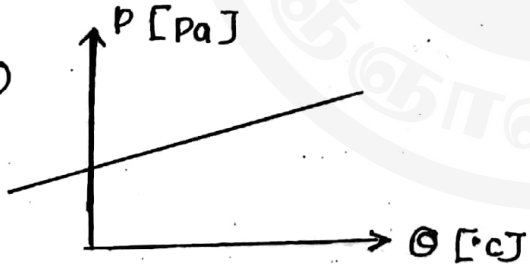
c) Draw thermeter and stirrer
   Name " " " " } both —— (1)

d) Glass is a poor conductor of heat. So we should allow some time to the air in glass bulb to attain the temperature of water —— (1)

e) By ensuring pressure meter shows constant reading —— (1)

f) i) stir well using the stirrer
   Control or remove bunson flame } —— (1)

g)



—— (1)

(h) $\frac{2\times10^5}{400} = \frac{P}{450}$

$P = 1.25\times10^5$ Pa.

i) Yes,
When temperature decreases, the water vapour in air may be saturated —— (1)

j) Obtain pressure readings in two instances while increasing pressure and decreasing the pressure. And obtain the average value —— (1)

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04.

i. The image could have formed behind the eye —— (1)

ii. To observe the image clearly —— (1)

iii. Marking u and v —— (1)

Marking z —— (1)

iv. The image and the pin must move together when the eye is moved left to right —— (1)

v. 1) $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ —— (1)

2) Graph —— (1)

3) Inverse value of intercept —— (1)

b) 1) $\frac{1}{-f} = \frac{1}{-f_1} + \frac{1}{f_2}$ —— (1)

ii) $f_R = 10\,cm$ —— (1)

10

Essay

01.

a) 1. Law of floating ——— ①

2. $mg = V\rho g$ ——— ①

$10^5 \times g = V_0 \times 10^3 \times g$

$V_0 = 100 m^3$ ——— ①

3. I. $(1 \times 10^5 + m)\, g = (V_0 + 2 \times 5)\, 1000 \times g$ —— ①

$1 \times 10^5 + m = 110 \times 1000$

$m = 1.1 \times 10^5 - 1 \times 10^5$

$= 10000\ kg$ —— ①

II. Volume of water that should be removed = $10 m^3$

$t = \frac{10 m^3}{0.5 m} = 20$ minutes —— ①

4. Mass of extra water = 10×1000

$F = ma$

$10^5 = (10^5 + 10^4) \times a$ —— ①

$a = \frac{10^5}{10^4 \times 11} \approx \frac{10}{11}\ ms^{-2} = 0.909\ ms^{-2}$ —— ①

b/ I. AV —— (1)

II. $F = \frac{2AV\rho V}{1}$

$= 2AV^2\rho$ —— (1)

III. $F = 2AV^2\rho$

$= 2 \times 2 \times (10)^2 \times 1000$

$= 4 \times 10^5 N$ —— (1)

IV. $F = ma$

$4 \times 10^5 = (10^5 + 10^4)\, a$ —— (1)

$a = \frac{4 \times 10^5}{1.1 \times 10^5}$

$= 3.63\ ms^{-2}$ —— (1)

V. $F = ma$

$4 \times 10^5 = 10^5 a$ —— (1)

$a = 4\ ms^{-2}$ —— (1)

15

02.

a) I, $V = \sqrt{\frac{T}{m}}$ — (1)

II, $\frac{\lambda}{2} = l$

$V = f\lambda$

$\sqrt{\frac{T}{m}} = f \times 2l$

$f = \frac{1}{2l}\sqrt{\frac{T}{m}}$ — (1)

III. When cross - surface area decreases, mass per unit length decreases. There fore frequency decreases — (1)

IV. $V = f\lambda$

I. $= 650 \times 0.6$

$= 390\ ms^{-2}$ — (1)

II. $V = \sqrt{\frac{T}{m}}$

$390 = \sqrt{\frac{T}{0.2 \times 10^{-6} \times 4000}}$ — (1)

$(390)^2 = \frac{T}{8 \times 10^{-4}}$

$T = 121.68\ N$ — (1)

III. $390 = 750 \times 2l$ — (1)

$\lambda = 0.26\ m$

IV. $f = \frac{1}{2l} \times V$

$= \frac{1}{2l} \times 390$

$= 1950\ Hz$ — (1)

b/ I. $V = \sqrt{\frac{\gamma R (273+\theta)}{M}}$ —— ①

II. Relative molecular mass of air may be decreased
concentration of water vapour in air may be increased
—— ①

III $dB = 10 \log \frac{P/4\pi r^2}{I_0}$

$20 = 10 \log \frac{P/4\pi r^2}{10^{-2}}$

$\frac{P}{4\pi r^2} = 10^{-10}$

$P = 4 \times 3 \times 10^2 \times 10^{-10}$

$= 1.2 \times 10^{-7}$ W —— ①

IV. $30 = 10 \log \frac{P \times n \times 100}{4\pi r^2 \times 10^2 \times I_0}$ —— ①

$30 = 10 \left[\log \frac{P/4\pi r^2}{I_0} + \log \frac{n \times 100}{1000} \right]$

$30 = 20 + 10 \log n$

$10 = 10 \log n$

$n = 10$ —— ①

V. By using resonace method — ①

VI. Temperature increases
Tension decreases
Therefore by increasing tension in strings
—— ①

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03.

I. Generation of electricity
Supply hot water to town areas } —— (2)

II.

a) $50 \times 10^6 = \frac{1}{2} mv^2$

$50 \times 10^6 = \frac{1}{2} \times m (10^3)^2$

$m = 100\,kg$ —— (1)

b) $H = m(s\theta + L)$ —— (1)

$= 100 (4000 \times 100 + 2 \times 10^6)$

$= 4 \times 10^7 \times 2 \times 10^6$

$= 42 \times 10^6\ J$ —— (1)

c) From the heat energy of earth —— (1)

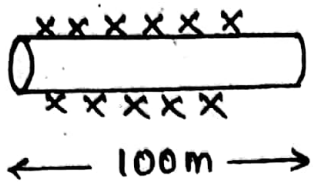
d) $\frac{Q}{t} = \frac{kA(\theta_1 - \theta_2)}{d}$ —— (1)

$= \frac{500 \times 1 \times 20}{0.1}$

$= 10^5\ J$ —— (1)

e) $4.2 \times 10^6 = 10^5 \times A$ —— (1)

$A = 420\,m^2$ —— (1)

f) 

$$\frac{Q}{t} = \frac{k A (\theta_1 - \theta_2)}{d} \quad \text{——— (1)}$$

$$= \frac{1000 \times 1 \times 30}{100}$$

$$= 300 \ Wm^{-2} \quad \text{——— (1)}$$

No. of rods $= \frac{42 \times 10^6 \ Wm^{-2}}{300 \ Wm^{-2}} = 14 \times 10^4$ rods ——(1)

g) $\left(\frac{m'}{t}\right) \times s \times (70 - 20) = 42 \times 10^6$ ——— (1)

$$\left(\frac{m'}{t}\right) = \frac{42 \times 10^6}{4000 \times 50}$$

$$= 210 \ kg \ s^{-1} \quad \text{——— (1)}$$

Total = Part I + Part II **15**

$$= 50 + \frac{70}{50} \times \text{mark.}$$

$$= 100\%.$$