FWC

தேசிய வெளிக்கள நிலையம் தொண்டைமானாறு
ஆறாம் தவணைப் பரீட்சை - 2024
National Field Work Centre, Thondaimanaru
6th Term Examination - 2024

பௌதிகவியல் - II
Physics - II

Three Hours 10 Min.

Gr. 13 (2024)

01	E	A

Index No: ……..

Important:

- ✶ This question paper consists of 21 pages.
- ✶ This questions paper comprises of two parts, **part A** and **Part B.** The time allotted for both parts is two hours and ten minutes.

Part A – Structured Essay: **(Pages : 2 - 10)**

Answer all the questions on this paper itself. Write your answers in the space provided for each question. Note that the space provided is sufficient for your answers and that extensive answers are not expected.

Part B – Essay: **(Pages : 11 - 20)**

This part contains **seven** questions, of which, **four** are to be answered. Use the papers supplied for this purpose.

At the end of the time allotted for this paper, tie the two Parts together so that **Part A** is on top of **Part B** before handing them over to the supervisor.

You are permitted to remove **only Part B** of the question paper from the Examination Hall.

For Examiner's Use Only

For the second paper			
Part	**Question Nos.**		**Marks Awarded**
A	1		
	2		
	3		
	4		
B	5		
	6		
	7		
	8		
	9	**A**	
		B	
	10	**A**	
		B	
Total	In numbers		
	In Words		

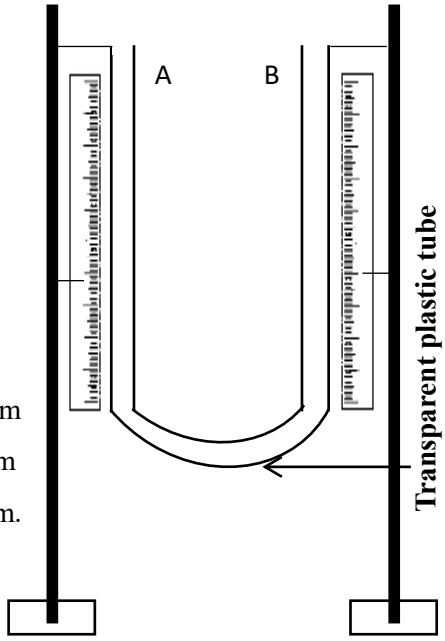
Code Numbers

Marks checked by 1	
Marks checked by 2	
Marking Examiner	
Supervised by	

Part - II(A)

Structured Essay Questions

01) A - U shaped tube is formed by connecting two glass tubes A and B with a transparent plastic tube. These glass tubes are connected to two stands with meter scales. Small beakers containing enough coconut oil and wates as well as two small funnels are provided.



(a) There are three different tubes sets P, Q and R are available in the laboratory

P : Glass tubes with a dimeter 0.5cm and a length 20cm

Q : Glass tubes with a dimeter 0.5cm and a length 80cm

R : Glass tubes with a dimeter 1.5cm and a length 80cm.

(i) Which tube set is most suitable for setting up the U-tube that are choosen by the student?

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(ii) Give the reason each one for not choosing the other two tube set

Not choosen tubes	Reason
(1)	.....
	.....
(2)	.....
	.....

(b) Usual laboratory U - tube is fitted on a flat surface board. Identify the main error that may occur due to connecting the arms of the U-tube with the stand unlike the usual laboratory U-tube arrangement.

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(c) Another student says that the result of the experiment will not be affected even if the diameter of the glass tubes are different. Do you agree with this statement? Give the reason.

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(d) i) Which liquid should be taken first into the U-tube in this experiment? state the reason.

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ii) The height which is measured from the common level of the water column and coconut oil column in this experiment are $h_\omega \; and \; h_o$ respectively. Indicate them in the above diagram.

iii) Obtain and expression for relative density S of the coconut oil interms of $h_\omega \;\; and \;\; h_o$

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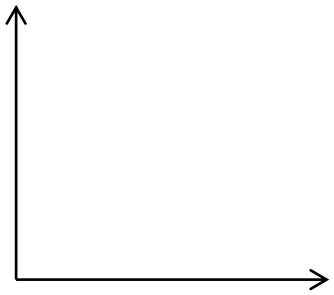
iv) What are the measurments that should be taken to obtain $h_\omega \;\; and \;\; h_o$

1).....

2).....

3).....

v) If it is intendended to determine the relative density S by graphical method. Draw the expected trend of the graph on the axis provided near by



vi) How would you determine S from the above graph.

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vii) If this experiment is conducted is conducted using much smaller dimeater glass tube instead of given tube, which of the following would change in the new graph obtained?

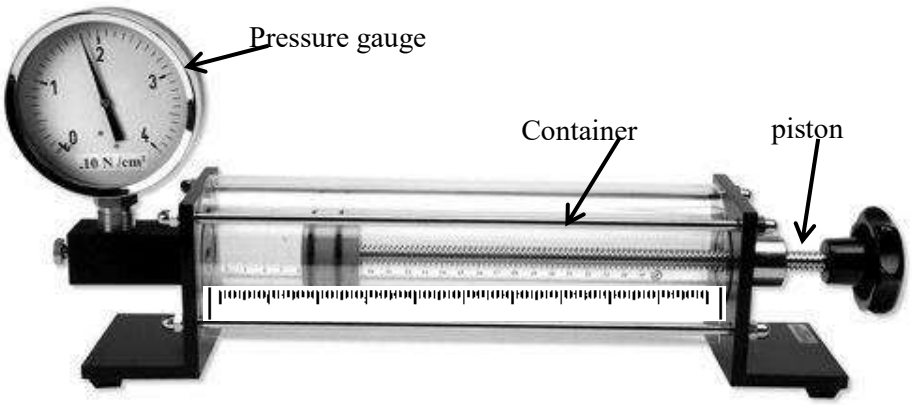
Mark (✓) for it

(1) Gradient only ( )

(2) Intercept only ( )

(3) Both Gradient and intercept ( )

02)



A student decides to use Boyle's low apparatus to verify the Boyle's low and determine the atmospheric pressure. Above figure shows the setup of the apparatus of it. The pressure gauge measure the excess pressure from the atmospheric pressure.

Let consider the atmospheric pressure be π

I. State Boyle's law

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II. If the pressure gauge shows reading ρ_0 then find the pressure of the gas in the container.

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III. Express Boyle's law in mathematical form

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IV. In order to verify Boyle's law a student decides to change the volume of the gas and record the corresponding pressure guage reading (ρ_0) . Rearrange the equation of Boyle's law for to get a straight line graph

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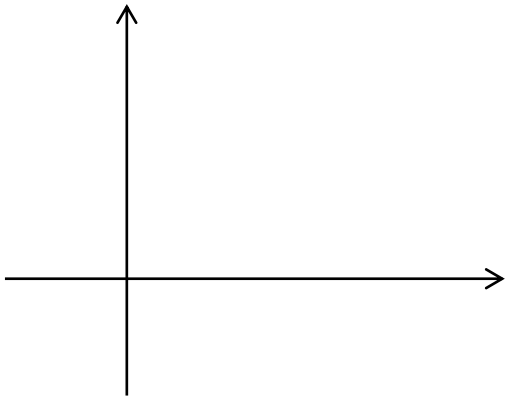
V. Draw the expected graph



VI. How do you conclude that the law is verified from the graph plotted?

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VII. From which part of the graph, would you determine the atmospheric pressure

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VIII. 1) For the high values of $\frac{1}{V}$ the practical points are deviated from straight line graph. What may be the reason for this deviation.

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2) What is the experimental procedure that can be adopted to rectify this deviation.

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IX. If the pressure gauge reading corresponding to the volume of the gas $100cm^3, 50cm^3$ are $1.5 \times 10^5 pa, 4 \times 10^5\ pa$ respectively. Calculate the atmospheric pressure.

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X. What will be the pressure gauge reading when the volume of the gas is changed to $200cm^3$

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03) You are asked to determine the frequency of a tuning fork using a sonometer for that the given instruments are shown in the figure (1)

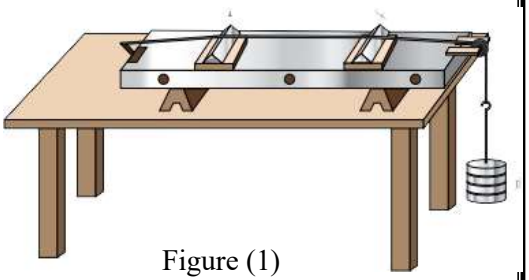

Figure (1)

(a) List the other apparatus required to perform this experiment.

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(b) What is the type of wave formed by the vibration of the sonometer wire?
(Transverse wave, Longitudinal wave) (Standing wave, Progressive wave)

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(c) What is the reason for using the wire in fundamental resonance mode?

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(d) When the wire vibrates in fundamental mode, draw the shape of the wave formed between the points P and Q on the diagram (2) use an arrow to indicate the best position to place the paper rider and lable it as x

Figure (2)

(e)

(i) Write down an equation for the speed of transverse wave on the sonometer wire (V) in terms of the mass (m) suspended from the sonometer wire, the mass per unit length (M) of the sonometer wire and the acceleration due to gravity (g)

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(ii) Drive an expression for frequency f of the turning fork interms of fundamental reasonance length $(l), m, M$ and g .

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(iii) Re arrange the above expression in e(ii) to plot a straight-line graph.

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(f)

(i) What is the purpose of having a same piece of sonometer wire which is used in the sonometer.

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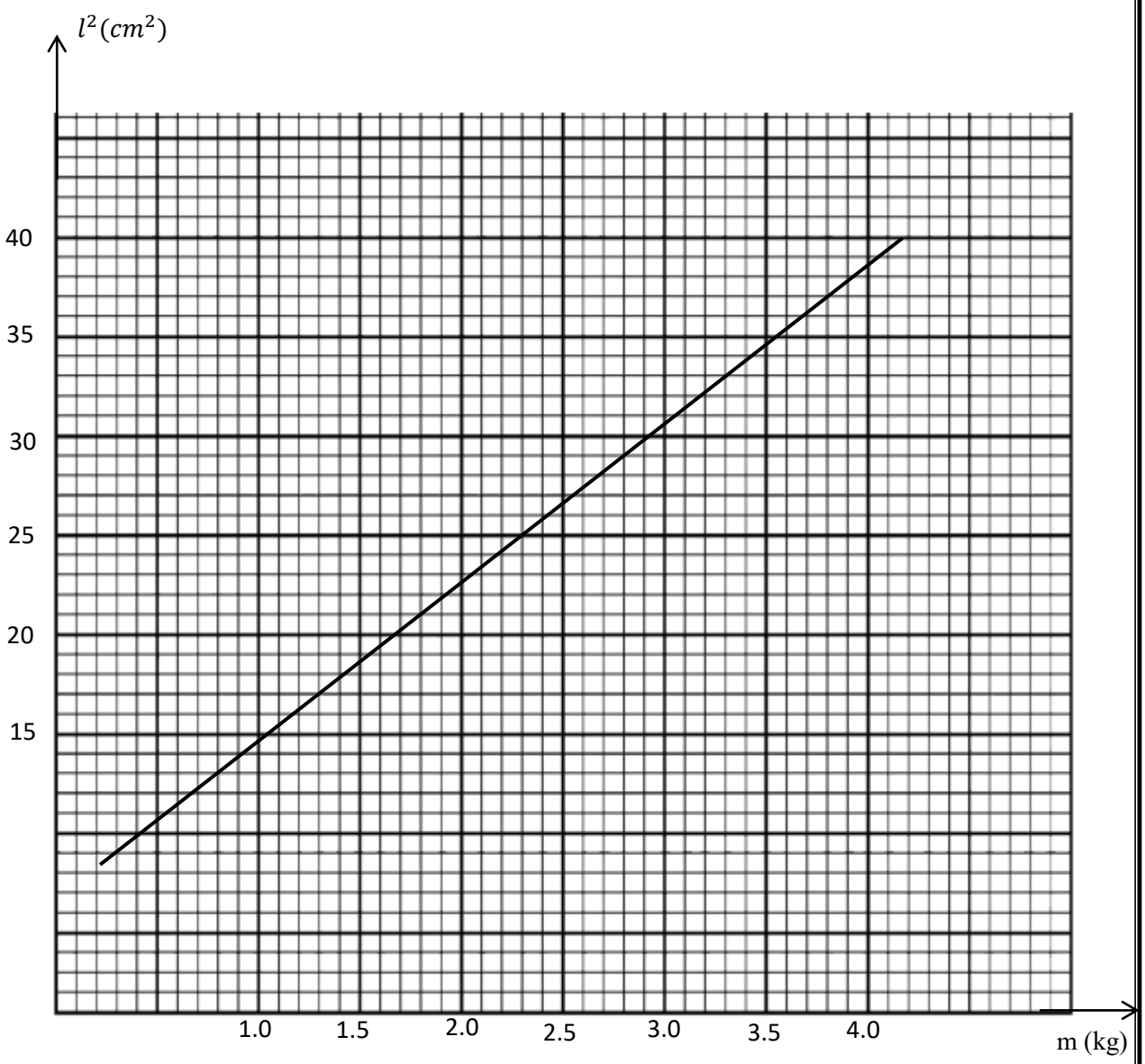
(ii) In the above f(i) , give the measurements that needed to measured to achieve the purpose specified by you and the measuring instruments used for it.

	Measurement	Measuring instruments.
1.	.....	.....
2.	.....	.....

(g)



(i) Obtain the gradient of the graph.

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(ii) If the mass per unit length is $1.25 \times 10^{-2} kgm^{-1}$. Find the frequency of the tuning fork.

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(h) When determining the reasonace length (l) in this experiment describe a possible error that may occur and the action you would take to minimize it.

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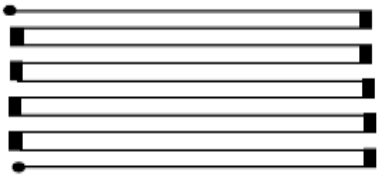
04) A potentiometer is constructed by connecting ten 1m long manganin wire in series.



(i) What is the purpose of using a thick metal plate to connect the end of these wires.

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(ii) Explain the advantages and disadvantages of using ten 1m long wires instead of a single 10m long wire

Advantage :.....

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Disadvantage: .....

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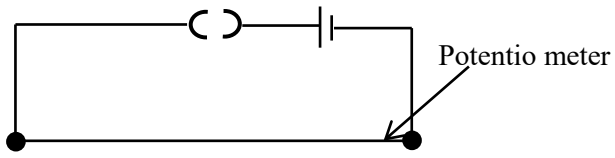
(iii) A potentiometer is to be used to measure the electromotive force of a 1.2V dry cell. The following apparatus are provided for this A cell with electromotive force E and internal resistance , a resistance box a galvanometer, High resistance, Switches, Connecting wires.

1) Complete the incomplete circuit diagram to determine the internal resistance of the dry cell.



2) Following lead-acied accumulators are given to maintained constant voltage difference across the potentiometer wire.

(a) 1V (b) 2V (c) 12V

Which of the above cell is most suitable for this? Give the reason.

Choice : .....

Reason : .....

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3) What is the reason for using lead acid accumulator in primary circuit.

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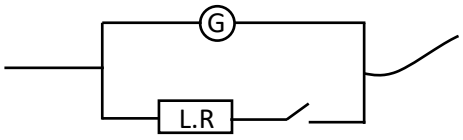
(iv) A student says that in this experiment a low resistance (L.R) can be used to protect the galvanometer from high current. The corresponding circuit diagram is given below.



How can the accurate balance length be obtained using the above circuit?

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(v) In order to obtain the internal resistance graphically, let consider when a cell with internal resistance r is connected in auxiliary circuit, the balance length is l_0 and when the resistance box has known resistance R the balance length is l

1. Obtain a relationship between E, r, R, l, l_0

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2. Rearrange the above relationship to plot a straight line graph

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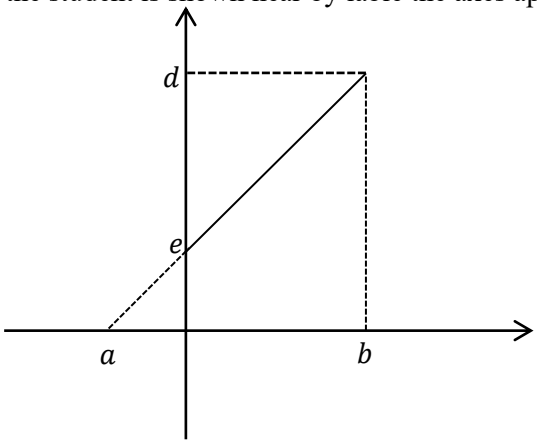
3. The graph plotted by the student is shown near by lable the axes appropriately.



4. By using the graph, give the internal resistance r in terms of a, b, d, e

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(vi) $l_o = 84cm$, and the resistance in the resistance box is 20Ω. If the corresponding balance length is $(l) = 80cm$, find the internal resistance r.

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