*MARKING SCHEME*

***PHYSICS PRACTICAL***

***PAPER 3***

2 ½ Hours

*You are provided with the following;*

* *A pendulum bob*
* *Two pieces of wood*
* *A retort stand*
* *A boss*
* *A clamp*
* *A ctop watch*
* *A metre rule/or half metre rule*
* *A piece of thread*

**Proceed as follows;**

a) Suspend a pendulum bob on a retort stand as shown below.

 

b) Displace the bob for a small angle. As it is oscillating time ten oscillations for every length of the string shown in the table below (9 marks)

3

2

1

2

1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Length, l(m)*** | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 |
| **Time ,t, for 10 oscillations(s)** | 13.00 | 15.20 | 18.11 | 20.01 | 22.00 | 24.14  |
| **Periodic time, T(s)** | 1.100 | 1.520 | 1.811 | 2.001 | 2.200 | 2.414 |
| **F=**$^{1}/\_{T }$**(Hz)** | 0.9091 | 0.6579 | 0.5522 | 0.4998 | 0.4545 | 0.4143 |
| **F2(Hz2)** | 0.8265 | 0.4328 | 0.3049 | 0.2498 | 0.2066 | 0.1716 |
| $^{1}/\_{L}$**(m-1)**  | 2.500 | 1.667 | 1.250 | 1.000 | 0.8333 | 0.7143 |

C) Plot a graph of F2 against 1/L. (5 marks)

A1

S1

P2

L1

F2 (Hz2)

 1/L (m-1)

d) Determine the slope ,**S**, of the graph. (3 marks)

 Change in F2  ; = 0.25 ;

 Change in 1/L

= 4.0 x 10-1 ;

 1.6

e) Given that the relationship between **F** and **L** is given by *,* ***F2 =*** $\frac{g}{4π²L}$ ,use the graph to determine the value of **g** giving its units . ( 3marks)

 s= g/4π2 ;

g= 4 x π2 x 0.2486 ;

= 9.814m/s2 ;

**QUESTION 2**

*PART A*

**You are provided with the following apparatus:**

* *A voltmeter (0 – 3 V)*
* *An ammeter (0 – 1A)*
* *A 10Ω carbon resistor*
* *A switch.*
* *One dry cell and a cell holder*
* *Six connecting wires ( 4 with crocodile clips)*

(a) (i) Connect the above apparatus as shown in the circuit diagram **below** with

the switch open.

A

10Ω

V

1. With the switch open record E. the voltmeter reading.

E = ………………**1.6 V** **;**……………………………….(1 mark)

1. Close the switch and record V, the voltmeter reading and I, the ammeter

reading.

V = ………………**1.4 V**……………………………….(1 mark)

I = …………………***0.08 A***………………………………(1 mark)

1. Given that E = Ir + V , determine r. (1mark)

 ***r = 2.5 Ω (±0.1)***

**PART B**

b) ***You are provided with the following:***

* *A complete retort stand*
* *An optical pin*
* *A concave mirror and a mirror holder*
* *A cork*
* *A candle*
* *A white screen*
* *A metre rule*

You are required to estimate the focal length of the concave mirror. Arrange the apparatus as shown in the figure below:

Eye



Stand

Cork

Image

Object pin

h

Mirror

1. By adjusting the clamp on the stand, move the object pin up and down until the inverted image and the pin itself appear to coincide (use – no- parallax method). Measure the distance, h .

h = …………**40.0……(± 0.5cm**)………………… cm ( 1mark)

1. Calculate the value ***f*** given that ; f= $\frac{h}{2}$

***f=*** ……………………**20.0…………(±0.5cm**)……………………………cm *(1*mark*)*

1. Arrange the apparatus as shown in figure 2 below



1. Place the candle at a distance u = 28cm from the mirror. Move the screen along the ruler

 until a sharp image is focused on the screen. Measure and record the image distance V .

1. Repeat the procedure for values of u = 30cm, 32cm, 34cm and 36cm. Record your values

 in the table below hence complete the column for values of M. ( 5marks)

|  |  |  |
| --- | --- | --- |
| **Object distance u (cm)** | **Image distance V (cm)** | **Magnification M= v/u** |
| 28.0 | ***78.0*** | ***2.7857*** |
|  30.0 | ***64.0*** | ***2.1333*** |
| 32.0 | ***54.0*** | ***1.6875*** |
| 34.0 | ***49.5*** | ***1.4559*** |
| 36.0 | ***45.5*** | ***1.2639*** |

 **1dp At least 3 dp**

 **1 mark for each correct row**

1. Plot a graph of magnification, M against image distance, v. (4 marks)

 ***m***

 ***A1***

 ***S1***

 ***P1***

 ***20 v(cm) L1***

 ***\_1***

 **S =** $\frac{∆m}{∆v}$ **;**

 **=** $\frac{20}{1}$ **;**

 **= 20cm ; ( ±1.0 cm)**

1. Given that  **M =** $\frac{v}{f }$ - 1 , Determine, ***f,*** the focal length of the mirror. (2 marks)

 *F = slope ; OR F = V \_intercept ;*

 *= 20cm ; (±1.0cm) = 20cm ; (±1.0cm)*