BOWEN UNIVERSITY, IWO. OSUN STATE. NIGERIA

COLLEGE OF AGRICULTURE, ENGINEERING, AND SCIENCES

PHYSICS PROGRAMME

FIRST SEMESTER EXAMINATION 2021/2022 SESSION

PHY 103: PRACTICAL PHYSICS I (1 CREDITS)

DATE: FRIDAY, 10TH FEBRUARY 2022 TIME: 8.30am – 10.30am

INSTRUCTION: ATTEMPT ANY TWO QUESTIONS.

QUESTION ONE

In an experiment to determine the acceleration due to gravity using a simple pendulum in the physics laboratory, the following reading were obtained for 20 complete oscillations.

Table 1: Observations

S/N	L (cm)	t_1 (s)	t_2 (s)	t (s)	T (s)	T^2 (s^2)
1	80.0	35.0	37.0			
2	90.0	38.0	38.0	38.00		
3	100.0	40.0	40.0			
4	110.0	41.0	42.0	41.50		
5	120.0	43.0	43.5	43.25		

Questions

i. Complete the table above. **(5 Marks)**

ii. List at least 6 apparatus you would need to carry out this experiment in the laboratory. **(3 Marks)**

iii. Plot a graph of L(cm) against T^2 (s^2) and find the slope of the graph. **(7 Marks)**

iv. Using the equation $T = {}^{2\pi}\sqrt{\frac{L}{g}}$, derive an expression for the acceleration due to gravity. **(5 Marks)**

v. Using your graph and the expression in (iv) above, determine the value for the acceleration due to gravity. **(2 Marks)**

vi. State three precautions you would have taken if you were to perform the experiment in the laboratory. **(3 Marks)**

vii. State a principle in physics associated with this experiment. **(3 Marks)**

viii. Define the period of oscillation of an oscillating body. **(2 Marks)**

QUESTION TWO

An experiment was carried out in the laboratory to determine the focal length of a concave mirror by obtaining the image of a distance. The observations recorded were entered in the Table 2 below.

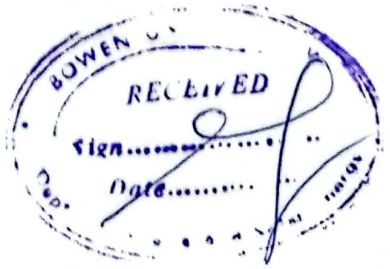


Table 2: Observations

S/N	The Position of mirror A (cm)	The Position of screen B (cm)	Difference between mirror and screen	Focal length f (cm)
1.	20	37		
2.	30		19	
3.	40	58	18	

i. Complete the table above **(5Marks)**

ii. Find the mean focal length of the concave mirror as determined by the method above **(2Marks)**

iii. List five (5) apparatus you know for carrying out the experiment in the laboratory **(5Marks)**

iv. Why is the focal length of a concave mirror negative **(2Marks)**

v. Where is the brightest and sharpest image formed by the concave mirror **(2Marks)**

vi. Write out the lens formula for a concave mirror and define the parameters **(4 Marks)**

vii. In an experiment to measure focal length of a concave mirror, the values of the focal length in successive observations are 17.3 cm, 17.8 cm, 18.3 cm, 18.2 cm, 17.9 cm, and 18.0 cm. calculate (i) the mean absolute error and (ii) percentage error. **(8Marks)**

viii. State two (2) precautions for concave mirror experiment in the laboratory **(2Marks)**

QUESTION THREE

In an experiment to verify Hooke's law by a student, the following setup was observed.

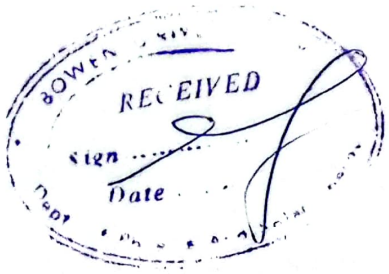
The hanger was suspended (without the slotted weights) to record an initial reading $x_0 = 7cm$. Furthermore, the weight on the hanger was increased i.e., $m = 20g, 40g, 60g, 80g, 100g$. The values were obtained and tabulated as below:

Table 3: Observations

M(g)	$x_0(cm)$	$x_i(cm)$	$e = x_i - x_0(cm)$
20	7	12	
40			6
60	7		7
80		15	
100	7	16	

i. Complete the table above. **(7 Marks)**

ii. Choosing a **suitable scale,** plot a graph of $M(g)$ *against* $e(cm)$. **(6 Marks)**



iii. Determine the slope and intercept of the graph. **(6 Marks)**

iv. State two (2) precautions taken by the student while performing the experiment. **(3 Marks)**

v. State Hooke's law; also write a mathematical expression for it. **(4 Marks)**

vi. Was it verified? Give reason(s) for your answer. **(4 Marks)**