BOWEN UNIVERSITY, IWO. OSUN STATE. NIGERIA

COLLEGE OF AGRICULTURE, ENGINEERING, AND SCIENCES

PHYSICS PROGRAMME

FIRST SEMESTER EXAMINATION 2022/2023 SESSION

PHY 291: PRACTICAL PHYSICS III (2CREDITS)

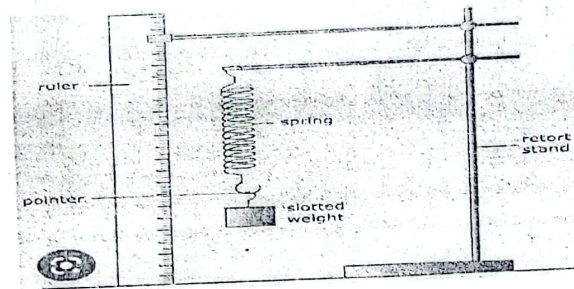TIME: 8:30-11.00AM (2HOURS 30MINS)

DATE: THURSDAY, 16TH FEBRUARY 2023

INSTRUCTION: ANSWER ANY TWO QUESTIONS.

QUESTION 1

You are supplied the following apparatus: spiral spring, retort stand, clamp, pointer, meter rule, hanger, slotted weights and stop watch.

1) Setup the apparatus given as shown above
2) Record the initial reading x_0(the hanger inclusive)
3) Increase the load on the hanger by adding a slotted weight of $m = 20g$, record the mass and the corresponding positions of the pointer on the meter rule.
4) Repeat step (3) for other values of $m = 40g, 60g, 80g, 100g, 120g, 140g$ and their corresponding values x_i of the pointer on the meter rule.
5) Progressively decrease the load in similar steps of $m = 20g$ and record as in step (4).
6) Find the extension $e = x_i - x_0$ of the spring for both steps (4) and (5) i.e. the increasing and decreasing loads.   [10MARKS]
7) Tabulate your readings as below:

m(g)	x_0 (cm)	x_i of increasing load x_{ii}(cm)	x_i of decreasing load $x_{id}(cm)$	Mean x_i $\frac{x_{ii}+x_{id}}{2}$(cm)	$e = x_i - x_0$ (cm)
20.00					
40.00					
60.00					
80.00					
100.00					
120.00					
140.00					

8) Plot a graph of e against m. [10MAR
9) Calculate the slope and the intercept. [7MARKS
10) State two (2) precautions taken in performing this experiment. [3MARKS]

QUESTION 2

a) Still considering the experiment in Question 1 above, starting from $m = 60g$, record the value of time t for 20 complete oscillations.
b) Increase the loads in steps of 20g until 140g.
c) Tabulate your readings. [8MARKS]
d) Plot a graph of T^2 against m. [10MARKS]
.e) Calculate the slope and intercept on both axes. [10MARKS]
f) State two (2) precautions taken in performing this experiment. [2MARKS]

QUESTION 3

The following results were obtained by displacing the free ends of a wooden meter rule with holes drilled at various intervals along its length. It was clamped to a retort stand, and a stop watch was used to calculate the time t for 20 complete oscillations. The center of gravity upon balancing it on a knife edge was found out to be C.G= $S_p = 49.50cm$

Point of suspension S_p(cm)	Time t for 20 oscillations (s)	$h = S_g - S_p$ (cm)	h^2 (cm^2)	$T^2 (s^2)$	$T^2h(cms^2)$

Given that $T^2h = \frac{4\pi^2}{g}[h^2 + k^2]$

g and k are constants, where g is the acceleration due to gravity; k is the radius of gyration of the body about the C.G.

a) Complete the table above [10MARKS]
b) Plot a suitable graph using the equation $T^2h = \frac{4\pi^2}{g}[h^2 + k^2]$ [13MARKS]
c) Hence, calculate the value of k^2 [5MARKS]
d) State two (2) precautions you took while performing this experiment. [2MARKS]