

CROSS RIVER UNIVERSITY OF TECHNOLOGY, CALABAR

DEPARTMENT OF PHYSICS

PHY 1104 (LAB. PHYSICS I) FIRST SEMESTER EXAMINATION 2017/2018 ACADEMIC SESSION

Instruction: Answer all Questions

Time: 1:30Mins.

1. What is the sensitivity values of the following instruments; (i) Metre rule (ii) Ammeter (0-5A) (iii) Voltmeter (0-3V) (iv) Stop Clock (0-60Sec.) scale deflections
2. Two lengths of a stick was measured with a metre rule as (20.0 ± 0.1) cm and (40.0 ± 0.1) cm. (i) Determine the percentage errors of the two readings (ii) Which of these readings has a higher degree of accuracy and why?
3. i. What is standard error? The following readings were obtained while measuring the radius of a circular ring; 2.20, 2.22, 2.15, 2.25, 2.10 cm (ii) determine the mean value of the diameter (iii) calculate the standard error in this observation.
4. Tranform the equation $y = ax^2 + bx + c$ into a linear equation of the form, $y = mx + c$ (ii) define the parameters m, x, c and y (iii) when C=0, what will be the nature of the equation.
5. In an experiment to determine the acceleration due to gravity using a compound pendulum, the following values were obtained; centre of gravity $S_p = 50.2$ cm, the corresponding scale reading of the pivot S_p at 5, 10, 15, 20, 25, 30, 35 and 40 cm after an oscillation for 10seconds is recorded in the table.

S_p cm	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	
t_1 (s)	32.1	31.8	31.0	30.7	30.8	31.7	34.0	38.2	
t_2 (s)	32.3	31.10	31.0	30.9	30.8	31.9	34.0	38.6	

Complete the table and find (i) mean t (ii) T(s) (iii) $h = S_g - S_p$ (iv) h^2 and (v) hT^2

- b. Plot a graph of hT^2 against h^2
- c. Measure the slope
- d. Measure the intercept on h^2 - axis
- f. Transform the equation $T = 2\pi \sqrt{\frac{h^2 + K^2}{gh}}$ to a linear equation form and deduce g and k from tour graph
- g. Also plot a graph of T against h and describe its nature
- i. What does k represent physically?

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PHY 1104 (LAB. PHYSICS)

INSTRUCTION: ATTEMPT ALL QUESTIONS

Time: 1:30Mins.

- 1(a) In a laboratory experiment, you are provided with a measurement from a metre rule and it recorded 12.5cm which is accurate to 0.1cm and a similar reading from a micrometer screw guage written as (1.35cm). (i) Indicate the uncertainty in the values and (ii) calculate percentage errors in the values.
- (b) During experiment, the diameter of a metal bar is measured several times with the following:
Results; 1.20, 1.25, 1.15, 1.20, 1.10cm. What is the standard error of the mean?
Write out the diameter.
- (c) Sketch the nature of the graphs in the following equations (i) $y = mx - c$ (ii) $y = ax^2 + bx + c$ (iii) $y = c/x$ (iv) Name the equations i, ii, and iii

2. An experiment was set up to determine acceleration due to gravity by using vertical Oscillation, The following readings were obtained

 $P_0 = 5.60\text{cm}$

Time for 20 Oscillations

Mass (g)	P (cm)	Extension $P_0\text{cm}$	$T_1(\text{s})$	$T_2(\text{s})$	T_m mean	T (s)	$T^2 (\text{s}^2)$
100.00	9.20		10.38	10.40			
200.00	13.20		11.09	11.45			
300.00	17.21		13.49	13.38			
400.00	21.42		16.13	15.37			
500.00	25.40		17.26	17.04			
600.00	29.10		18.98	19.98			

- (i) Complete the table
- (ii) Transform the equation, $T = 2\pi \sqrt{\frac{m+m_0}{lg}}$ to a linear plot able equation
- (iii) Plot a graph of M against T^2
- (iv) Determine the slope
- (v) The intercept in the graph, m_0
- (vi) Determine the value of g
- (vii) Mention two precautions you will take if you were to carry out the experiment
- (viii) What is simple harmonic motion?

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FIRST SEMESTER EXAMINATION 2015/2016 ACADEMIC SESSION

PHY 1104: LABORATORY PHYSICS I

INSTRUCTION: ATTEMPT ALL QUESTIONS IN SECTION A & B

Time: 2½ Hrs.

Section A

1. The equation of a straight line is given by $P = ax + k$. What do a and k represent
2. Draw a graph of the equation in question 1. In which $k = 0$
3. In the equation governing the motion of a simple pendulum $T = 2\pi\sqrt{I/g}$, transform the equation making g the subject of the equation
4. In question 3 if you were to plot a graph of T^2 against I . Write down the part of the transform equation that represents the slope.
5. What do you understand by standard error of value.
6. Suppose $T_1 = 94.0 \pm 0.5$; $T_2 = 85.5 \pm 0.5^\circ\text{C}$ and $T = T_1 - T_2$
If the errors quoted are standard errors. Write down the value of T and the standard error.
7. If $V = \pi d^2 l / d$ where $l = 89 + 0.1\text{cm}$ (limit m.e.) and $D = 2.1 + 0.1\text{cm}$ (limit m.e.)
Obtain the maximum error in V

SECTION B

In an experiment to determine the radius of gyration of a bar pendulum and the acceleration due to gravity, a student displaced the bar slightly to note the time for 10 oscillations. The bar was suspended from the 5cm mark S_p . The entire experiment was then repeated for equal interval of 5cm and the following observation were made. The bar or meter rule was balanced at $S_g =$

S_p	5	10	15	20	25	30	35	40
T_1	32.2	31.8	31.0	30.6	30.8	31.8	34.0	38.2
T_2	32.2	31.8	31.0	30.7	30.8	31.8	34.0	38.4

Questions

1. Construct a composite table for the results
2. Determine $h = S_g - S_p$ (cm)
3. Determine the period for each position
4. Plot a graph of hT^2 against h^2
5. Determine the slope of your graph
6. Read out the intercept on the h^2 axis
7. From the equation $T = 2\pi\sqrt{\{(h^2 + k^2)/gh\}}$
8. Deduce the values of g , and k from your graph
9. What does k represent?
10. Plot another graph of T against h using a suitable scale and a different graph page. Is your graph a straight line or a curve?
11. If it is a straight line what does the shape represent and if it is a curve what does the minimum point represent.
12. State two sources of error in this experiment.