EXPERIMENT NUMBER – 3.11

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CSE   DOP: 01/06/2022

 SUBJECT: PHYSICS FOR ENGINEERS
GRP: 510 B

AIM OF THE EXPERIMENT-

To measure the g using kater's pendulum.

APPARATUS–

S.N.	Equipment	Range	Quantity
1	Kater's pendulum	120cm	1
2	Stop watch	N.A	1
3	Meter rod	100cm	1

OBSERVATION TABLE–

FORMULA USED :

$$g = \frac{8\pi^2}{\dfrac{T1^2 + T2^2}{l1 + l2} + \dfrac{T1^2 - T2^2}{l1 - l2}}$$

The following formula is used for the determination of acceleration due to gravity 'g':

S No	No. of Oscillations	Time about the knife edge K1			Time of one oscillation T1 (secs)	Mean T1 Secs.	Time about the knife edge K2			Time of one oscillation T2 (secs)	Mean T2 Secs.
		Min	Sec	Total			Min	Sec	Total		
1.	20	0	39	39	1.95	1.95	0	38.8	38.8	1.94	1.94
2.	25	0	48.75	48.75	1.95		0	48.5	48.5	1.94	

Here, T1: time periods of the oscillating pendulum from knife-edge K1 T2: time periods of the oscillating pendulum from knife-edge K2 l1: distances between knife-edges K1 and CG of the pendulum l2: distances between knife-edges K2 and CG of the pendulum

CALCULATIONS–

Distance between K1 and CG (l1) = 66.25 cm Distance

between K2 and CG (l2) = 23.75cm

$$T_1 = 1.95 \text{ s} \qquad T_2 = 1.94 \text{ s} \qquad l_1 = 66.25$$

$$T_1^2 = 3.8 \qquad T_2^2 = 3.76 \qquad l_2 = 23.75$$

$$\frac{T_1^2 + T_2^2}{l_1 + l_2} = \frac{3.8 + 3.76}{6.9} = 8.404$$

$$\frac{T_1^2 - T_2^2}{l_1 - l_2} = \frac{0.04}{66.25 - 23.75} = \frac{0.04}{42.25} = 0.001$$

$$g = \frac{8\pi^2}{\dfrac{T_1^2 + T_2^2}{l_1 + l_2} + \dfrac{T_1^2 - T_2^2}{l_1 - l_2}} = \frac{8\pi^2}{8.404 + 0.001}$$

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PERCENTAGE ERROR-

Percentage Error

$$\% \text{ error} = \frac{\text{Standard Value} - \text{Experimental value}}{\text{Stand. Value}} \times 100$$

$$= \frac{9.8 - 9.39}{9.8} \times 100$$

$$\% \text{ Error} = 4.18\%$$

- ## RESULTS AND DISCUSSION-

Acceleration due to gravity

'g'=9.39 m/s^2 Standard value

of 'g' = 9.8 m/s^2

Percentage Error=4.18%

Conclusion: Hence, the value of the acceleration due to gravity, i.e. 'g' has been calculated and is found to be approximately equal to the standard value of the acceleration due to gravity.

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LEARNING OUTCOMES

1. Remember the concepts related to fundamentals of C language, draw flowcharts and write algorithm/pseudocode.
2. Understand the way of execution and debug programs in C language.
3. Apply various constructs, loops, functions to solve mathematical and scientific problem.
4. Analyze the dynamic behavior of memory by the use of pointers.
5. Design and develop modular programs for real world problems using control structure and selection structure.

EVALUATION COLUMN (To be filled by concerned faculty only)

Sr. No.	Parameters	Maximum Marks	Marks Obtained
1.	Worksheet Completion including writing learning objective/Outcome	10	
2.	Post-Lab Quiz Result	5	
3.	Student engagement in Simulation/Performance/Pre-Lab Questions	5	
4.	Total Marks	20	