EXPERIMENTAL REPORT 5

**DETERMINATION OF MOMENT OF INERTIA**

**BASED ON TORSIONAL VIBRATION**

**Experimental result and Data Processing**

***1. Measurement of Force (F): r = 125mm***

***a.***

| **Trial** | **r (m)** | **F (N)** |
| --- | --- | --- |
| 1 | 0.125 | 0.60 |
| 2 | 0.55 |
| 3 | 0.60 |
| 4 | 0.55 |
| 5 | 0.55 |
|  |  |  |

***b***.

| **Trial** | **r (m)** | **F (N)** |
| --- | --- | --- |
| 1 | 0.125 | 0.95 |
| 2 | 0.95 |
| 3 | 0.90 |
| 4 | 0.90 |
| 5 | 0.95 |
|  |  |  |

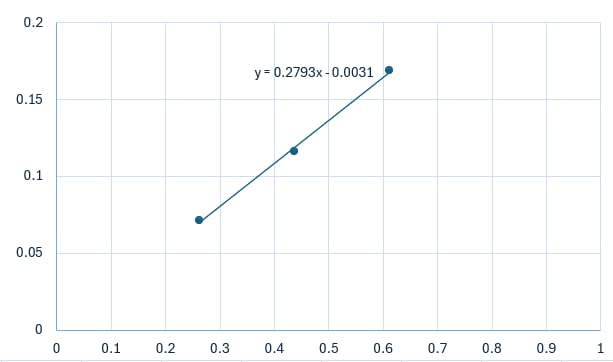
***c.***

| **Trial** | **r (m)** | **F (N)** |
| --- | --- | --- |
| 1 | 0.125 | 1.35 |
| 2 | 1.30 |
| 3 | 1.40 |
| 4 | 1.35 |
| 5 | 1.35 |
|  |  |  |

***2 Measurement of vibration period (T):***

| **Trial** |  | |  | |  | |
| --- | --- | --- | --- | --- | --- | --- |
| **3T1 (s)** | **T1 (s)** | **3T2 (s)** | **T2 (s)** | **3T3 (s)** | **T3 (s)** |
| **1** | 3.50 | 1.167 | 3.20 | 1.067 | 3.22 | 1.073 |
| **2** | 3.41 | 1.137 | 3.30 | 1.100 | 3.29 | 1.097 |
| **3** | 3.43 | 1.143 | 3.18 | 1.060 | 3.27 | 1.090 |
| **4** | 3.50 | 1.167 | 3.31 | 1.103 | 3.25 | 1.083 |
| **5** | 3.46 | 1.153 | 3.29 | 1.097 | 3.26 | 1.087 |
|  |  | |  | |  | |

***3 Graph showing the relationship of torsion on deflection angle :***

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*Ox:*  (rad)

*Oy*: (Nm)

***4 Determination of the torsion modulus D as the slope m of the above graph and its uncertainty***

*Using the above graph, we can see that the “best fit” line has the equation*

*y = 0.2792x - 0.003*

*Therefore we can measure slope m as or*

*We obtain:*

*Hence:*

|  |
| --- |

***5 Calculation of the moment of inertia of the long rod***

*We have:*

*Hence:*

|  |
| --- |