**EXPERIMENT**

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1. Objective 2. Apparatus used 3. Theory 4. Procedure 5. Observations & Calculations 6. Graphs 7. Results & Discussions 8. Precautions.

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**1. Objective**

To measure the deflection of fixed end beam and compare Experimental and Theoretical results.

**2. Apparatus Used**

Beam deflection apparatus, beam, dial gauge, weights, hangers.



**3. Theory**

**Beam:**

A beam is a structural element that is capable of withstanding load primarily by resisting bending. The bending force induced into the material of the beam as a result of the external loads, own weight, span and external reactions to these loads is called a bending moment.

**Fixed End Beam:**

A beam that is supported at both free ends and is restrained against rotation and vertical movement is called a fixed end beam. It is also known as built-in beam or encase beam.

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It can be shown that the deflection of a fixed end beam with a single concentrated load at the center can always be expressed in the form:

Z= (1/192) \* (WL3)/ (EI)

Where:

 Z: is the deflection

 W: is the load acing on the beam

 L: is the span length

 E: Modulus of elasticity

 I: moment of inertia

**4. Procedure**

* Measure the length of beam between two fixed ends.
* Measure width “b” and depth “h” and calculate moment of inertia as I=bh3/12
* Put load “W” at the center of beam.
* Read deflection at the center with dial gauge.
* Calculate deflection at the center using formula.
* Calculate the percentage error in measured and calculated deflections.
* Repeat the experiment by taking different values of load “W”.

**5. Observations & Calculations**

* **Material --------------- Length = L =----------------**
* **Width = b = ------------------ Depth = h = ---------------**
* **Modulus of elasticity = E =---------------------**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr # | Load on beamW | Deflection measuredZ’ | Deflection calculatedZ | % Error |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |

**6. Graph**

Draw the graph b/w Load Vs Deflection measured.

Draw the graph b/w Load Vs Deflection calculated.

**7. Results & Discussion**

The measured deflections should closely match with calculated deflections using formulae.

**8. Precautions**

* Apply load without any jerk.
* Perform the experiment away from vibrations and other disturbances.
* Dial gauge should be handled properly.