



DEPARTMENT OF CIVIL ENGINEERING

STRUCTURAL ANALYSIS LABORATORY

Structural Analysis Laboratory is fully organized and well equipped with many instruments in order to verify different established theorem and formula of structural analysis. Basically, this is a demonstrative lab. Here is the list of experiments that are performed in this laboratory:

- a) To find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value.
- b) To verify Clerk Maxwell's Reciprocal theorem by means of a mild steel beam.
- c) To determine the horizontal thrust in a three hinged arch for a given system of loads experimentally and verify the same with calculated values.
- d) To study experimentally a two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically
- e) To determine the ratio of the fixed end moment at one end to the moment applied at the other end.
- f) To determine the elastic displacement of the curved members experimentally and verification of the same by analytical methods.
- g) Comparison of experimental and theoretical results of forces in the members and the component displacement of the loaded joint D of a three-bar suspension system for vertical loads.
- h) To study behavior of different types of columns and find Euler's buckling load for each case.
- i) To calculate experimentally and theoretically the loads in the three suspension rods supporting an elastic beam with a concentrated load hung midway between two of the suspension rods under two conditions.
- j) To study the behavior of a cantilever beam under unsymmetrical bending.

The descriptions of the instruments are listed below:

a. Elastic Properties of Beam Apparatus:

This apparatus is used to find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value. It consists of a steel beam mounted on a steel frame having one end is over hanged with pinned support and other end is over hanged with simple support. It is also used to determine the ratio of the fixed end moment at one end to the moment applied at the other end.



Elastic Properties of Beam Apparatus

b. Maxwell Reciprocal Theorem Apparatus:

This apparatus is used to verify Clerk Maxwell's Reciprocal theorem. It consists of a stainless- steel beam with one end pinned and other end is over hanged on a simple support. The length of beam is 100 cm.



Maxwell Reciprocal Theorem Apparatus

c. Behavior of Column and Strut Apparatus:

This Apparatus is used to study the behavior of different types of columns under axial and find Euler's buckling load for each case. It consists of four struts with different end conditions.



Behavior of Column and Strut Apparatus

d. Three Hinged Arch Apparatus:

To determine the horizontal thrust in a three hinged arch for a given system of loads experimentally and verify the same with calculated values. It consists a steel three hinged arch of 100 cm length with 10 equally divided segments.



Three Hinged Arch Apparatus

e. Two Hinged Arch Apparatus:

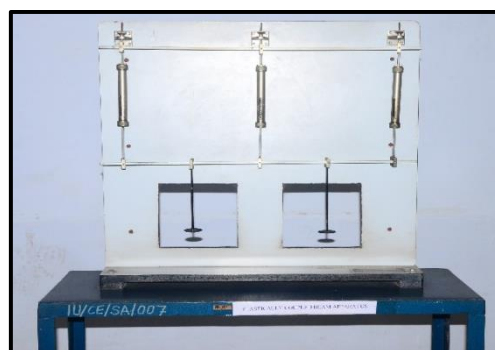
This apparatus is used to study a two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically. It consists a steel two hinged arch of 100 cm length and marked with equal 10 segments.



Two Hinged Arch Apparatus

f. Elastically Coupled Beam Apparatus:

To calculate experimentally and theoretically the loads in the three suspension rods supporting an elastic beam with a concentrated load hung midway between two of the suspension rods under two conditions.



Elastically Coupled Beam Apparatus.

- g. Redundant Joint Apparatus:** This apparatus is used for comparison of experimental and theoretical results of forces in the members and the component displacement of the loaded joint of a three-bar suspension system for vertical loads.



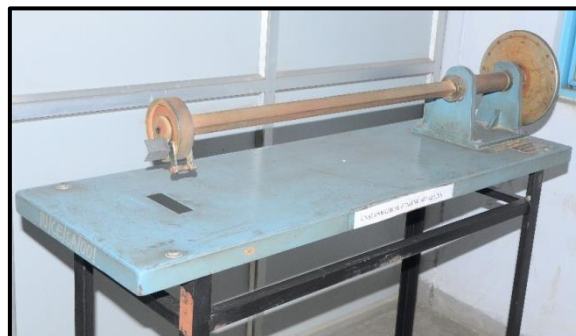
Redundant Joint Apparatus

- h. Curved Member Apparatus:** This apparatus is used to determine the elastic displacement of the curved members experimentally and verification of the same by analytical methods. It consists of four curved members: i) quadrant of circle ii) semi-circle with straight arm iii) quadrant of a circle with straight leg and iv) a whole circle.



Curved Member Apparatus

- i. Unsymmetrical Bending Apparatus:** By this apparatus one can study the behavior of a cantilever beam under unsymmetrical bending. It consists a stainless-steel cantilever beam of an angle section.



Unsymmetrical Bending Apparatus

- j. Deflection of Truss Apparatus:** This apparatus is used to determine the deflection of a pin connected truss analytically and graphically and verify the same experimentally. It consists of a Pratt type truss having 18 members.



Deflection of Truss Apparatus.