

## EXPERIMENT NO.07

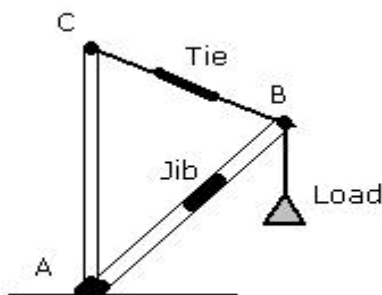
**Aim:** STUDY OF FORCES IN THE MEMBERS OF JIB CRANE.

**Apparatus:**

Apparatus of jib crane, hook, weights, scale, string.

**Objectives:**

- a) To understand facts & concepts of mechanism of jib crane & nature of forces in members of jib crane.
- b) To find the relationship between forces in the members of jib crane & lengths of members of jib crane.



Experimental setup

**Theory:**

**Triangle law of forces:**

If three coplanar concurrent forces are in equilibrium be represented in magnitude & direction by three sides of triangle taken in order then the first point of the first force coincides with the last point of last force i. e. force triangle is closed.

Jib crane is used to lift heavy loads. When it lifts load then jib member is subjected to compression & tie member is subjected to tension.

**Procedure:**

1. Organise the physical set up of experiment & study it. Adjust the position of clamp on vertical post.
2. Observe the initial readings in jib & tie & note them.
3. Apply load (W), say 10N.
4. Observe the final readings in tie & jib. Also measure the lengths of tie, post & jib in loaded condition & note them.
5. Tabulate your observations.
6. Calculate forces in jib & tie by subtracting the initial readings from final readings.

7. Construct the scaled triangle for lengths of members of jib crane.
8. Considering the vertical side of triangle as the applied load (W) then find forces in jib & tie by measuring the lengths of corresponding sides of triangle & multiplying it by scale.
9. Repeat the procedure from 5.2 to 5.8 for two more values of W for same position of clamp.
10. Change position of clamp & repeat the steps from 5.2 to 5.9.

Observations:

Initial readings of jib = ----- N

Initial readings of tie = ----- N

**Observation Table:**

Position of clamp	Vertical load w/N	OBSERVED FORCES				CALCULATED FORCES				
		JIB		TIE		LENGTH OF MEMBERS (cm)			FORCES IN (N)	
		FINAL READING	FORCE IN JIB	FINAL READING	FORCE IN TIE	POST.	JIB.	TIE.	JIB.	TIE.

**Calculations:**

**Result:**

- a) Force triangle closes / remains open.
- b) Nature of forces in jib & crane.
- c) Relationship between forces in members & their lengths.

**Conclusion:**

1. Magnitude of observed forces and calculated forces are \_\_\_\_\_ (equal/ nearly equal/ not equal)

Ideal conclusion is magnitude of observed force = magnitude of calculated force

2. The difference in the above two forces is because of \_\_\_\_\_

(error of manipulation/ instrument error/ error of observation)