K J Somaiya College of Engineering, Mumbai-77

(Autonomous College Affiliated to University of Mumbai)

Batch: D2 Roll No.: 16010221025
Experiment / assignment / tutorial No._____
Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

Title: Jib Crane

CO3: Analyze applications of equilibrium using free body diagram

Objective

To calculate the forces in the members of a simple jib crane

Theory

A crane is a type of machine, generally equipped with a hoist, wire ropes or chains, and sheaves, that can be used both to lift and lower materials and to move them horizontally. It is mainly used for lifting heavy things and transporting them to other places. It uses one or more simple machines to create mechanical advantage and thus move loads beyond the normal capability of a human. Cranes are commonly employed in the transport industry for the loading and unloading of freight, in the construction industry for the movement of materials and in the manufacturing industry for the assembling of heavy equipment.

AIM:

To find the forces in the members of a truss.

APPARATUS:

Jib crane apparatus, spring balance, weights, scale, etc.

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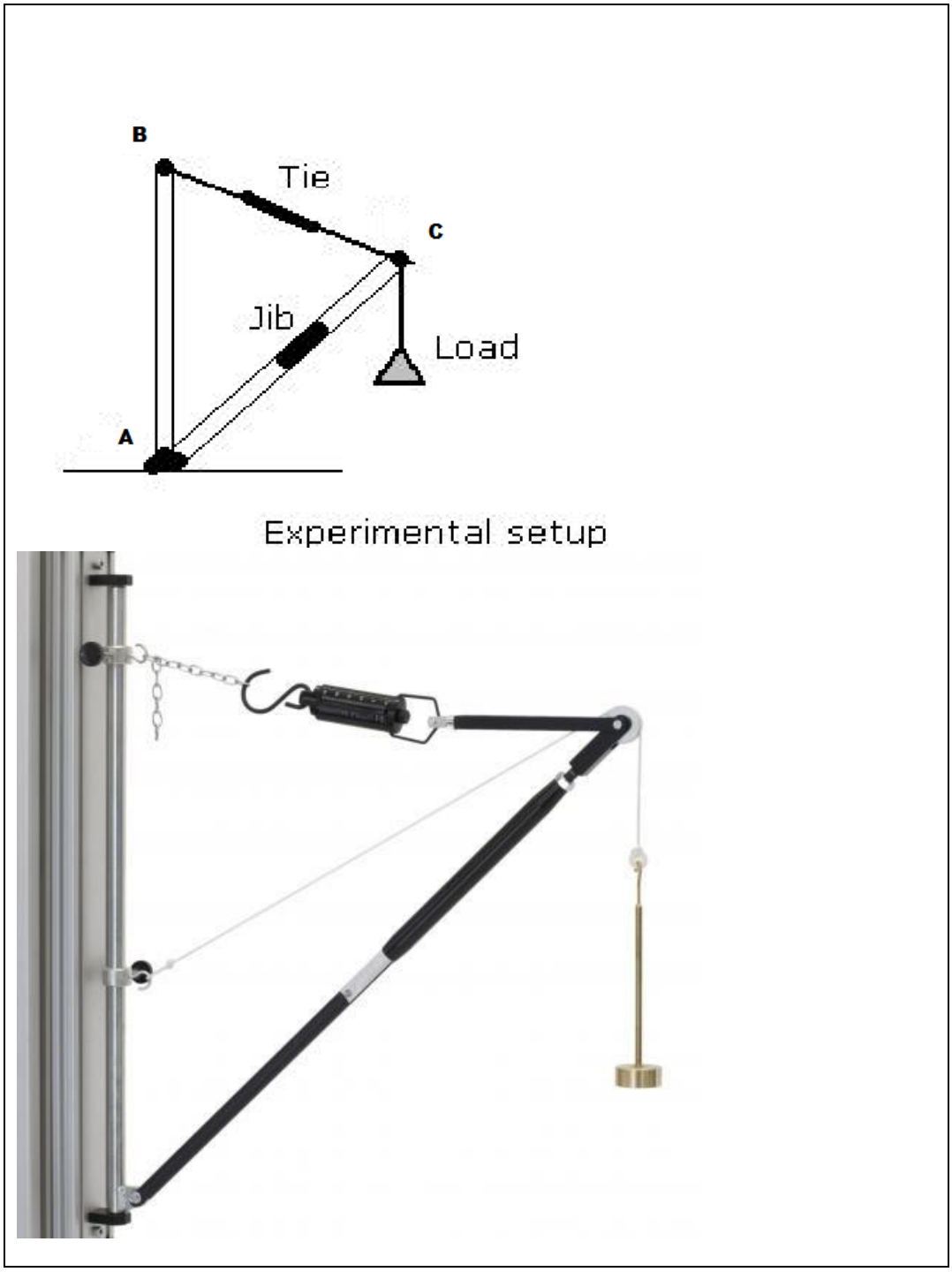
Setup Diagram:



Department of Mechanical Engineering

Jan-May-2020

PROCEDURE:

1. Attach spring balance with BC member.
2. Put weight in pan at C.
3. With the help of scale measure the length of each member.
4. Take the readings on spring balance at members BC and AC and the weight in pan at C.
5. Find the forces in members by analytical calculations and verify the results.

OBSERVATION TABLE:

Sr. No.	Weight in Pan (N)	Length of members (mm)		
		AB	BC	AC
1	1	94	93	130
2	2	94	83	128
3	3	94	82	127

Sr. No.	Weight in Pan (N)	Spring balance reading (N)		Forces on members (N)	
		BC	AC	BC	AC
1	1	1.5	1.2	1.37	0.79
2	2	2.6	2.2	1.15	1.74
3	3	4	3.2	2.40	2.63

CALCULATION:

By cosine rule :

$$BC^2 = AB^2 + AC^2 - 2AB \times AC \cos(a)$$

$$BC^2 - AB^2 - AC^2 = -2AB \times AC \cos A.$$

$$a = \cos^{-1}\left(\frac{AB^2 + AC^2 - BC^2}{2AB \times AC}\right)$$

Calculations done using calculator.

RESULT:

Force in Member BC = 21.83N

Force in Member AC = 23N

Signature of faculty in-charge