

### Practical No. 09: Verify law of polygon of forces using Universal force table for given forces.

**I. Practical Significance**

Many times there is a need to determine the resultant force. Depending upon the type of force system resultant can be determined by applying law of polygon of forces. After performing this experiment students will be able to find the resultant of three or more forces by graphically using law of polygon.

**II. Industry/Employer Expected Outcomes**

Apply the principles of engineering mechanics to find resultant of concurrent forces acting on structure (analytically and graphically).

**III. Course Level Learning Outcome(s)**

CO2 - Analyze the given force system to calculate resultant force.

**IV. Laboratory Learning Outcome(s)**

Analyze the resultant force of given force system.

**V. Relevant Affective Domain related Outcome(s)**

- Follow safety practices and precautions.
- Demonstrate working as a leader/a team member.
- Maintain tools and equipment.

**VI. Relevant Theoretical Background**

The law states that "If a number of forces acting simultaneously on a particle, be represented in magnitude and direction, by sides of a polygon taken in order, then the resultant of all these forces is represented in magnitude and direction by closing side of polygon taken in opposite direction."

This experiment is used to study the forces acting on a particle with the help of Universal force table as shown in figure.

**VII. Actual diagram used in laboratory with equipment specifications.**

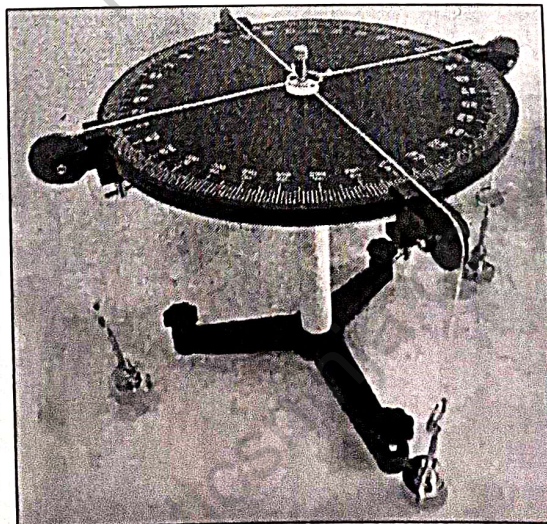


Fig. 9.1 Universal Force table



## XI. Observations Table

Obs. No.	Magnitude of Forces in (N) (Weight in hanger + Weight of hanger)					Angles between two forces in (degree)					
	F1	F2	F3	F4	F5 (From graph)	$\theta_1$	$\theta_2$	$\theta_3$	$\theta_4$	$\theta_5$	$\theta_5$ From graph
1	0.06	3.64	3.10	1.62	2.62	42	36	43	36	93	
2	5.06	2.90	2.81	2.51	3.89	50	40	34	46	34	
3	5.06	2.40	2.2	2.2	2.11	51	41	36	40	36	
4											
5											

## XII. Results

1. The force polygon is closed/not closed.

## XIII. Interpretation of results

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 relation between resultant and  
 equilibrant  
 .....

## XIV. Conclusions and Recommendations

1. If the force polygon is closed.....
2. If the force polygon is not closed.....

## XV. Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO. Write answers of minimum three questions.

1. State & explain law of polygon of forces.
2. What can be the sources of error in this experiment?
3. Distinguish the following system of forces with a suitable sketch. a) Coplanar b) concurrent c) Parallel d) Collinear.
4. If the force polygon is not a closed figure, what does it indicate.

Space for answers

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 .....



Q. 4  $\longrightarrow$

Ans:- the law of polygon is not  
verified x the force is not  
in equilibrium