

Law of Moments:

“In equilibrium,” when number of coplaner forces act on a body, the sum of the clockwise moments about any point in their plane is equal to sum of the anticlockwise moments about the same point.”

Varignon’s Theorem of Moments

“The algebraic sum of moments of all forces about any point is equal to the moment of their resultant about the same point.”

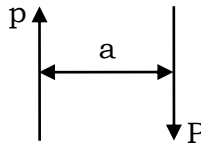
ΣMF_A = Algebraic sum of moments of all forces
about point A

MR_A = Moment of resultant force about point A

$$\Sigma MF_A = MR_A$$

Couple:

“Two equal, unlike parallel, non-collinear forces form a couple.”

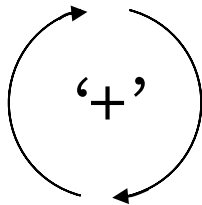


Moment of a Force

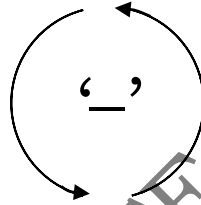
It is the rotational effect produced by a force on a body on which it acts. It is equal to the magnitude of the force multiplied by the perpendicular distance of the point from the line of action of the force.

Moment of a Force

Directions (Sign convention)

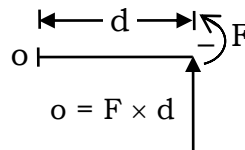
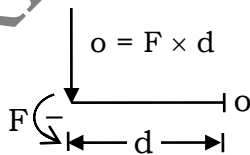
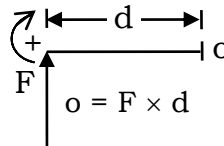
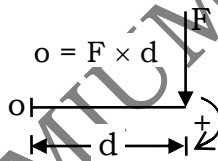


“Clockwise”



“Anticlockwise”

Moment at any point = Vertical Force \times Horizontal distance



Or Moment at any point = Horizontal Force \times Vertical distance

Limitations of Lami's Theorem

1. The theorem is applicable only if the body is in equilibrium.
2. The theorem is not applicable for parallel forces (or non-concurrent forces).
3. The theorem is not applicable for more or Less than three concurrent forces.
4. The theorem is not applicable for non-coplaner Forces.

Necessary conditions for Lami's Theorem

1. Out of the three forces P, Q and R at least one force must be known.
2. Out of the three angles α , β and γ any two angles must be known.
3. Lami's theorem is based on sine rule.
4. Lami's theorem is applicable only when three coplaner concurrent forces keep the body at rest.

Uses of Lami's Theorem

1. To solve the problems on equilibrium of three coplaner concurrent forces. The unknowns to be calculated.
2. Reaction at the points of conduct.
3. Tensions in the string [rope, wire and cable].
4. Inclination of the string with vertical or horizontal
5. Angle between forces.
6. Unknown forces

Equilibrant Force

“An equilibrium of number forces acting on a body is a single force which when acting with other forces brings the set of forces and the body in equilibrium.”