

Chapter - 1

Force and moment (Resultant and Equilibrium)

Engineering mechanics \Rightarrow It is the branch of physical science which deals with the state of a body under the action of external agency.

State $\begin{cases} \rightarrow \text{state of rest} \\ \rightarrow \text{state of motion} \end{cases}$

External agency $\begin{cases} \rightarrow \text{Force} \\ \rightarrow \text{moment} \end{cases}$

Force \Rightarrow Force is an action of an external agency which changes or tries to change the state of a body. (Unit = Newton; Push/Pull)

Moment \Rightarrow It is a measure of turning effect.
 Unit = Nm
 moment = Force \times distance

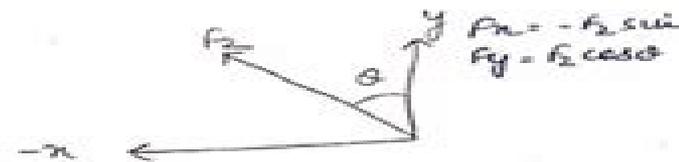
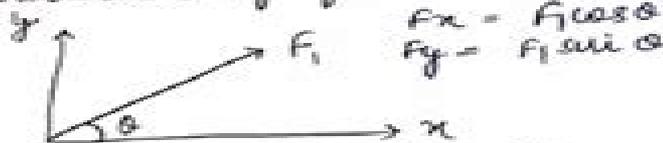
moment about O = $F \times d$

Quantity \Rightarrow Anything which can be measured directly or indirectly.

- i) Scalar (mag)
- ii) vector (mag - dir)

Rigid body \Rightarrow When there is no deformation in the body after the application of external force, the body is said to be rigid. \Rightarrow Deformation is very negligible, so neglected. \Rightarrow No body is perfectly rigid.

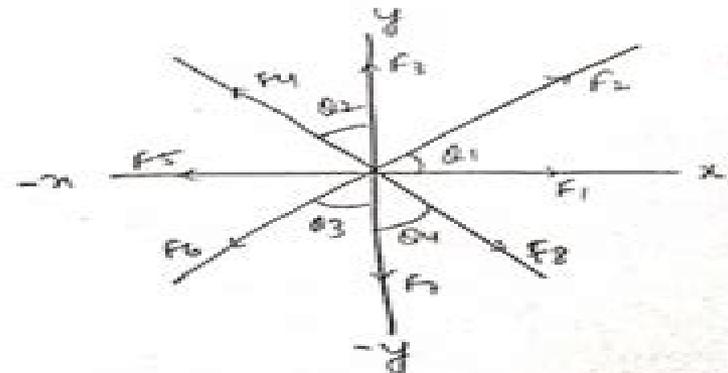
Resolution of force \Rightarrow



Composition of forces \Rightarrow

$\Sigma F_x =$ Horizontal $= F_1 + F_2 \cos \theta_1 - F_4 \sin \theta_2 - F_5 - F_6 \sin \theta_3 + F_8 \sin \theta_4$

$\Sigma F_y =$ Vertical $= F_2 \sin \theta_1 + F_3 + F_4 \cos \theta_2 - F_6 \cos \theta_3 - F_7 - F_8 \cos \theta_4$



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