

## 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)

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.

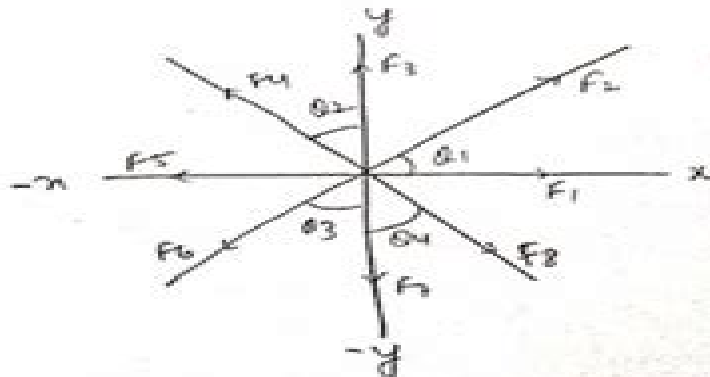
Resolution of force  $\Rightarrow$



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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