

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.

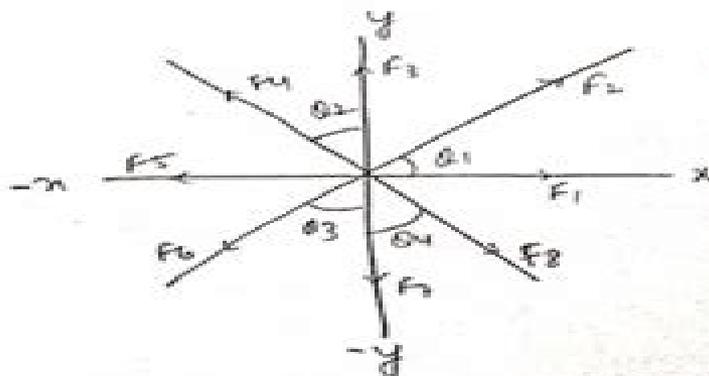
Resolution of force \Rightarrow



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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1. Understanding the eBook Mechanical Engineering 1st Year Notes Jain University
 - The Rise of Digital Reading Mechanical Engineering 1st Year Notes Jain University
 - Advantages of eBooks Over Traditional Books
2. Identifying Mechanical Engineering 1st Year Notes Jain University
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Mechanical Engineering 1st Year Notes Jain University
 - User-Friendly Interface
4. Exploring eBook Recommendations from Mechanical Engineering 1st Year Notes Jain University
 - Personalized Recommendations
 - Mechanical Engineering 1st Year Notes Jain University User Reviews and Ratings
 - Mechanical Engineering 1st Year Notes Jain University and Bestseller Lists
5. Accessing Mechanical Engineering 1st Year Notes Jain University Free and Paid eBooks
 - Mechanical Engineering 1st Year Notes Jain University Public Domain eBooks
 - Mechanical Engineering 1st Year Notes Jain University eBook Subscription Services

- Mechanical Engineering 1st Year Notes Jain University Budget-Friendly Options
- 6. Navigating Mechanical Engineering 1st Year Notes Jain University eBook Formats
 - ePub, PDF, MOBI, and More
 - Mechanical Engineering 1st Year Notes Jain University Compatibility with Devices
 - Mechanical Engineering 1st Year Notes Jain University Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Mechanical Engineering 1st Year Notes Jain University
 - Highlighting and Note-Taking Mechanical Engineering 1st Year Notes Jain University
 - Interactive Elements Mechanical Engineering 1st Year Notes Jain University
- 8. Staying Engaged with Mechanical Engineering 1st Year Notes Jain University
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Mechanical Engineering 1st Year Notes Jain University
- 9. Balancing eBooks and Physical Books Mechanical Engineering 1st Year Notes Jain University
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Mechanical Engineering 1st Year Notes Jain University
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Mechanical Engineering 1st Year Notes Jain University
 - Setting Reading Goals Mechanical Engineering 1st Year Notes Jain University
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Mechanical Engineering 1st Year Notes Jain University
 - Fact-Checking eBook Content of Mechanical Engineering 1st Year Notes Jain University
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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