

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.

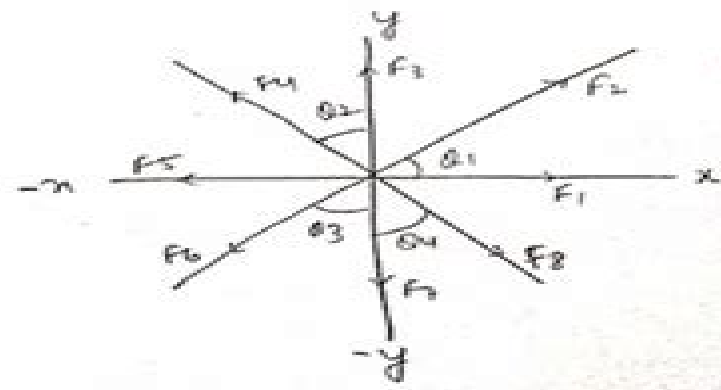
Resolution of force \Rightarrow



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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Arturo Cuomo



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Synthesis of Highway Practice National Cooperative Highway Research Program,2005 Bridge Maintenance, Safety, Management, Resilience and Sustainability Fabio Biondini,Dan M. Frangopol,2012-06-21 Bridge Maintenance Safety Management Resilience and Sustainability contains the lectures and papers presented at The Sixth International Conference on Bridge Maintenance Safety and Management IABMAS 2012 held in Stresa Lake Maggiore Italy 8 12 July 2012 This volume consists of a book of extended abstracts 800 pp Extensive collection of revised expert papers on recent advances in bridge maintenance safety management and life cycle performance representing a major contribution to the knowledge base of all areas of the field Handbook of Human Factors and Ergonomics Gavriel Salvendy,2012-03-13 The fourth edition of the Handbook of Human Factors and Ergonomics has been completely revised and updated This includes all existing third edition chapters plus new chapters written to cover new areas These include the following subjects Managing low back disorder risk in the workplace Online interactivity Neuroergonomics Office ergonomics Social networking HF E in motor vehicle transportation User requirements Human factors and ergonomics in aviation Human factors in ambient intelligent environments As with the earlier editions the main purpose of this handbook is to serve the needs of the human factors and ergonomics researchers practitioners and graduate students Each chapter has a strong theory and scientific base but is heavily focused on real world applications As such a significant number of case studies examples figures and tables are included to aid in the understanding and application of the material covered Robust Intelligence and Trust in Autonomous Systems Ranjeev Mittu,Donald Sofge,Alan Wagner,W.F. Lawless,2016-04-07 This volume explores the intersection of robust intelligence RI and trust in autonomous systems across multiple contexts among autonomous hybrid systems where hybrids are arbitrary combinations of humans machines and robots To better understand the relationships between artificial intelligence AI and RI in a way that promotes trust between autonomous systems and human users this book explores the underlying theory mathematics computational models and field applications It uniquely unifies the fields of RI and trust and frames it in a broader context namely the effective integration of human autonomous systems A description of the current state of the art in RI and trust introduces the research work in this area With this foundation the chapters further elaborate on key research areas and gaps that are at the heart of effective human systems integration including workload management human computer interfaces team integration and performance advanced analytics behavior modeling training and lastly test and evaluation Written by international leading researchers from across the field of autonomous systems research Robust Intelligence and Trust in Autonomous Systems dedicates itself to thoroughly examining the challenges and trends of systems that exhibit RI the fundamental implications of RI in developing trusted relationships with present and future autonomous systems and the effective human systems integration that must result for trust to be sustained Contributing authors David W Aha Jenny Burke Joseph Coyne M L Cummings Munjal Desai Michael Drinkwater Jill

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