



Unit-1

STATICS OF PARTICLES

Topic-1

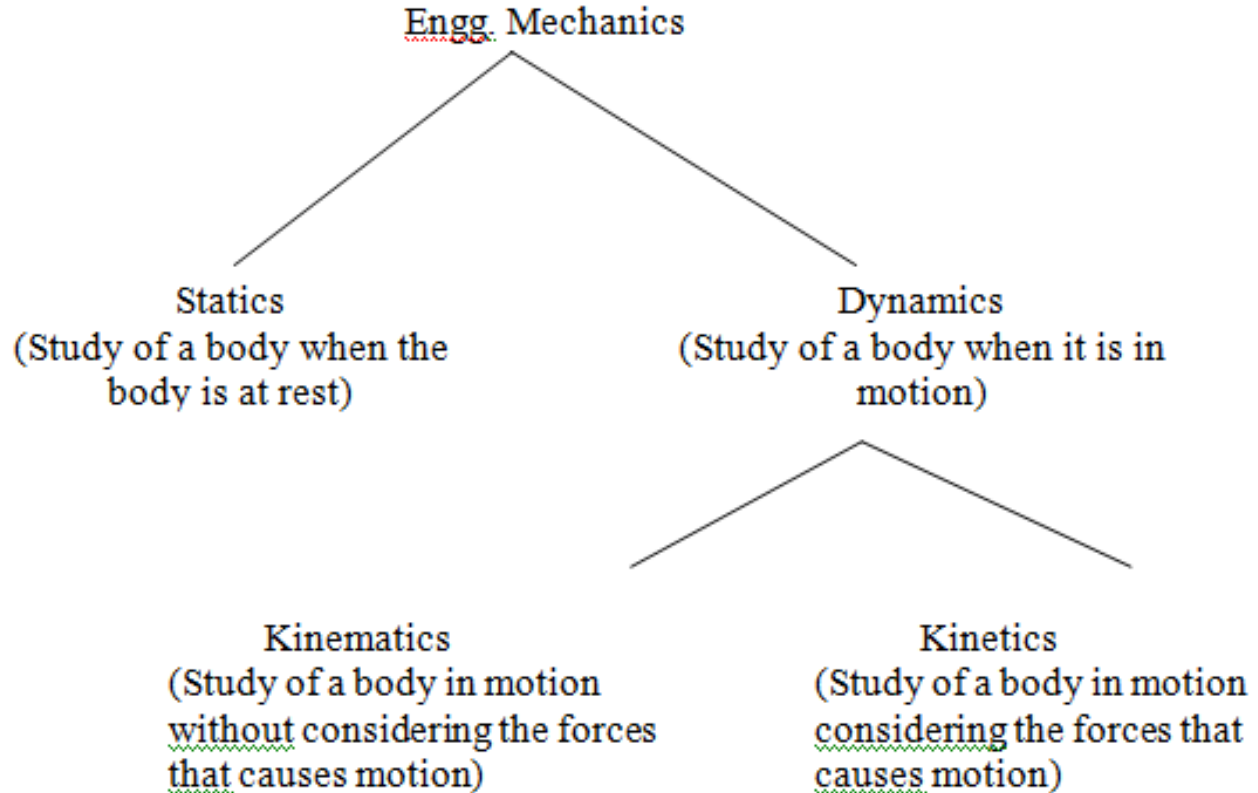
Introduction – Units and Dimensions –
Laws of Mechanics



Introduction



- Engg. Mechanics is a branch of science which deals with the behavior of a body when the body is at rest or motion.





Terms used in Engineering Mechanics



- **Vector quantity:** A quantity which is completely specified by magnitude and direction is known as vector quantity. (Eg.) Velocity, Acceleration, Force & Momentum.
- **Scalar quantity:** A quantity which is completely specified only by magnitude is known as scalar quantity. (Eg) Mass, Time , Length etc.
- **Particle:** A particle is a body of negligible dimensions and the mass of the particle is considered to be concentrated at a point.
- **Rigid body:** A body which does not deform under the action of applied force.
- **Mass:** The quantity of matter contained in a body is called as mass.
- **Weight:** The force with which a body is attracted towards the centre of the earth.

$$W = mg$$



Units of Quantities (SI Unit)

Quantity	Unit	Symbol	Formula
Acceleration	Metre /(Second) ²	-	m/s ²
Angle	Radian	rad	Rad
Angular Acceleration	radian/(Second) ²	-	Rad/s ²
Angular Velocity	Radian/second	-	Rad/s
Area	Square meter	-	m ²
Density	Kilogram/(meter) ³	-	Kg/m ³
Energy	Joule	J	Nm
Force	Newton	N	Kg m/s ²
Frequency	Hertz	Hz	(1/s)
Length	Meter	M	M
Mars	Kilogram	Kg	Kg
Moment of force	Newton-metre	-	Nm
Power	Watt	W	J/s
Pressure	Pascal	Pa	N/m ²
Stress	Pascal	Pa	N/m ²
Time	Second	S	S
Velocity	Metre/second	-	m/s



LAWS OF MECHANICS



- **Newton's first law of motion:** A body remains in its state of rest or motion unless a external force acting on it.
- **Newton's second law of motion:** The acceleration of a particle is proportional to the resultant force acting on it and is in the direction of the force applied.

$$F = ma$$

- **Newton's Third law of motion:** To every action there exists an equal and opposite reaction.



Gravitation law of attraction



- States that any two bodies in the universe attract each other with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

G – Universal Gravitational constant

$$G = 6.673 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$$

- G value – Henry Cavendish – After Newton's death
- Earth's standard acceleration due to gravity $g = 9.80665 \text{ m/s}^2$ (32.1740 ft/s²)
- An object falling near the earth's surface increases its velocity by 9.80655 m/s for each second of its descent.

Guess the Dialogues....!!!!



“Thallu Thallu Thallu Thallu Thallu **Thallu**” is a word
“Enna Kaiyya Puduichu **Iluthiya**” Is an Emotion



Am going to speak about....



Here is the CLUE..!!!!!!

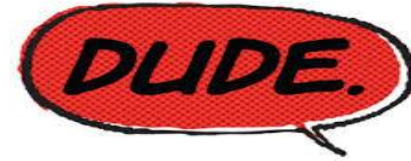


FORCE

DEFINITIONS:

- ✓ Force is a **push or pull**.
- ✓ Force is **the capacity to do work or cause Physical Change**.
- ✓ **Physical power or strength possessed** by a living being.

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CHARACTERISTICS OF A FORCE

How Much.....?? – **Magnitude**

Where....????? – **Point of Application**

Path.....!!!! – **Direction (or) Line of Action**



SYSTEM OF FORCES

