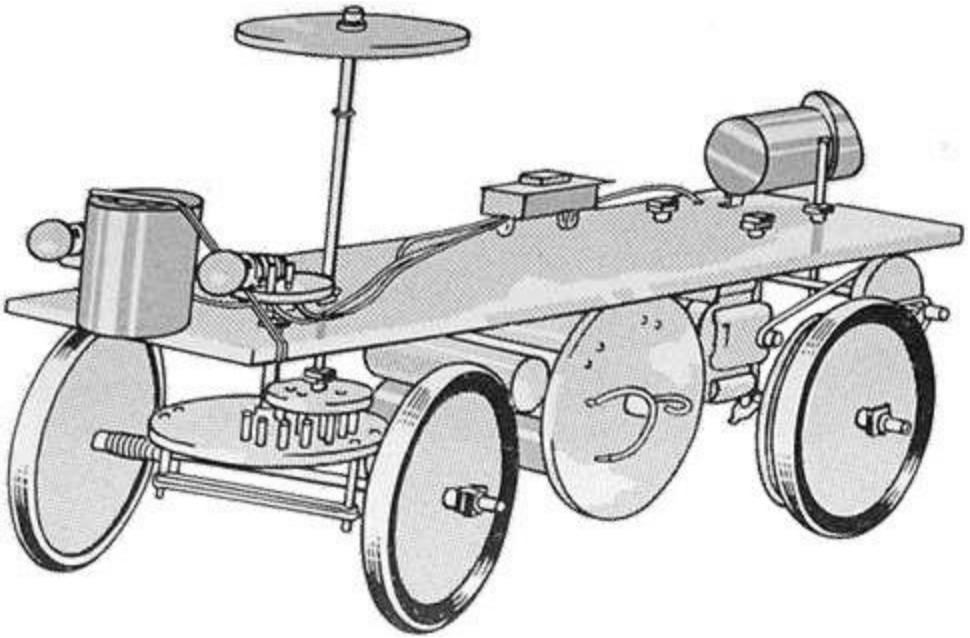
SNS COLLEGE OF TECHNOLOGY

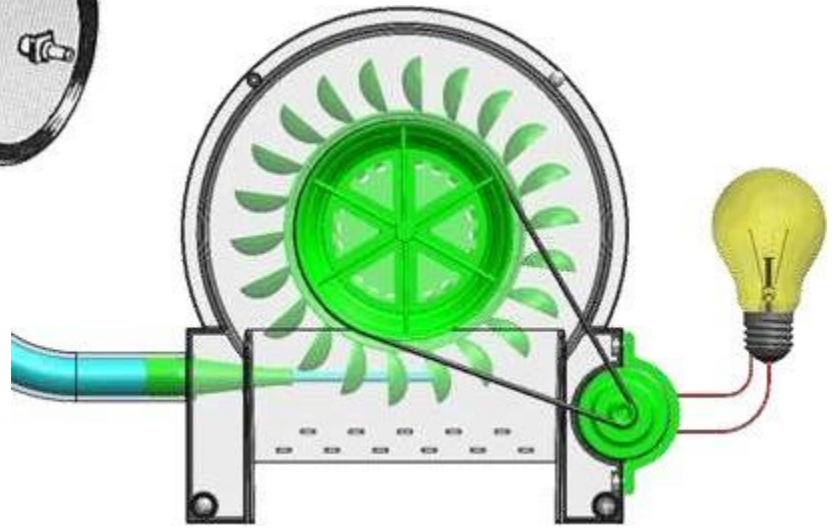
23MET101- ENGINEERING MECHANICS

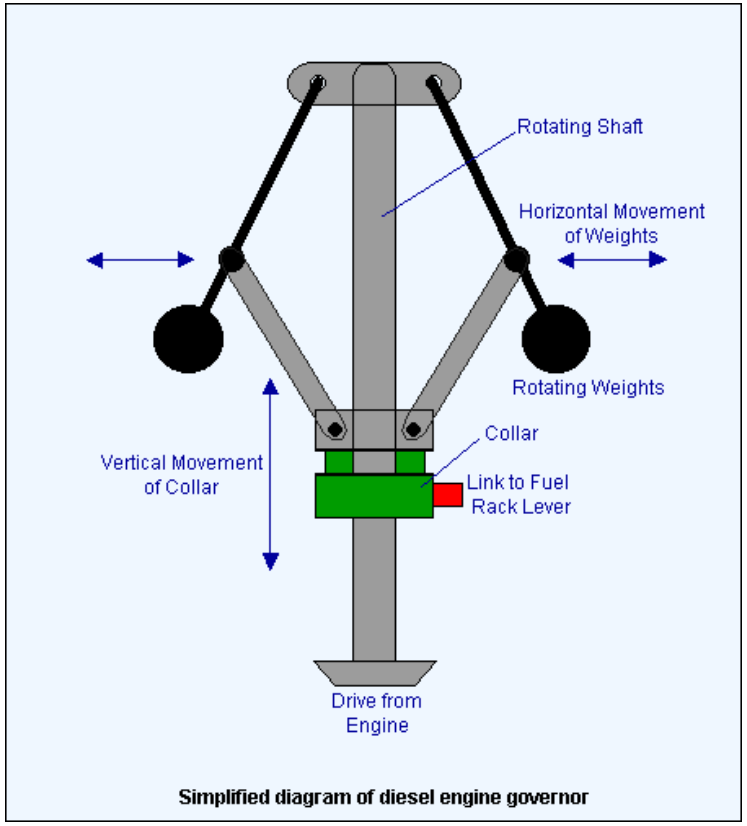
UNIT I - BASICS & STATICS OF PARTICLES

Introduction- Units and Dimensions

INTRODUCTION





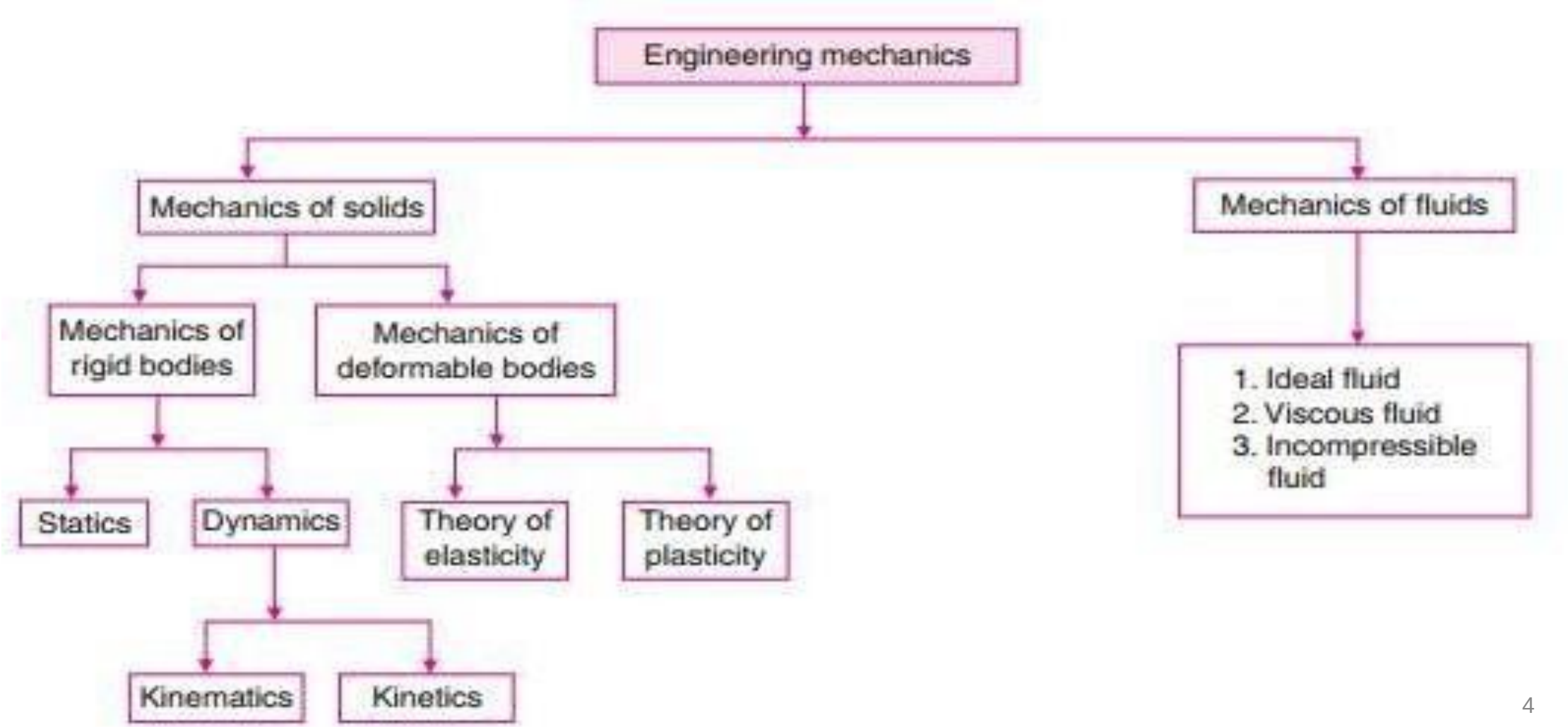


Simplified diagram of diesel engine governor

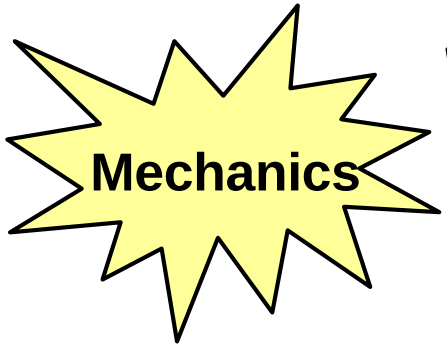
INTRODUCTION

- To deal with the above situations, we need to know about Engineering Mechanics
- Mechanics is the **foundation of most engineering sciences** and is an indispensable prerequisite to their study.
- **Mechanics is the science which describes and predicts the conditions of rest or motion of bodies under the action of forces.**

Branches of EngineeringMechanics



Mechanics: The actions and effects of forces on bodies.



Statics: Bodies at rest, or in equilibrium

Dynamics: Bodies in motion, or out of equilibrium

IN EQUILIBRIUM → Will be static, OR move with constant velocity

Velocity=0

Velocity= constant

OUT OF EQUILIBRIUM → Will accelerate (velocity changing)

Velocity changing with time

Dynamics: → **Kinematics:** Study of motion without reference to forces producing motion: Relations between **position**, **velocity**, **acceleration** and **time**.

Kinetics: Relations between **unbalanced forces** and the **changes in motion** they produce.

E.g. Rollercoaster ride:

Kinematics: how fast, how far, and how long it takes...

Kinetics: What forces were involved to produce this motion?

- Weight
- Friction
- Aerodynamic drag

Six Fundamental Concept of Mechanics

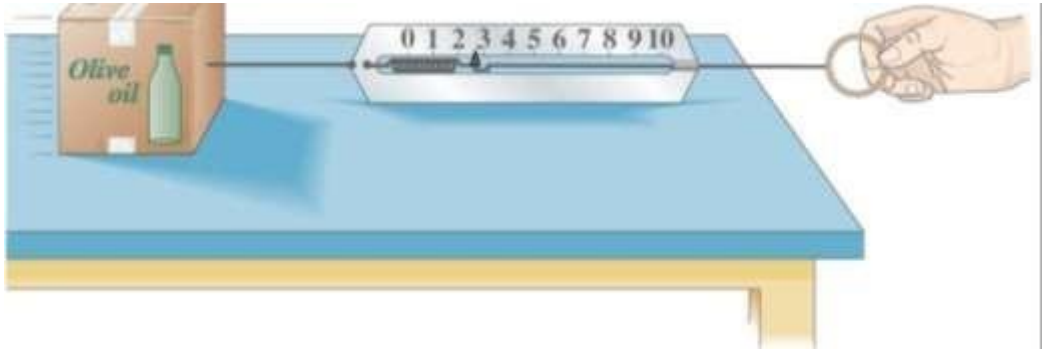
- ***Space*** - associated with the motion or the position of a point P given in terms of three coordinates measured from a reference point or origin.

- ***Time -*** definition of an event requires specification of the time and position at which it occurred.

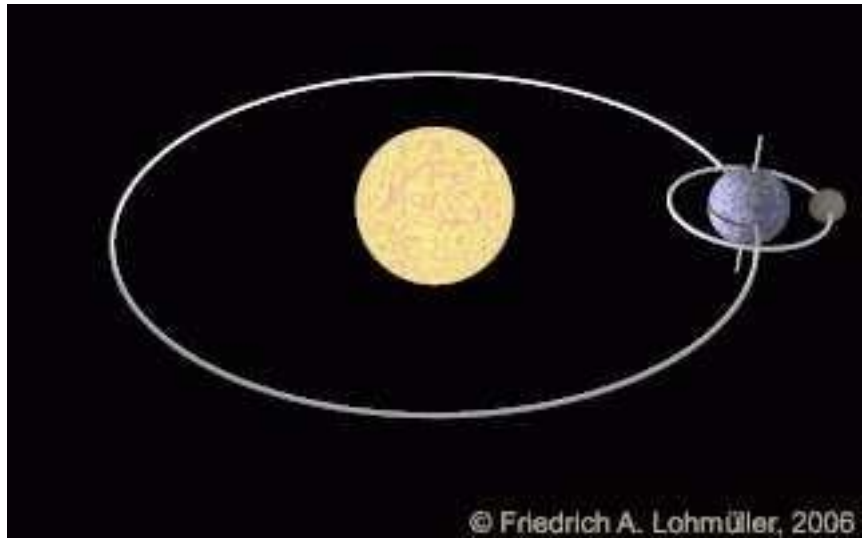
- ***Mass -*** used to characterize and compare bodies, e.g., response to earth's gravitational attraction and resistance to change in translational motion.

Force

A force is a push or pull. An object at rest needs a force to get it moving; a moving object needs a force to change its velocity.



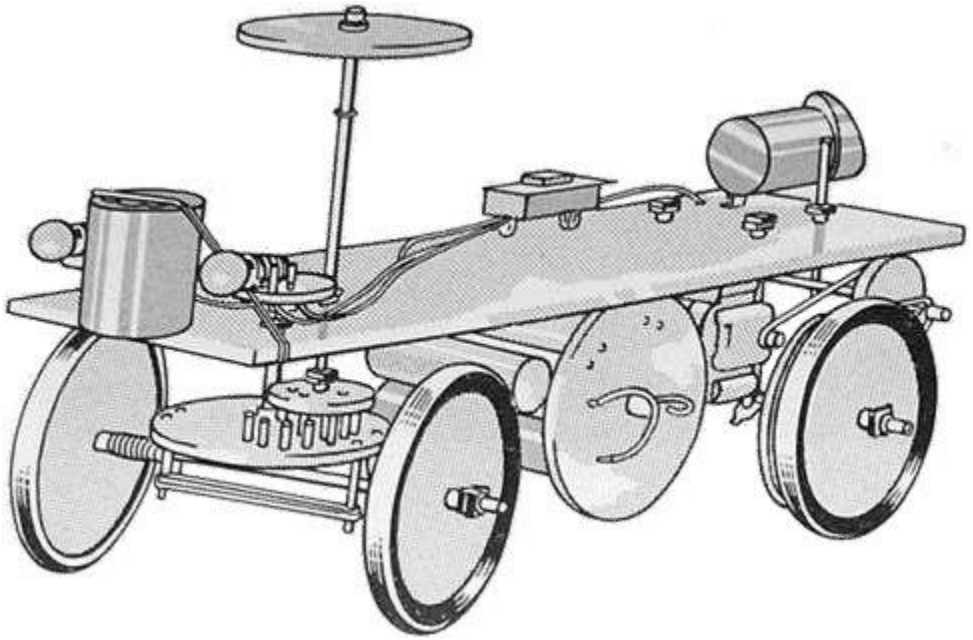
The magnitude of a force can be measured using a spring scale.



Particle

A particle has a mass but size is neglected.

When a body is idealised as a particle, the principles of mechanics reduces to a simplified form, since the geometry of the body will not be concerned in the analysis of the problem.



Rigid Body

A combination of large number of Particles in which all the particles remain at a fixed distance from one another before and after application of load.

Here mass & size of the bodies are considered when analysing the forces.