

# ENGINEERING MECHANICS

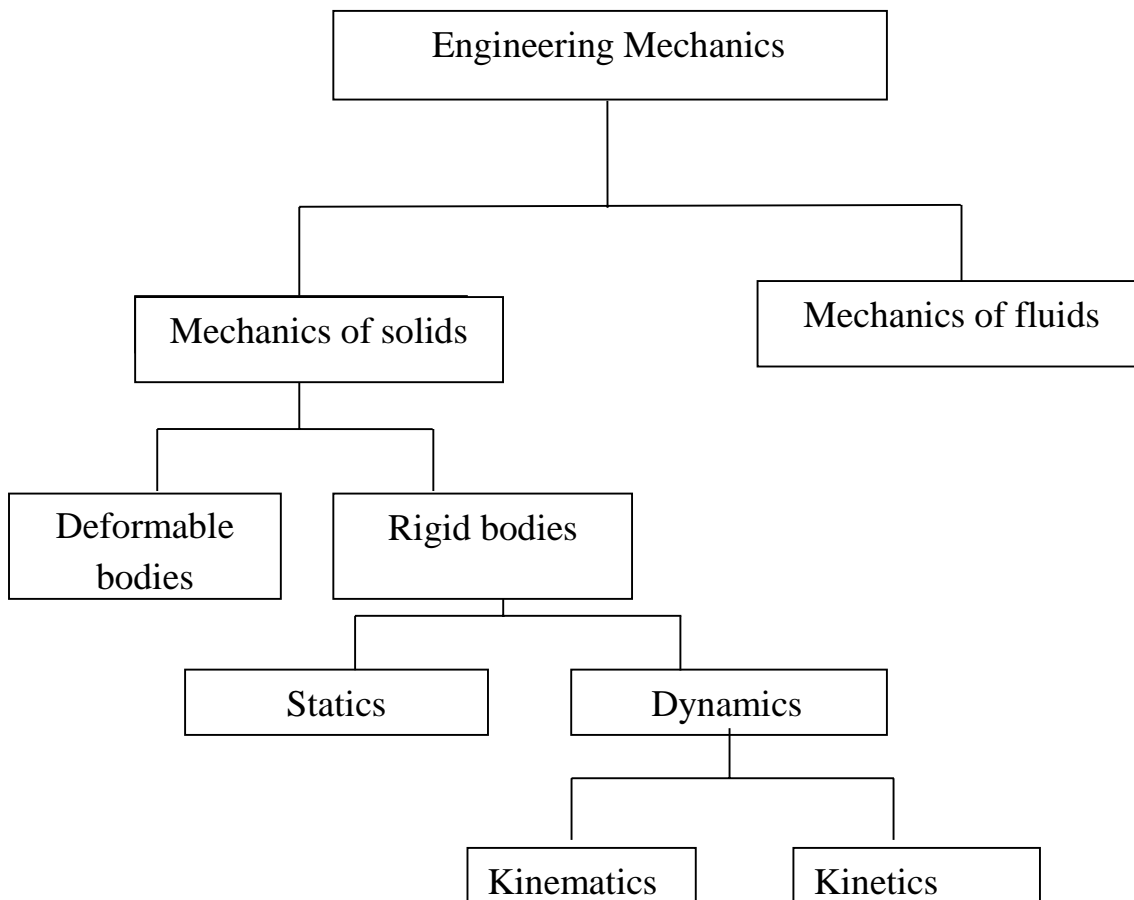
## **OBJECTIVES:**

To develop capacity to predict the effect of force and motion in the course of carrying out the design function of Engineering.

## **UNIT-I BASIC & STATICS OF PARTICLES**

### **Engineering Mechanics:**

Engineering Mechanics may be defining as a branch of science which deals with the behavior of a body with the state of rest or motion, subjected to action of force.



**Rigid Bodies:**

When a body does not undergo any deformation under the application of forces then it is known as Rigid body.

**Deformable body:**

When a body undergoes a temporary or permanent change in its dimensions due to application of force it is known as deformable body.

**Statics:**

It is the branch of science, which deals with the study of a body at rest.

**Dynamics:**

It is the branch of science which deals with the study of a body in motion.

**Kinematics:**

It is the study of a body in motion without considering the forces, that cause the motion.

**Kinetics:**

It is the study of a body in motion, with considering the forces, that causes the motion.

**Application of Mechanics:**

Engineering mechanics has application in many areas of engineering projects. To cite of few examples, engineering mechanics is applied in the design of spacecrafts and rockets. Analysis of structural stability and machine strength, vibrations, robotics, electrical machines, flow and automatic controls.

## Mass and weight

### Mass:

The Quantity of matter contained in a body is called mass. The force with which a body is attracted towards the centre of the earth is called weight.

Weight = Mass of body  $\times$  acceleration due to gravity

$$W = mg$$

$$G = 9.81 \text{ m/s}^2.$$

### Difference between Mass and Weight

	Mass	Weight
1.	It is a Quantity of matter contained in a body	It is the force with which the body is attracted towards the centre of the earth
2.	It is constant at all places	It is not constant at all places
3.	It resist motion in body	It provides motion in body
4.	It is a scalar quantity	It is a vector quantity
5.	It is never zero	It is zero at the centre of earth
6.	It is measured in kg both in MKS and SI units.	It is measured in Kgf in MKS units and Newton (N in SI units)

## UNITS OF MEASUREMENTS

### Measurement:

A physical Quantity can be measured by comparing the sample with a known standard amount.

## **Unit:**

The known amount used in the measurement of physical quantity is called a unit.

### **1.Fundamental Units:**

The units which are used for the measurement of basic or fundamental quantities ( Mass, Length, Time) are known as fundamental units.

Eg. i) Mass ii) Length iii) Time.

### **2.Derived Units:**

All units which are used for the measurement of physical quantities other than fundamental ones are called derived units.

Eg. Area, Volume, Speed, Velocity, etc....

### **System of Units:**

1. Foot pound second system [ FPS system]
2. Centimeter gram second system [ CGS system]
3. Metre kilogram second system [MKS system]
4. System of International [SI system]

### **Six Fundamental Units in SI system:**

1. The metre as the fundamental unit of length.
2. The kilogram as the fundamental unit of mass.
3. The second as the fundamental unit of time.
4. The ampere as the fundamental unit of electric current.
5. Kelvin as the fundamental unit of thermodynamics temperature.
6. The candela as the fundamental unit of luminous intensity.

