MIMLI DAS

Lecturer, Mechanical Engineering

ENGINEERING MECHANICS

CHAPTER 2: COPLANAR CONCURRENT FORCES

Lecture 3:

2.3 Coplanar, Concurrent and Non-Concurrent forces, composition and resolution of forces. Problems.

Coplanar forces: The forces whose lines of action lie on the same plane are known as coplanar forces.
Concurrent forces: The forces which meet at one point are known as concurrent forces.
Non-concurrent forces: The forces which do not meet at one point are called non-concurrent forces.
Coplanar Concurrent forces: The forces which meet at one point and their lines of action also lie on the same plane are known as coplanar concurrent forces.
Coplanar Non-Concurrent forces: The forces which do not meet at one point but their lines of action lie on the same plane are known as coplanar non-concurrent forces.

Principle of forces:

1) Principle of physical independence of forces: It states, " If a number of forces are simultaneously acting on a particle, then the resultant of these forces will have the same effect as produced by all the forces."

2) Principle of transmissibility of forces: It states, " If a force acts at any point on a rigid body, it may also be considered to act at any other point on its line of action, provided this point is rigidly connected with the body."

Example. Suppose a body as shown in Fig. 4-(a) is to be moved by a horizontal force P applied by hooking a rope to some pint on the body. The force P will have the same effect if it is applied at 1, 2, 3 as shown in Fig. 4-(b) or any point on its line of action. This property of force is called *transmissibility.*

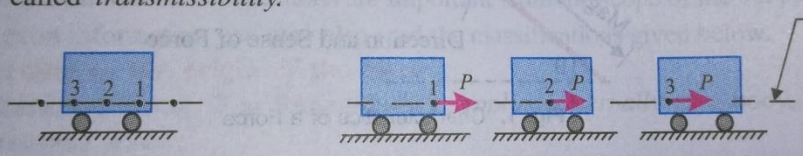


Fig. 4 (a)

Fig. 4 (b)

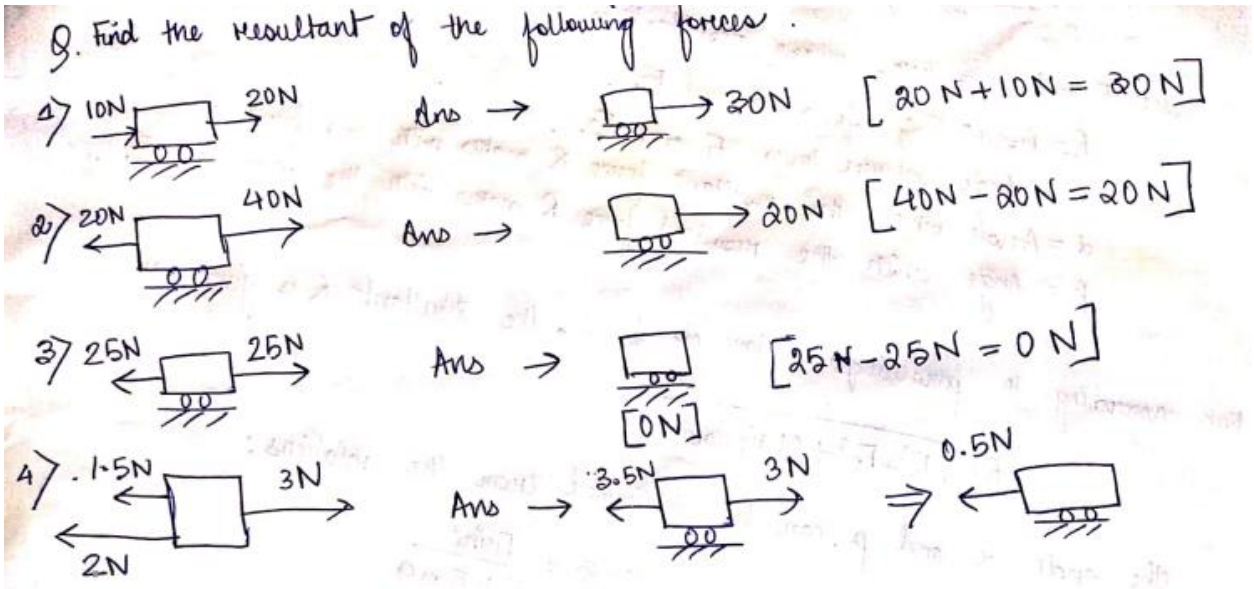
NOTE: Particle: a body of infinitely small volume and considered to be a concentrated point.

Rigid body: a body which can retain its shape and size , even if subjected to some external forces.

Resultant force: If a number of forces are acting simultaneously on a particle then it is possible to find out a single force which could replace them i.e. which would produce the same effect as produced by all the given forces. This single force is called resultant force and the given forces are called component forces.

Composition and resolution of forces: (important)

Composition / Compounding of forces	Resolution of forces
It is the process of finding out the resultant / net force of a number of given forces acting on a single body.	It is the process of splitting up the given force into two components, without changing its effect on the body. A force is resolved generally along the two mutually perpendicular directions.
Output is a single force.	Output is generally two forces i.e horizontal force and vertical force.



ASSIGNMENT 1: Write a note on the various types of forces with appropriate diagrams.