



Laws of dry friction: law of dry friction

(1) static friction: at rest

- i) The frictional force always acts in the opposite direction to meet the body tends to move.
- ii) frictional force does not depend on the shape and area of contact of the bodies.
- iii) The frictional force depends on the degree of roughness of the contact area b/w two bodies.
- iv) The frictional force is equal to the force applied to the body, so long as the body is at rest.

$$V) F_m \leq \mu_s N_R$$

$$F_m = \mu_s \cdot N_R$$

2) laws of Dynamic friction:

- i) The frictional force acts in the opposite direction to that body moves.
- ii) The magnitude of dynamic friction bears a constant ratio to the normal reaction b/w two surfaces.

iii) Coefficient of kinetic friction is less than the coefficient of static friction.

Impending motion:

The state of motion of a body which is just about to move (or) slide is called impending motion of the body.



Contact surfaces Range of  $\mu_s$

Wood on wood  $\rightarrow$  0.2-0.6

leather on wood  $\rightarrow$  0.2-0.5

Metal on ice  $\rightarrow$  0.03-0.05

Leather on metal  $\rightarrow$  0.3-0.6

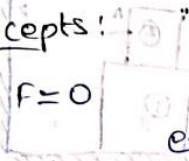
Mild steel on Mild steel  $\rightarrow$  0.5-0.6

Rubber on pavement  $\rightarrow$  0.6-0.8

Basic Concepts:

case (i)

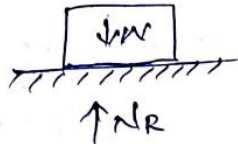
$$F = 0$$



Body is in the condition of equilibrium.

$$\sum V = 0$$

$$NR = W$$

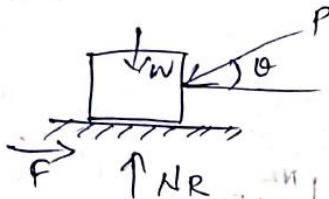


case (ii)  $F < F_m$

Body is still in equilibrium

$$\sum H = 0, \quad F = P \cos \theta$$

$$\sum V = 0, \quad NR = W + P \sin \theta$$



case (iii)  $F = F_m$

When the limiting friction is attained, then the block is in impending motion, i.e. just start to move.

$$F_m = \mu \cdot NR \quad \text{is applied.}$$

$$\sum H = 0 \quad F_m = P \cos \theta$$

$$NR = W + P \sin \theta$$

case (iv)  $F > F_m$

$F = \mu N$  not be applied

$F = \mu_k N$  is applied.



**SNS COLLEGE OF TECHNOLOGY**  
*(An Autonomous Institution)*  
**COIMBATORE-641 035, TAMIL NADU**

