RAMA UNIVERSITY

www.ramauniversity.ac.in

FACULTY OF ENGINEERING & TECHNOLOGY

3. The magnitude of the limiting friction (F) bears a constant ratio to the normal reaction (RN) between the two surfaces.

4. The force of friction is independent of the area of contact, between the two surfaces.

5. The force of friction depends upon the roughness of the surfaces

Laws of Kinetic or Dynamic Friction

Following are the laws of kinetic or dynamic friction :

1. The force of friction always acts in a direction, opposite to that in which the body is moving.

2. The magnitude of the kinetic friction bears a constant ratio to the normal reaction between the two surfaces. But this ratio is slightly less than that in case of limiting friction.

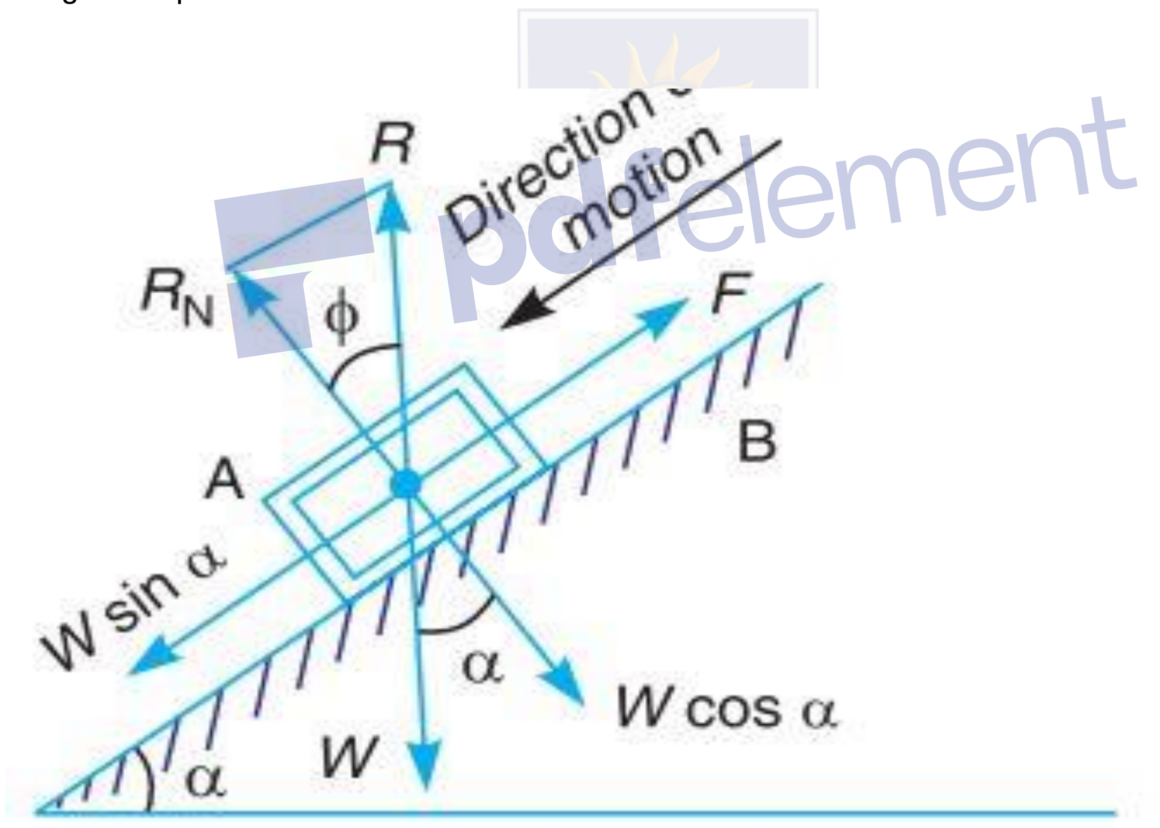
3. For moderate speeds, the force of friction remains constant. But it decreases slightly with the increase of speed.

Coefficient of Friction

It is defined as the ratio of the limiting friction (F) to the normal reaction (RN) between thetwo bodies. It is generally denoted by μ. Mathematically, coefficient of friction, $\mu = F/RN$

Angle of Repose

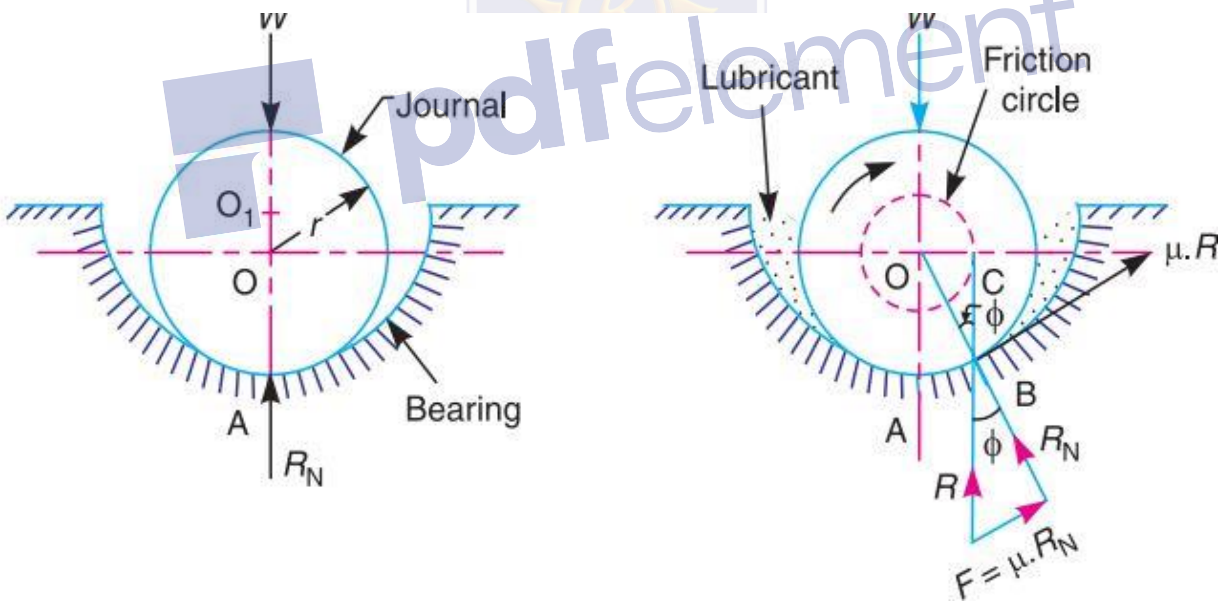
Consider that a bodyAof weight (W) is resting on an inclined plane B, as shown in Fig. If the angle of inclination αof the plane to the horizontal is such that the body begins to move down the plane, then the angle αis called the angle of repose.



The weight of the body (W) can be resolved into the following two components :
1. W sin α, parallel to the plane B. This component tends to slide the body down the plane.
2. W cos α, perpendicular to the plane B. This component is balanced by the normal reaction (R N) of the body Aand the plane B.

Friction in Journal Bearing-Friction Circle

A journal bearing forms a turning pair as shown in Fig. The fixed outer element of a turning pair is called a bearing and that portion of the inner element (i.e. shaft) which fits in the bearing is called a journal. The journal is slightly less in diameter than the bearing, in order to permit the free movement of the journal in a bearing.



When the bearing is not lubricated (or the journal is stationary), then there is a line contact between the two elements as shown in Fig. The load Won the journal and normal reaction RN(equal to W) of the bearing acts through the centre. The reaction RN acts vertically upwards at point A. This point Ais known as seat or point of pressure.

A 60 mm diameter shaft running in a bearing carries a load of 2000 N. If the coefficient of friction between the shaft and bearing is 0.03, find the power transmitted when it

runs at 1440 r.p.m.

Solution. Given : d= 60 mm or r = 30 mm = 0.03 m ; W = 2000 N ; μ = 0.03 ; N = 1440 r.p.m. or $\omega = 2\pi \times 1440/60 = 150.8$ rad/s

We know that torque transmitted,

$T = \mu.W.r = 0.03 \times 2000 \times 0.03 = 1.8$ N-m

$\therefore$ Power transmitted, $P = T.\omega = 1.8 \times 150.8 = 271.4$ W