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**17/ENG06/055**

**MECHANICAL ENGINEERING**

**300 LEVEL**

**MEE 312 ASSIGNMENT 2**

1. Explain dry friction and fluid friction
2. **DRY FRICTION**

Dry friction is a force that opposes the relative lateral motion of two solid surfaces in contact. Dry friction is subdivided **into static friction between non-moving surfaces**, **and *kinetic friction* between moving surfaces.** With the exception of atomic or molecular friction, dry friction generally arises from the interaction of surface features, known as [asperities](https://en.wikipedia.org/wiki/Asperity_(materials_science)) (unevenness of surface, roughness, ruggedness).

1. **Static friction**

An object experiences static friction when the object is not moving. The friction increases as the applied force increases until the block moves. After the block moves, it experiences kinetic friction, which is less than the maximum static friction. Static friction is friction between two or more solid objects that are not moving relative to each other. For example, static friction can prevent an object from sliding down a sloped surface. The coefficient of static friction, typically denoted as μs, is usually higher than the coefficient of kinetic friction. The static friction force must be overcome by an applied force before an object can move. The maximum possible friction force between two surfaces before sliding begins is the product of the coefficient of static friction and the normal force. The instant sliding occurs, static friction is no longer applicable and the friction between the two surfaces is then called kinetic friction. An example of static friction is the force that prevents a car wheel from slipping as it rolls on the ground. Even though the wheel is in motion, the patch of the tire in contact with the ground is stationary relative to the ground, so it is static rather than kinetic friction. The maximum value of static friction, when motion is impending, is sometimes referred to as limiting friction.

1. **Kinetic friction**

Kinetic friction, also known as dynamic friction or sliding friction, occurs when two objects are moving relative to each other and rub together. The coefficient of kinetic friction is typically denoted as μk, and is usually less than the coefficient of static friction for the same materials. The friction force between two surfaces after sliding begins is the product of the coefficient of kinetic friction and the normal force. New models are beginning to show how kinetic friction can be greater than static friction. Kinetic friction is now understood, in many cases, to be primarily caused by chemical bonding between the surfaces, rather than interlocking asperities; however, in many other cases roughness effects are dominant, for example in rubber to road friction. Surface roughness and contact area affect kinetic friction for micro- and Nano-scale objects where surface area forces dominate inertial forces. An example of kinetic friction is rubbing hands to produce heat.

Practical examples:

* Striking of a match against the matchbox.
* It is used in braking in vehicles.
* Rubbing of stones to start a fire.

1. **FLUID FRICTION**

Fluid friction occurs between fluid layers that are moving relative to each other. This internal resistance to flow is named viscosity. The viscosity of a fluid is described as its thickness. Thus, water is thin, having a lower viscosity, while honey is thick, having a higher viscosity. The less viscous the fluid, the greater its ease of deformation or movement. All real fluids offer some resistance to shearing and therefore are viscous.

Practical examples:

* When a person swims, their skin and the water rubs together and it makes it difficult for the swimmer to move in water.
* Skydiving – parachute is slowed down by air resistance.
* If there is a wet surface between two thin glass plates, you will notice that plates get stuck and the bottom plate doesn’t fall when you hold only the top one.
* When any object is dropped in a fluid, the extent of splash is depended on the fluid friction of that particular fluid.

1. Explain the following machines
2. Wedges:Wedge is a device that tapers to a thin edge, usually made of metal or wood, and used for splitting, lifting, or tightening, as to secure a hammer head onto its handle. Along with the lever, wheel and axle, pulley, and screw
3. Square threaded screws: The square thread form is a common [screw thread](https://en.wikipedia.org/wiki/Screw_thread) form, used in high load applications such as [leadscrews](https://en.wikipedia.org/wiki/Leadscrew) and [jackscrews](https://en.wikipedia.org/wiki/Jackscrew).
4. Journal bearings: Journal bearings make use of a pressure wedge of fluid that forms between the rotating shaft and the bearing. The portion of the shaft supported by the bearing is called the journal and is usually hardened for wear-resistance. It’s used to support the crank shaft and cam shaft.