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15/ENG06/020

MECHANICAL ENGINEERING

MECHANICS OF MACHINE (MEE 312)

QUESTION 1

Dry friction: this is the force that opposes one solid surface sliding across another solid surface. Dry friction always opposes the surfaces sliding relative to one another and can have the effect of either opposing motion or causing motion in bodies.

Practical examples:

1. Rubbing a pen over hair
2. Walking on the floor

Fluid friction: Fluid friction occurs between fluid layers that are moving relative to each other. This internal resistance to flow is named viscosity. In everyday terms, the viscosity of a fluid is described as its “thickness”. All real fluids offer some resistance to shearing and therefore are viscous. It is helpful to use the concept of an ideal fluid that offers no resistance to shearing and so is not viscous.

Practical examples:

1. 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
2. You find lighter dust particles move fast on the surface of a flowing river

QUESTION 2

Wedges: wedges are simple machines that are used to separate two objects, or portions of objects, through the application of force. Wedges are made up of two inclined planes. These planes meet and form a sharp edge. This edge can split things apart. Wedges are used as either separating or holding devices. There are two major differences between inclined planes and wedges. First, in use, an inclined plane remains stationary while the wedge moves. Second, the effort force is applied parallel to the slope of an inclined plane, while the effort force is applied to the vertical edge (height) of the wedge. Force multiplication varies inversely with the size of the wedge angle; a sharp wedge (small inclined angle) yields a large force.

Wedges are used as either separating or holding devices. A wedge can either be composed of one or two inclined planes. A double wedge can be thought of as two inclined planes joined together with their sloping surfaces outward. Examples of wedges are: knives, axes, forks and nails

Square-threaded screws: Since these **types of screw threads** are in the form of a square, it is called **Square thread**. The flanks or the sides of this thread are perpendicular to the axis of the thread. The depth and thickness of the thread are equal to half the pitch. Since the root and crests of the square threads are 90° sharp corners which are likely to work quickly when pit it uses. hence the crests and roots are modified in the actual threads. The square thread is quite square in section. It is used for transmission of motion and power as in vices, clamps etc. And for converting a rapid rotary motion into slow linear motion, as for example, the lead screw of a lathe, screw presses, jacks, etc.

Journal bearing: also called plain bearing and it is the simplest type of bearing, comprising just a bearing surface and no rolling elements. Therefore, the journal (i.e., the part of the shaft in contact with the bearing) slides over the bearing surface. The simplest example of a plain bearing is a shaft rotating in a hole. A simple linear bearing can be a pair of flat surfaces designed to allow motion; e.g., a drawer and the slides it rests on or the ways on the bed of a lathe.