GUWOR-NIKI WARE-EBI

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MECHANICAL ENGINEERING

QUESTION 1

- Dry Friction: Dry friction resists relative lateral motion of two solid surfaces in contact. The two regimes of dry friction are 'static friction' between non-moving surfaces, and kinetic friction (sometimes called sliding friction or dynamic friction) between moving surfaces. The Coulomb friction may take any value from zero up to one, and the direction of the frictional force against a surface is opposite to the motion that surface would experience in the absence of friction. Thus, in the static case, the frictional force is exactly what it must be in order to prevent motion between the surfaces; it balances the net force tending to cause such motion. In this case, rather than providing an estimate of the actual frictional force, the Coulomb approximation provides a threshold value for this force, above which motion would commence. This maximum force is known as traction. The force of friction is always exerted in a direction that opposes movement (for kinetic friction) or potential movement (for static friction) between the two surfaces. For example, a curling stone sliding along the ice experiences a kinetic force slowing it down. For an example of potential movement, the drive wheels of an accelerating car experience a frictional force pointing forward; if they did not, the wheels would spin, and the rubber would slide backwards along the pavement. Note that it is not the direction of movement of the vehicle they oppose; it is the direction of (potential) sliding between tire and road.

- 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 (except superfluid) offer some resistance to shearing and therefore are viscous. Air resistance is an **example of fluid friction** caused by the particles that make up air. It causes a falling object to slow down.

QUESTION 2

- Wedge: A **wedge** is simple machine that consists of two inclined planes, giving it a thin end and thick end. A wedge is used to cut or split apart objects. Force is applied to the thick end of the wedge, and the wedge, in turn, applies force to the object along both of its sloping sides. This force causes the object to split apart.

- Square-Threaded Screws: The **square thread form** is a common screw form, used in high load applications such as lead screws and jackscrews. It gets its name from the square cross-section of the thread. It is the lowest friction and most efficient thread form, but it is difficult to fabricate. The greatest advantage of square threads is that they have a much higher intrinsic efficiency than trapezoidal threads. Due to the lack of a thread angle there is no radial pressure, or bursting pressure, on the nut. This also increases the nut life.

- Journal Bearings: **Journalbearings** are one of the most common types of hydrodynamic bearings. Their primary purpose is to support a rotating shaft. They are used in various subsystems in engines and power trains, for example for support of both crankshaft and camshaft. They are also used in the rocker shaft of rocker-arm valve train systems.