Assignment 2: Engineering Mechanics (NMEC101) (Session 2025-26)

<u>Instruction</u>: Figure numbers correspond to the problem numbers.

1. The 10-kg block A is at rest against the 50-kg block B as shown. The coefficient of static friction μ_s is the same between blocks A and B and between block B and the floor, while friction between block A and the wall can be neglected. Knowing that P = 150 N, determine the value of μ_s for which motion is impending.

2. The position of the automobile jack is controlled by a screw ABC that is single-threaded at each end (right-handed thread at A, left-handed thread at C). Each thread has a pitch of 2 mm and a mean diameter of 7.5 mm. If the coefficient of static friction is 0.15, determine the magnitude of the couple **M** that must be applied to raise the automobile.

3. In the gear-pulling assembly shown, the square-threaded screw AB has a mean radius of 0.0234 m and a lead of 0.006 m. Knowing that the coefficient of static friction is 0.10, determine the couple which must be applied to the screw to produce a force of 1000 N on the gear. Neglect friction at end A of the screw.

4. A differential band brake is used to control the speed of a drum which rotates at a constant speed. Knowing that the coefficient of kinetic friction between the belt and the drum is 0.30 and that a couple of magnitude 125 N. m is applied to the drum, determine the corresponding magnitude of the force P that is exerted on end D of the lever when the drum is rotating (a) clockwise, (b) counterclockwise.

5. A recording tape passes over the 20-mm-radius drive drum B and under the idler drum C. Knowing that the coefficients of friction between the tape and the drums are $\mu_s = 0.40$ and $\mu_k = 0.30$ and that drum C is free to rotate, determine the smallest allowable value of P if slipping of the tape on drum B is not to occur.
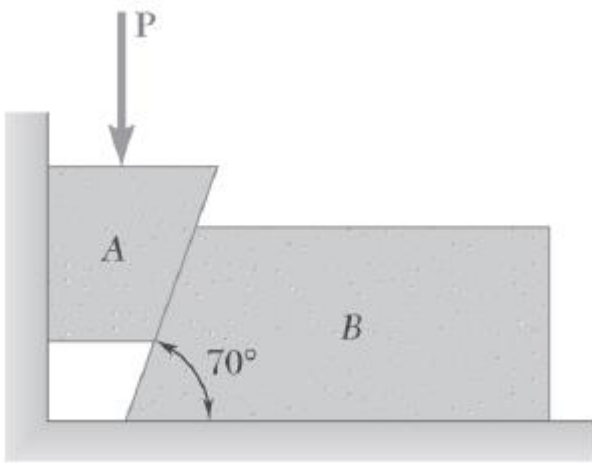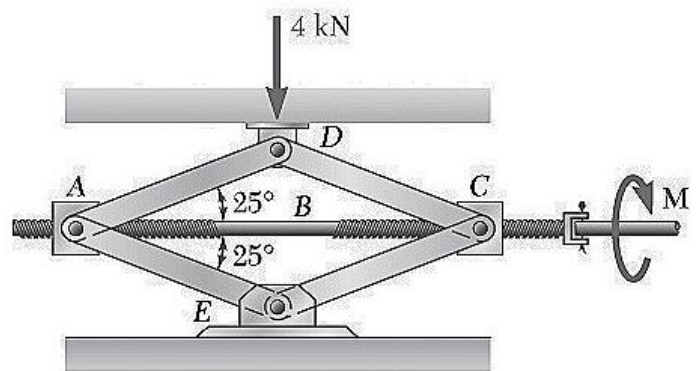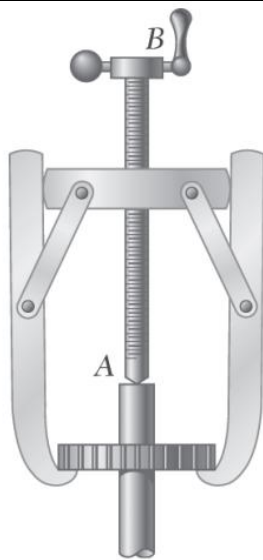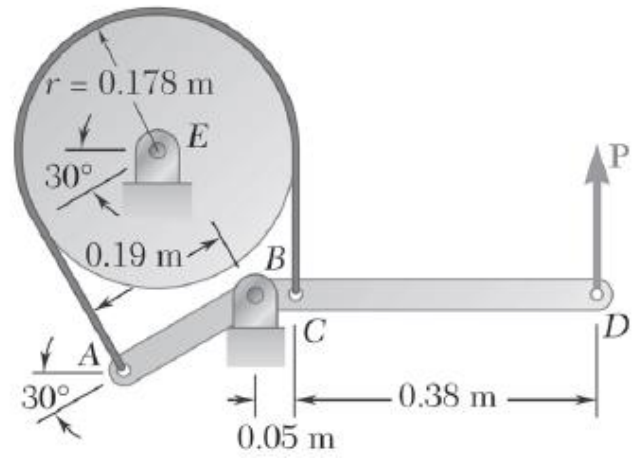

| Fig. 1 | Fig. 2 |

Fig. 3	**Fig. 4**

Fig. 5