5. An open-link chain is obtained by bending low-carbon steel rods of 10 mm diameter into the shape shown in Fig.5. The chain carrier a load of 500 N, determine:

(a). The largest tensile stress in the straight portion of a link.(5%)

(b). The largest compressive stress in the straight portion of a link.(5%)

(c). The distance between the centroidal and the neutral axis of a cross section.(10%)

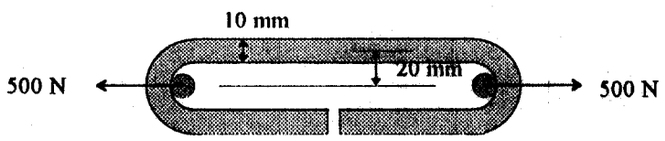


Fig.5

6. A torque T is applied at the end D of shaft BCD (Fig.6). Knowing that both portions of the shaft are of the same material and same length, but that the diameter of BC is three times the diameter of CD. G (constant) is the modulus of rigidity of the material, and J (constant) the polar moment of inertia of portion CD of the shaft.(20%)

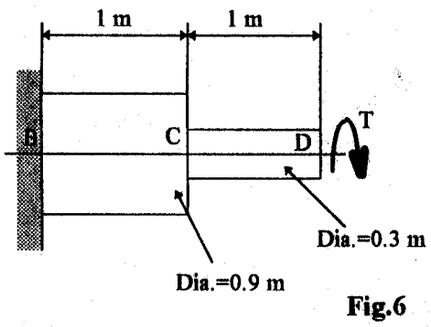


Fig.6

3. In Fig.3, each block has a mass of 10 kg. What force F must be applied to block A to accerate block A at 10 m/s^2. Friction is negligible.(15%)

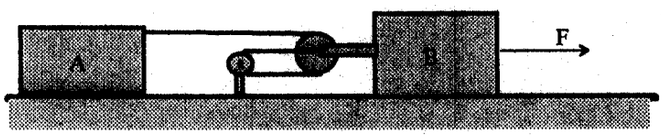


Fig.3

4. A spool of wire is shown in Fig.4. The radius of the gyration of the spool is 250 mm. The mass of the spool is 4 kg. Determine the acceleration of the mass center G for the case: (μ_s : static friction coefficient; μ_k : dynamic friction coefficient)

(a). $\mu_s = 0.4$, $\mu_k = 0.20$.(10%)

(b). $\mu_s = 0.15$, $\mu_k = 0.10$.(10%)

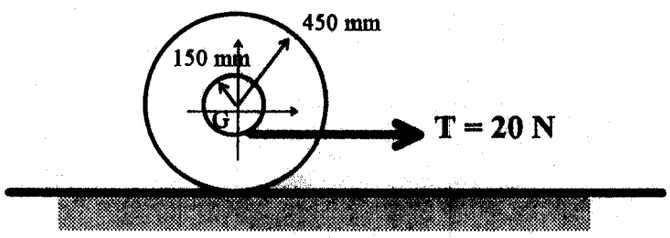


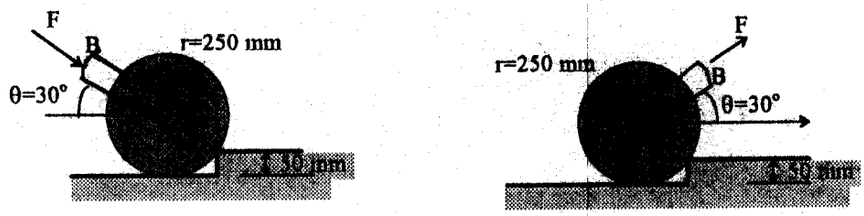
Fig. 4

1. The lawn roller has a weight 10 kg and is to be lifted over the 50-mm-high step. Determine the magnitude of force F required to

(a). Push it over the step.(5%)

(b). Pull it over the step.(5%)

If force F is directed at θ = 30° along the linkage AB.



(a) (b)

Fig.1

2. Using the principle of virtual work, determine the force that the spring must exert in order to hold the mechanism in equilibrium when θ = 30 °. Neglect the weight of the members and slider.(15%)

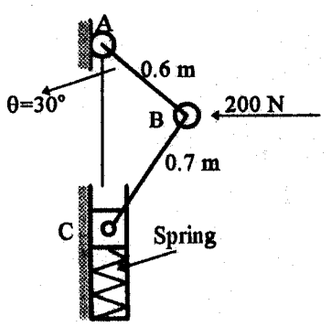


Fig.2