1. Describe the following terms from biomechanical point of view.
   (a) Lag Screw effect
   (b) Compression hip screw
   (c) Double locking phenomenon (gait)
   (d) Tension band
   (e) Double support (gait)

2. Describe the significance of medullary cavity for the mechanical stressing to tubular bone.

3. Fig. 3-a is a mode of bending stress provoked by the eccentrically body weight. Draw the modes of bending stress in Fig. 3-b. Fig 3-c. and Fig 3-d.

4. A patient applies a 150 N force to a cane as shown in Fig. 4 with the elbow at an angle of 30° to vertical. What force is require by triceps and what is the joint force? The distance from the triceps insertion to joint center is assumed to be 3 cm and the distance from joint center to cane is 36 cm. The weight of the forearm is relatively insignificant and can be neglected.

5. A posture as shown in Fig. 5 and the kinematic and anthroponetric data are:
   $h = 30$ cm $\Theta_H = 30°$ $\alpha = 60°$
   $b = 20$ cm $\Theta_T = 40°$ $D = 11$ cm $E = 5$ cm
   $mg_{sw} = 350$ N (above L5/S1 level), $mg_{load} = 450$ N
   The moment at hip for an average anthrometric male in this posture is found to be 200 N m. Abdominal Pressure is empirical predicted by:
   $$P_a = 10^{-4}[43 - 0.36(\Theta_H + \Theta_T)][M_H^{1.8}]$$
   The diaphram area is assumed to be 465 cm^2
   Find F_a, F_{musc} and F_{comp}.

3.

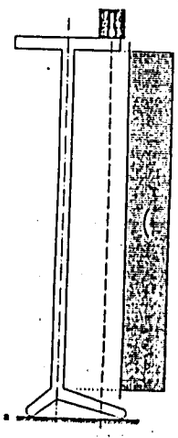

Fig. 3-a

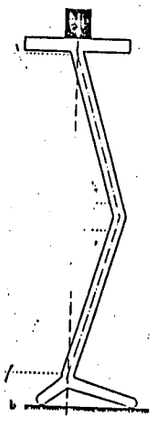

Fig. 3-b

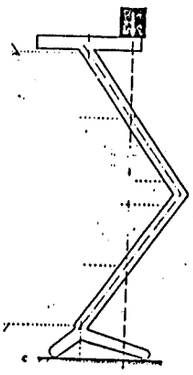

Fig. 3-c

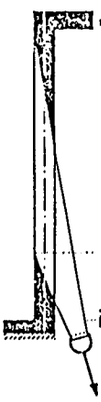

Fig. 3-d

4.

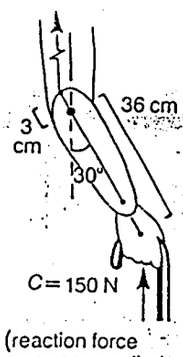

Fig. 4

5.

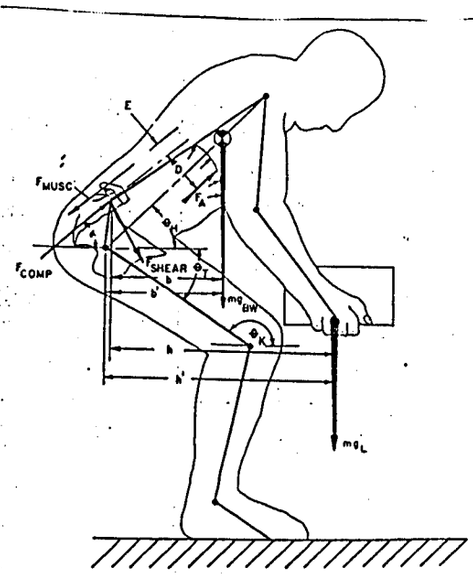

Fig. 5