25% 1. A T bar as in figure 1 is supported by bearings A and B and leans against a frictionless vertical wall at D. The vertical force P of magnitude 400N is applied at the E, the midpoint of rod CD. Determine the reaction force at D.

25% 2. In figure 2, the table which has a radius of 600mm and a weight of 120N is supported by three equally spaced legs around the edge. A vertical load P of 300N is applied to the top of the table at D. Determine the maximum value of $a$ for the table not to tip over. Show, on a sketch, the area on the table over which P can act without tipping the table.

25% 3. AS shown in figure 3, wheel D of radius $R_1 = 6$cm rotates at a speed $\omega = 5$rad/sec and wheel C of radius $R_1 = 12$cm is connected to wheel D by connecting rod AB. The wheels are separated by a distance $d = 24$cm. At A and at B there are ball-and-socket connections. What is the angular speed of wheel C at the instant shown?

25% 4. Consider a block B on the rotating plate in figure 4. When the total acceleration of block B reaches $4m/s^2$, it starts to slide as the static friction force between block B and the plate is exceeded. If the plate starts from rest at t=0 and is accelerated at the constant rate of $5rad/s^2$, determine the time t and the angular velocity of the plate when teh block starts sliding, assuming r=250 mm.

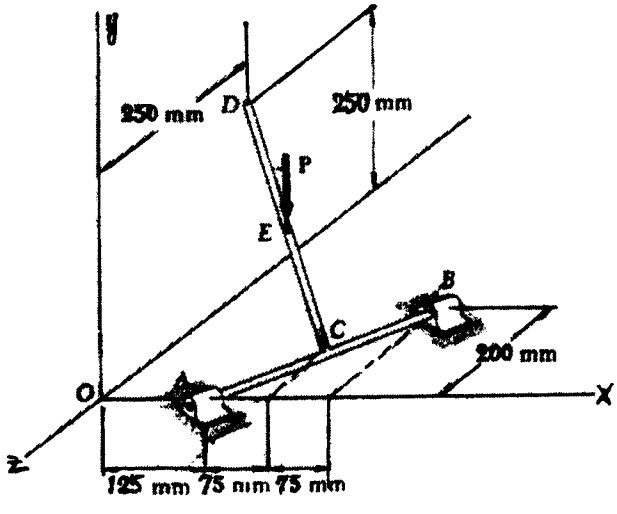


Figure 1

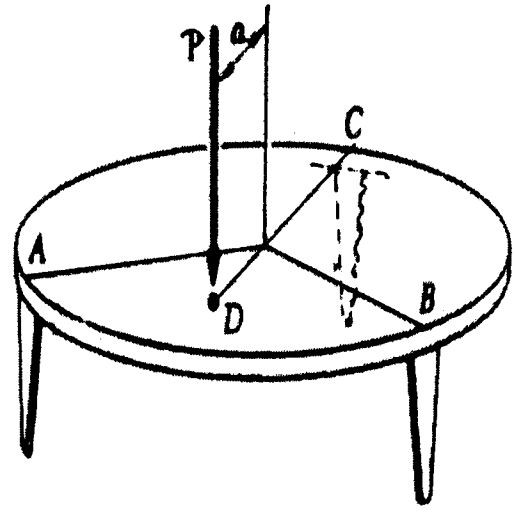


Figure 2

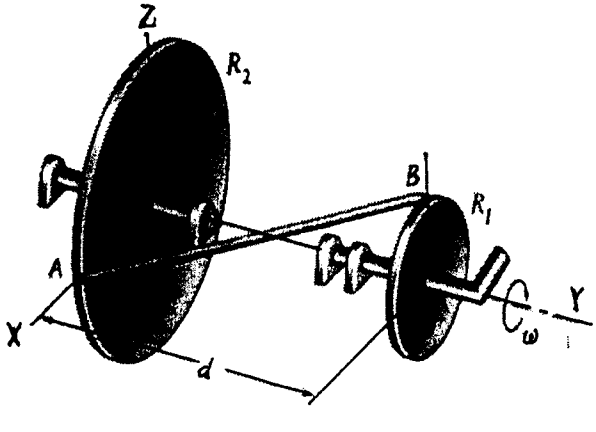


Figure 3

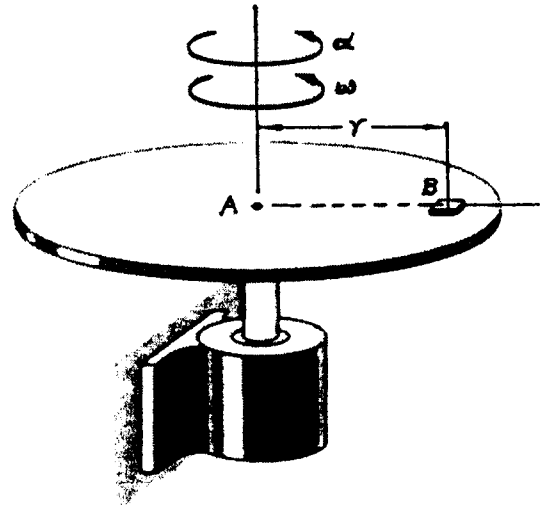


Figure 4