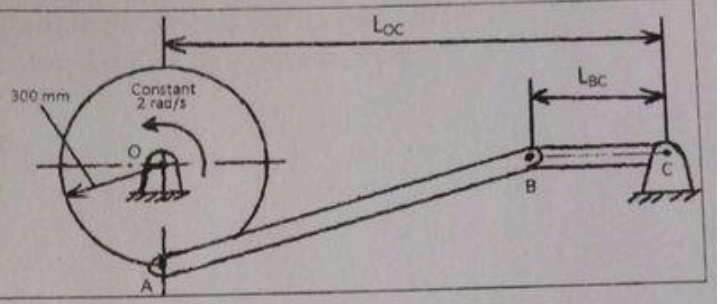
(1) For the mechanism shown, and for L_{BC} = 300 mm and L_{OC} =1.3 m, the magnitude of the angular velocity ω_{BC} in rad/s is

(A) 6.67 (B) 3.0

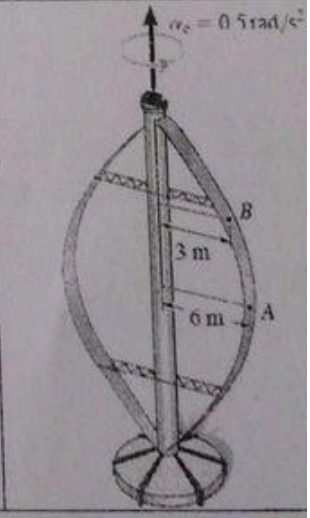
(C) 10 (D) 2.0

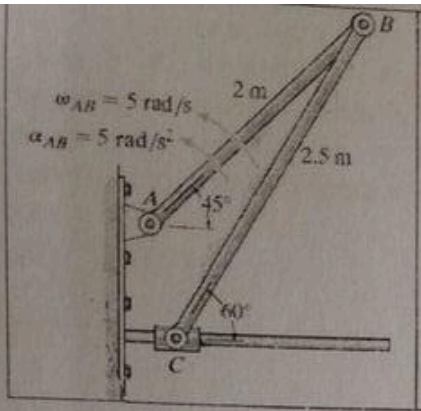


(2) The vertical-axis windmill consists of two blades is shown. If the blades are originally at rest and begin to turn with a constant angular acceleration of α_C=0.5 rad/s^2 , the magnitude of the acceleration of point *A* on the blade when *t = 4s* is

(A) 75.5 (B) 24.2

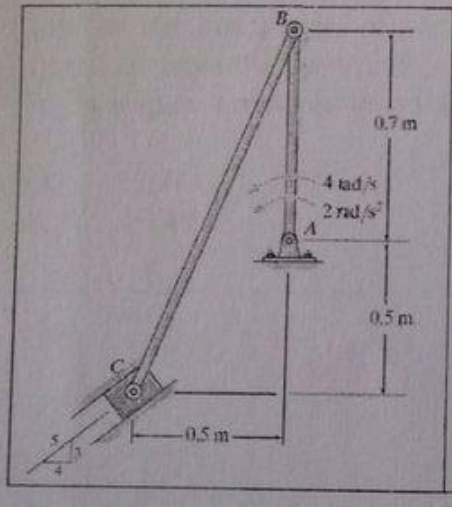
(C) 37.7 (D) 12.1





(3) Rod *AB* has the angular motion shown. Knowing that α_{BC} = 30.5 rad/s^2 counter clockwise, the magnitude of the acceleration of collar *C* at this instant, in m/s^2, is

(A) 57.95 (B) 60.78
(C) 63.61 (D) 66.44

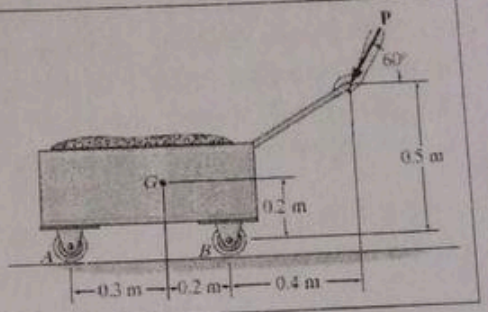


(4) At the given instant member *AB* has the angular motions shown. The magnitude of the velocity, in m/s, of the slider block *C* at this instant is

(A) 1.875 (B) 1.563
(C) 0.938 (D) 1.250

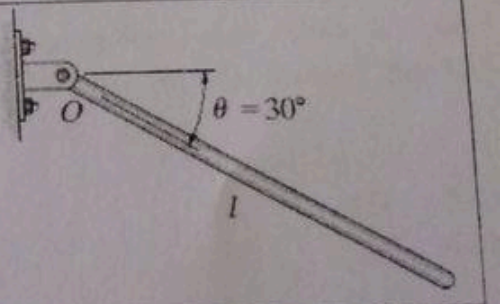
(5) The handcart has a mass of 200 kg and center of mass at *G*. Neglect the mass of the wheels. The largest magnitude of force **P**, in Newtons, that can be applied to the handle so that the wheels at *A* continue to maintain contact with the ground is

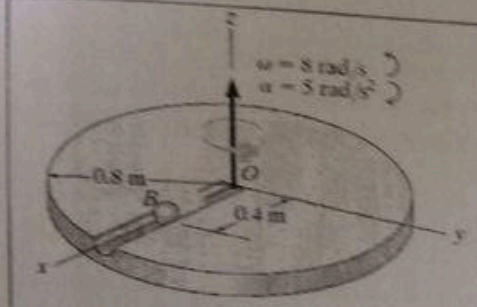
(A) 3995.72 (B) 2996.79
(C) 998.93 (D) 1997.86



(6) The bar has a mass *m* and length *l*. If it is released from rest from the position $\theta = 30°$, for m=2 kg and *l*=0.5 m, its angular acceleration at this instant, in rad/s^2, is

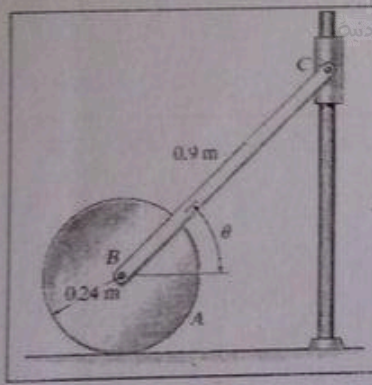
(A) 12.74 (B) 16.99
(C) 25.49 (D) 50.97





(7) At the instant shown, ball B is rolling along the slot in the disk with a velocity of 600 mm/s and an acceleration of 1150 mm/s^2, both measured relative to the disk and directed away from O. The acceleration, m/s^2, of the ball at this instant is

(A) $-22.45\,\hat{i} + 7.6\,\hat{j}$ (B) $-23.45\,\hat{i} + 7.6\,\hat{j}$
(C) $-24.45\,\hat{i} + 7.6\,\hat{j}$ (D) $-25.45\,\hat{i} + 7.6\,\hat{j}$

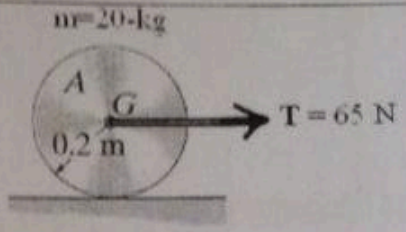


(8) The system consists of a 10-kg disk A, 2-kg slender rod BC, and a 0.5-kg smooth collar C. The disk rolls without slipping. The system is released from rest when $\theta = 45^\circ$. The velocity of the collar, in m/s, at the instant the rod becomes horizontal, i.e., $\theta = 0^\circ$, is

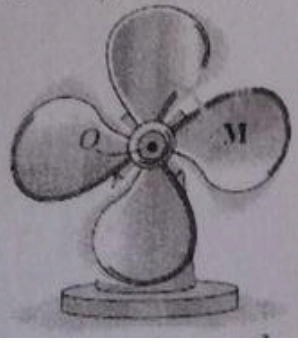
(A) 3.65 (B) 3.87
(C) 4.23 (D) 4.01

(9) Disk A is pulled by a force T. The minimum coefficient of static friction between the disk and the surface so that the disk will roll without slipping is

(A) μ_s=0.110
(B) μ_s=0.144
(C) μ_s=0.178
(D) μ_s=0.076



$M = 3(1 - e^{-0.2t})$ N · m



(10) The fan has a total mass of 2 kg and moment of inertia I_O about an axis passing through the fan's center *O*. If the fan is subjected to a moment ***M***, where *t* is in seconds, its angular velocity in rad/s when t = 4 s starting from rest is

(A) ω=41.79
(B) ω =20.79
(C) ω = 30.68
(D) ω = 12.41

$$\int e^{kx}\,dx = (1/k)e^{kx} + C$$

(11) The uniform 60-kg bar in Figure is held in the equilibrium position by cords *AC* and *BD*. Determine the tension in *BD* and the angular acceleration of the bar immediately after *AC* is cut.