UNIVERSITY of ARKANSAS
1871

MEEG 2013 **Name:** _____

(Underline your **last name**.)

Final Exam ( ) **ID#:** _____

Circle the correct or nearest item in each of the following: (10% each)

1. At the instant shown, the accelerations of the blocks *A* and *B* in the system are $\mathbf{a}_A = 2$ m/s^2 ↓ and $\mathbf{a}_B = 3$ m/s^2 ↑, respectively. The acceleration of the block *C* is

(*a*) 2 m/s^2 ↑. (*b*) 2 m/s^2 ↓. (*c*) 6 m/s^2 ↑. (*d*) 8 m/s^2 ↑. (*e*) 8 m/s^2 ↓.

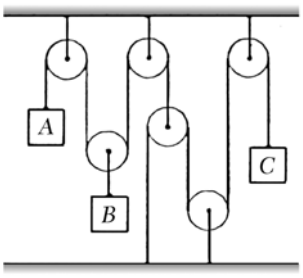

Fig. P1

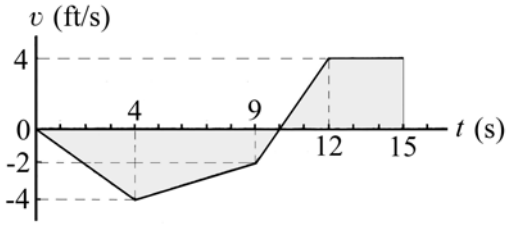

Fig. P2 & P3

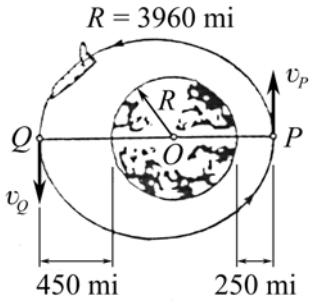

Fig. P4 & P5

2. The velocity of a particle in rectilinear motion is shown. The total distance traveled by the particle during $0 \le t \le 13$ s is

(*a*) 12 ft. (*b*) 16 ft. (*c*) 32 ft. (*d*) 36 ft. (*e*) 40 ft.

3. The velocity of a particle in rectilinear motion is shown. It is known that the initial position of the particle is $x_0 = 15$ ft. The time t_1 at which the particle passes through the origin is

(*a*) 5.94 s. (*b*) 5.78 s. (*c*) 5.63 s. (*d*) 5.49 s. (*e*) 5.34 s.

4. A spacecraft revolves around the earth as shown. The period of orbit of the spacecraft is

(*a*) 1.583 h. (*b*) 1.597 h. (*c*) 1.611 h. (*d*) 1.625 h. (*e*) 1.639 h.

5. A spacecraft revolves around the earth as shown. The minimum speed of the spacecraft in its orbit is

(*a*) 4.45 mi/s. (*b*) 4.49 mi/s. (*c*) 4.52 mi/s. (*d*) 4.56 mi/s. (*e*) 4.60 mi/s.

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6. The 10-kg unbalanced wheel has a central radius of gyration $\bar{k}$ = 240 mm about *G* and rolls without slipping with ω_1 = 7.5 rad/s ↻ in the position shown, where *r* = 480 mm and *b* = 140 mm. When *G* is directly to the left of *C*, the angular velocity ω_2 of the wheel is

(*a*) 4.77 rad/s ↻. (*b*) 5.21 rad/s ↻. (*c*) 5.63 rad/s ↻. (*d*) 6.06 rad/s ↻. (*e*) 6.47 rad/s ↻.

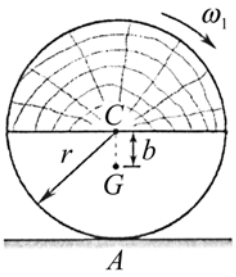

Fig. P6 & P7

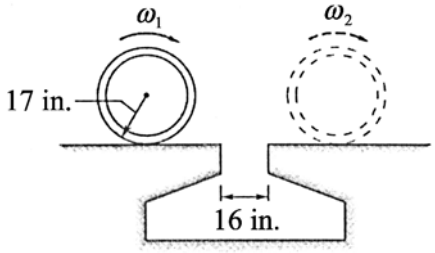

Fig. P8 & P9

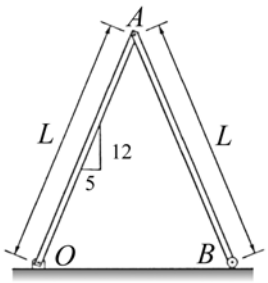

Fig. 10

7. Refer to Prob. 6. When *G* is directly to the left of *C*, the angular acceleration α of the unbalanced wheel is

(*a*) 12.48 rad/s^2 ↺. (*b*) 11.40 rad/s^2 ↺. (*c*) 10.39 rad/s^2 ↺. (*d*) 9.43 rad/s^2 ↺. (*e*) 8.54 rad/s^2 ↺.

8. A section of pipe weighing 96.6 lb rolls without slipping with angular velocity ω_1 just before falling into the 16-in. gap. Assume that the impact is perfectly plastic and the angular speed of the pipe after having crossed the gap is ω_2 = 2.2 rad/s. The angular speed ω' of the pipe just after impact is

(*a*) 2.99 rad/s. (*b*) 2.90 rad/s. (*c*) 2.82 rad/s. (*d*) 2.74 rad/s. (*e*) 2.66 rad/s.

9. Refer to Prob. 8. the angular speed ω of the pipe just before impact is

(*a*) 3.52 rad/s. (*b*) 3.62 rad/s. (*c*) 3.73 rad/s. (*d*) 3.84 rad/s. (*e*) 3.95 rad/s.

10. If α_{OA} = 1.2 rad/s^2 ↻ just after the release from rest in the position shown, the length *L* of each slender rod of weight *W* is

(*a*) 3.48 ft. (*b*) 3.73 ft. (*c*) 4.02 ft. (*d*) 4.35 ft. (*e*) 4.75 ft.