1st Midsemester Test 2020. April 07.

A

1. A 1800-kg car stopped at a traffic light is struck from the rear by a 900-kg car, and the two become entangled, moving along the same path as that of the originally moving car. If the smaller car were moving at 20.0 m/s before the collision, what is the velocity of the entangled cars after the collision?

a. 22 m/s b. 22 m/s c. 16 m/s d. 6,67 m/s e. none of them

2. A 3.00 kg particle has a velocity of $3\vec{i} - 4\vec{j}$ m/s. The magnitude of the linear momentum:

a. 5 Ns b. 15 Ns c. 9 Ns d. -12 Ns e. none of them

3. A ball of mass 0.20 kg is released from a height of 1.25 m. It rebounds from the floor to reach a height of 0.80 m. What impulse was given to the ball by the floor?

a. 4,9 Ns b. 4 Ns c. 0,2 Ns d. 1,8 Ns e. none of them

4. High-speed stroboscopic photographs show that the head of a golf club of mass 200 g is traveling at 60.0 m/s just before it strikes a 50.0-g golf ball at rest on a tee. After the collision, the club head travels (in the same direction) at 40.0 m/s. Find the speed of the golf ball just after impact.

a. 20 m/s b. 80 m/s c. 40 m/s d. 56 m/s e. none of them

5. The angular position of the particle is $\Theta(t)= 2 + 3t^2 + t^3$ (rad), its average angular velocity between 1s and 3s is:

a. 22 rad/s b. 22 rad/s c. 16 rad/s d. 25 rad/s e. none of them

6. The angular velocity of the particle is $\omega(t)= 4 + 2t^2 - t^3$ (1/s), its average angular acceleration between 2s and 3s is:

a. 5 $1/s^2$ b. -9 $1/s^2$ c. -9,81 $1/s^2$ d. 9,1 $1/s^2$ e. none of them

7. A wheel starts from rest and rotates with constant angular acceleration to reach an angular speed of 12.0 rad/s in 3.00 s. The angular acceleration of the wheel is:

a. 4 $1/s^2$ b. 4 $1/s^2$ c. 2 $1/s^2$ d. 6 $1/s^2$ e. none of them

8. A wheel starts from rest and rotates with constant angular acceleration to reach an angular speed of 12.0 rad/s in 3.00 s. Find the angle in radians through which it rotates in this time:

a. 20 rad b. 9 rad c. 36 rad d. 18 rad e. none of them

9. A rotating wheel requires 4.00 s to rotate through 1200 rad. Its angular speed at the end of the 4.00 s interval is 100 rad/s. What is the magnitude of the constant angular acceleration of the wheel?

a. 30 $1/s^2$ b. 120 $1/s^2$ c. 20 $1/s^2$ d. 100 $1/s^2$ e. none of them

10. A rotating wheel rotates at constant angular acceleration. The initial angular velocity is 10 rad/s in the beginning. The rotating wheel rotates 4.00 s and finally its angular speed is 50 rad/s. Find the angle in radians through which it rotates in this time:

a. 60 rad b. 30 rad c. 50 rad d. 40 rad e. none of them

11. A horizontal 800-N merry-go-round is a solid disk of radius 2.0 m, started from rest by a constant horizontal force of 50.0 N applied tangentially to the edge of the disk. Find the angular acceleration of the disc:

a. 2,5 $1/s^2$ b. 6,2 $1/s^2$ c. 1,25 $1/s^2$ d. 0,625 $1/s^2$ e. none of them

12. A horizontal 800-N merry-go-round is a solid disk of radius 2.0 m, and it rotates at 4 rad/s. Find the kinetic energy of the disk:

a. 640 J b. 2560 J c. 3000 J d. 1280 J e. none of them

13. A uniform solid disc of mass 10.0 kg rolls without slipping on a horizontal surface. At the instant its center of mass has a speed of 10.0 m/s. Find the total kinetic energy of the disk!

a. 750 J b. 1500 J c. 3000 J d. 500 J e. none of them

14. A 1.50-kg particle moves in the x-y plane with a velocity of $\vec{v} = 3\vec{i} - 4\vec{j}$ m/s. Determine the angular momentum of the particle in Js, when its position vector is $\vec{r} = 5\vec{i}$:

a. 22,5 $\vec{k}$ b. -30 $\vec{k}$ c. 15 $\vec{i}$ d. - 15 $\vec{j}$ e. none of them

15. A 2.00-kg object is attached to a horizontal spring. The spring is initially stretched by 0.100 m, and the object is released from rest there. It proceeds to move without friction. The next time the speed of the object is zero is 0.500 s later. What is the maximum speed of the object?

a. 0,253 m/s b. 0,314 m/s c. 0,628 m/s d. 1,356 m/s e. none of them

16. The simple pendulum has a string of 0,5 m. The period of the harmonic motion of the pendulum is:

a. 1,0 s b. 1,4 s c. 2,9 s d. 0,69 s e. none of them