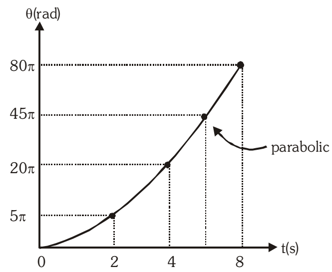
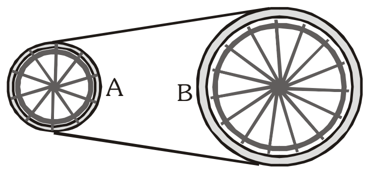
1. The angular displacement(θ) of the blades of a ceiling fan, when the fan is switched on at t = 0, is shown in figure. The average angular velocity of the fan blades during the first 8 seconds will be



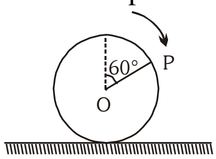
(A) 40π rad/s (B) 20π rad/s (C) 10π rad/s (D) 5π rad/s

2. A continuous conveyor belt passes over two discs A & B of radii R and 4R respectively. They start from rest. A has angular acceleration of $\frac{\pi}{4}$ rad s^{-2}. What is the angular velocity of the disk B at the end of 32 seconds ?



(A) π rad s^{-1} (B) 2π rad s^{-1} (C) 4π rad s^{-1} (D) $\frac{\pi}{4}$ rad s^{-1}

3. A wheel of radius R = 0.1 m is rolling without slipping on a horizontal surface as shown in the figure. Centre of the wheel moves with a constant speed $\sqrt{3}$ m/s. The speed of the point P with respect to ground is



(A) $2\sqrt{3}$ m/s (B) zero (C) 3 m/s (D) $\sqrt{3}$ m/s

4. A flywheel rotates with a uniform angular acceleration. Its angular velocity increases from 20π rad/s to 40π rad/s in 10 seconds. The number of rotations, it made in this period are

(A) 100 (B) 150 (C) 200 (D) 250

5. At t = 0 a flywheel is rotating with angular velocity ω_0. It then undergoes uniform angular acceleration for a time t_1, at the end of which the angular velocity is ω_1. How many revolutions did the flywheel make during this time interval ?

(A) $\frac{1}{2}(\omega_0 + \omega_1)t$ (B) $\frac{\omega_0 t}{2\pi}$ (C) $\frac{\omega_1 t}{2\pi}$ (D) $\frac{(\omega_0+\omega_1)t}{4\pi}$

6. We want to build a clock having different features. Mark **INCORRECT** statement :

(A) It is possible to build a clock in which the tips of the second hand, the minute hand, and the hour hand move with the same tangential acceleration.

(B) It is possible to build a clock in which the tips of the second hand, the minute hand, and the hour hand move with the same angular acceleration.

(C) It is possible to have a situation in which the second hand, the minute hand, and the hour hand with the same angular position.

(D) It is possible to build a clock in which the tips of the second hand, the minute hand, and the hour hand move with the same angular speed.

7. The moment of inertia of a solid cylinder about its axis is given by $(1/2)MR^2$. If this cylinder rolls without slipping, the ratio of its rotational kinetic energy to its translational kinetic energy is

(A) 1 : 1 (B) 2 : 2 (C) 1 : 2 (D) 1 : 3

8. A hoop and a solid cylinder have the same mass and radius. They both roll, without slipping, on a horizontal surface. If their kinetic energies are equal

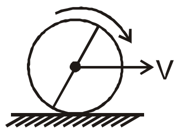
(A) the hoop has a greater translational speed than the cylinder

(B) the cylinder has a greater translational speed than the hoop

(C) the hoop and the cylinder have the same translational speed

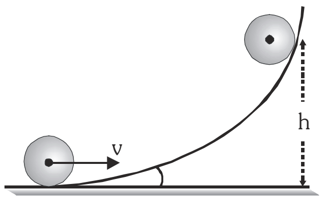
(D) the hoop has a greater rotational speed than the cylinder

9. A ring of mass m is rolling without slipping with linear velocity v as shown is figure. A rod of identical mass is fixed along one of its diameter. The total kinetic energy of the system is



(A) $\frac{7}{5}mv^2$ (B) $\frac{2}{5}mv^2$ (C) $\frac{5}{3}mv^2$ (D) $\frac{5}{4}mv^2$

10. A disc of mass M and radius R rolls on a horizontal surface and then rolls up an inclined plane as shown in the figure. If the velocity of the disc is v, the height to which the disc will rise will be

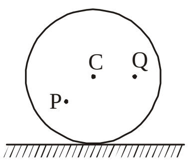


(A) $\frac{3v^2}{2g}$ (B) $\frac{3v^2}{4g}$ (C) $\frac{v^2}{4g}$ (D) $\frac{v^2}{2g}$

11. A body is rolling without slipping on a horizontal plane. If the rotational energy of the body is 40% of the total kinetic energy, then the body might be:

(A) Cylinder (B) Hollow sphere (C) Solid cylinder (D) Ring

12. A disc is rolling without slipping with angular velocity ω. P and Q are two points equidistant from the centre C. The order of magnitude of velocity is



(A) $v_Q > v_C > v_P$ (B) $v_P > v_C > v_Q$ (C) $v_P = v_C$, $v_Q = v_C/2$ (D) $v_P < v_C > v_Q$

Answers

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1. (C) **2.** (B) **3.** (C) **4.** (B) **5.** (D) **6.** (D) **7.** (C) **8.** (B) **9.** (C) **10.** (B)
11. (B) **12** (A)