Circular Motion L2

Disclaimer: Physics

Date: 23/09/2022

Subject: Physics

Topic : Tangential and Centripetal
Acceleration

Class: Standard XI

Time: 00:20 hrs

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1. A particle is initially at rest, moves along in a circle of radius $R = 2\,\text{m}$ with an angular acceleration $\alpha = \dfrac{\pi}{8}\text{rad}/\sec^2$. The magnitude of average velocity of the particle over the time it moves by half of the circle is

    A. $4\,\text{m/s}$

    B. $3\,\text{m/s}$

    C. $2\,\text{m/s}$

    D. $1\,\text{m/s}$

2. A particle is moving along a circular path of radius $5\,cm$, at a speed of $v = 5t^2$, where v is in cm/s and t is in seconds. The magnitudes of tangential acceleration and total acceleration (in mm/s^2) of the particle at time $t = 2\,s$ are

    A. $200 \text{ and } 825$

    B. $20 \text{ and } 800$

    C. $200 \text{ and } 1000$

    D. $100 \text{ and } 825$

3. A solid body starts from rest. Angular acceleration of the body spinning about a stationary axis is given by $\alpha = 2\cos\theta$ (in rad/s^2) where θ is the angle of rotation from initial position. Then which of the following graphs correctly represents the variation of angular velocity with respect to θ?

A.

B.

C.

D.
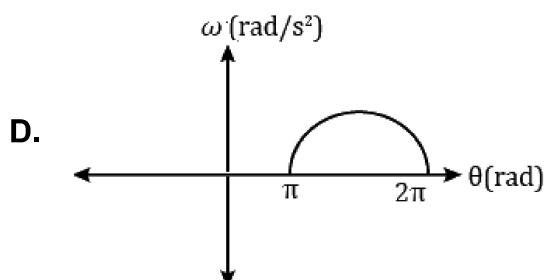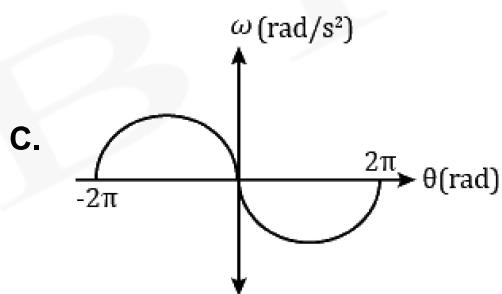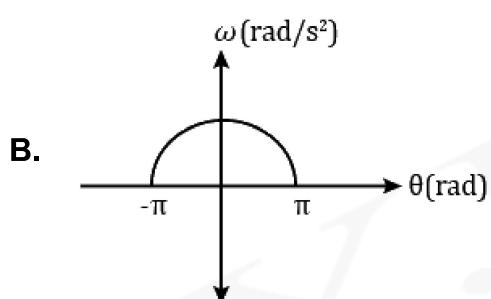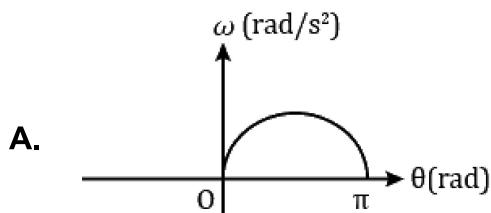
4. In a beyblade game, the beyblade has an initial angular speed of $180 \, \text{rpm}$. It slows down and eventually comes to rest in a time of 5 minutes. The average angular acceleration of the beyblade is

    A. $\dfrac{\pi}{30} \text{rad/s}^2$

    B. $\dfrac{\pi}{40} \text{rad/s}^2$

    C. $\dfrac{\pi}{50} \text{rad/s}^2$

    D. $\dfrac{\pi}{70} \text{rad/s}^2$

5. A pulley wheel of diameter $2 \, cm$ has a $1 \, m$ long cord strapped across its periphery. The wheel is initially at rest. If it is given an angular acceleration of $0.1 \, rad/s^2$, then the time taken for the cord to unwind completely is

    A. $20 \, s$

    B. $20\sqrt{3} \, s$

    C. $20\sqrt{5} \, s$

    D. $10\sqrt{10} \, s$