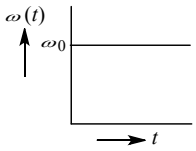
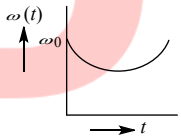
DPP
DAILY PRACTICE PROBLEMS

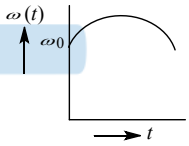
CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 6**

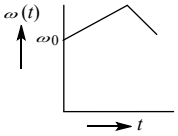
Topic :- SYSTEM OF PARTICLES AND ROTATIONAL MOTION

1. A particle performs uniform circular motion with an angular momentum L. If the frequency of particle's motion is doubled and its KE is halved, the angular momentum becomes
   a) $\frac{L}{2}$ b) $2L$ c) $4L$ d) $\frac{L}{4}$

2. A circular platform is free to rotate in a horizontal plane about a vertical axis passing through its centre. A tortoise is sitting at the edge of the platform. Now the platform is given an angular velocity ω_0. When the tortoise moves along a chord of the platform with a constant velocity (w.r.t. the platform), the angular velocity of the platform will vary with the time t as
   a) 

   b) 

   c) 

   d) 

3. Particles of masses m, $2m$, $3m$, ……, nm grams are placed on the same line at distances l, $2l$, $3l$,……., nl cm from a fixed point. The distance of centre of mass of the particles from the fixed point in centimeters is
   a) $\frac{(2n+1)l}{3}$ b) $\frac{l}{n+1}$ c) $\frac{n(n^2+1)l}{2}$ d) $\frac{2l}{n(n^2+1)}$

4. A small object of mass m is attached to a light string which passes through a hollow tube. The tube is hold by one hand and the string by the other. The object is set into rotation in a circle of radius R and velocity v. The string is then pulled down, shortening the radius of path of r. What is conserved
   a) Angular momentum b) Linear momentum
   c) Kinetic energy d) None of the above

5. Two rods each of mass m and length l are joined at the centre to form a cross. The moment of inertia of this cross about an axis passing through the common centre of the rods and perpendicular to the plane formed by them, is
   a) $ml^2/12$ b) $ml^2/6$ c) $ml^2/3$ d) $ml^2/2$

6. The vector product of the force (F) and distance (r) from the centre of action represents

a) KE b) PE c) Work d) Torque

7. A rod of length l is hinged at one end and kept horizontal. It is allowed to fall. The velocity of the other end of the rod is

a) $\sqrt{3gl}$ b) $\sqrt{2gl}$ c) $2\,Ml^2$ d) None of these

8. A solid cylinder rolls down an inclined plane of height 3 m and reaches the bottom of plane with angular velocity of $2\sqrt{2}\ rad.s^{-1}$. The radius of cylinder must be [Take $g = 10ms^{-2}$]

a) 5 cm b) 0.5 cm c) $\sqrt{10}\ cm$ d) $\sqrt{5}\ m$

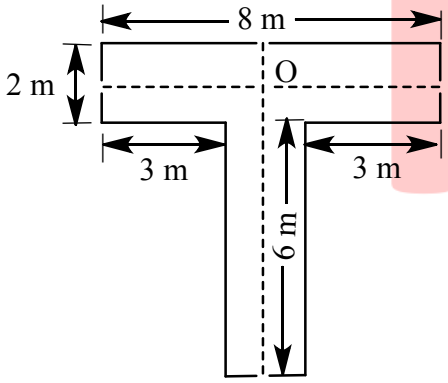
9. When two bodies collide elastically, the force of interaction between them is

a) Conservative b) Non-conservative
c) Either conservative or non-conservative d) Zero

10. A disc of moment of inertia $\frac{9.8}{\pi^2} kg\ m^2$ is rotating of 600 rpm. If the frequency of rotation changes from 600 rpm to 300 rpm, then what is the work done

a) 1467 J b) 1452 J c) 1567 J d) 1632 J

11. The distance of the centre of mass of the T-shaped plate from O is



a) 7 m b) 2.7 m c) 4 m d) 1 m

12. The moment of inertia of a circular ring of radius r and mass M about diameter is

a) Mr^2 b) $\frac{1}{2}Mr^2$ c) $\frac{3}{2}Mr^2$ d) $\frac{1}{4}Mr^2$

13. A solid sphere of mass $1kg$, radius $10cm$ rolls down an inclined plane of height $7m$. The velocity of its centre as it reaches the ground level is

a) 7 m/s b) 10 m/s c) 15 m/s d) 20 m/s

14. Two discs have same mass and thickness. Their materials are of densities ρ_1 and ρ_2. The ratio of their moment of inertia about central axis will be

a) ρ_1:ρ_2 b) $\rho_1\rho_2$:1 c) 1:$\rho_1\rho_2$ d) ρ_2:ρ_1

15. A flywheel rotating about a fixed axis has a kinetic energy of 360 $joule$ when its angular speed is 30 rad/sec. The moment of inertia of the wheel about the axis of rotation is

a) $0.6\ kg \times m^2$ b) $0.15\ kg \times m^2$ c) $0.8\ kg \times m^2$ d) $0.75\ kg \times m^2$

16. A particle of mass m moving with a velocity $(3\hat{i} + 2\hat{j})ms^{-1}$ collides with a stationary body mass M and finally moves with a velocity $(-2\hat{i} + \hat{j})ms^{-1}$. If $\frac{m}{M} = \frac{1}{13}$, then

a) The impulse received by each is ,$m(5\hat{i} + \hat{j})$

b) The velocity of the M is $\frac{1}{13}(5\hat{i} + \hat{j})$

c) The coefficient of restitutions $\frac{11}{7}$

d) All the above are correct

17. The principle of conservation of angular momentum, states that angular momentum

a) Always remains conserved

b) Is the product of moment of inertia and velocity

c) Remains conserved until the torque acting on it remains constant

d) None of these

18. Two rings of the same radius and mass are placed such that their centres are at a common point and their planes are perpendicular to each other. The moment of inertia of the system about an axis passing through the centre and perpendicular to the plane of one of the rings is (mass of the ring $= m$ and radius $= r$)

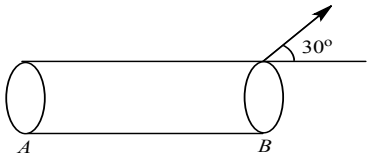
a) $\frac{1}{2}mr^2$ b) mr^2 c) $\frac{3}{2}mr^2$ d) $2mr^2$

19. When a torque acting upon a system is zero, then which of the following will be constant

a) Force b) Linear momentum

c) Angular momentum d) Linear impulse

20. The instantaneous velocity of a point B of the given rod of length 0.5 m is 3 ms^{-1} in the represented direction. The angular velocity of the rod for minimum velocity of end A is



a) 1.5 $rads^{-1}$ b) 5.2 $rads^{-1}$ c) 2.5 $rads^{-1}$ d) None of these