1. A point mass moves along the circumference of a circle of radius *R*. As it completes 4 rotations, its displacement and distance covered are

(a) 0 and $8\pi R$ (b) $8\pi R$ and 0
(c) $8\pi R$ and $2R$ (d) none of these

***2.* π radians equals**

(a) 30^o (b) 60^o
(c) 90^o (d) 180^o

3. 1 rad equals

(a) 53.7^o (b) 35.7^o
(c) 57.3^o (d) 75.3^o

4. The dimensions of angular displacement are

(a) [L] (b) [L^o]
(c) [L^2] (d) [L^{-1}]

5. The circumference of a circle subtends at the centre an angle equal to

(a) π radians (b) 2π radians
(c) $\frac{\pi}{2}$ radians (d) 4π radians

6. A flywheel makes 300 rpm. Its angular velocity in rad s^{-1} is

(a) 10 π (b) 20 π
(c) 30 π (d) none of these

7. The dimensions of angular velocity are

(a) [LT] (b) [LT^{-1}]
(c) [T] (d) [T^{-1}]

8. The angular speed of a minute hand in a clock in rad s^{-1} is

(a) 5.8×10^{-4} (b) 1.7×10^{-3}
(c) 5.2×10^{-3} (d) 1.0×10^{-1}

9. The linear speed of a point on the rim of a wheel of diameter 1 m which makes 30 rpm is

(a) $\frac{\pi}{2} ms^{-1}$ (b) $\pi\, ms^{-1}$

(c) $30\pi\ ms^{-1}$ (d) $60\pi\ ms^{-1}$

10. The ratio of the angular speed of the minute hand to the hour hand of a clock is

(a) 1 : 6 (b) 6 : 1
(c) 1 : 12 (d) 12 : 1

11. Which one of the followings is correct?

(a) $\omega = vr$ (b) $v = \frac{r}{\omega}$

(c) $v = r\omega$ (d) $\omega = \frac{r}{v}$

12. All points of a rigid body rotating about a given axis have the same

(a) tangential velocity (b) angular velocity
(c) tangential acceleration (d) angular acceleration

13. The relation between tangential and angular acceleration is

(a) $a_T = r\alpha$ (b) $a_T = \frac{\alpha}{r}$

(c) $a_T = \frac{r}{\alpha}$ (d) $a_T = \frac{\alpha}{v}$

14. The centripetal force acting on a body of mass *m* moving in a circle of radius *r* with constant angular speed ω is

(a) $F_C = m\omega r$ (b) $F_C = m\omega^2 r$
(c) $F_C = m\omega r^2$ (d) $F_C = m\omega^2 r^2$

15. A satellite circles the Earth with a speed *v* at a distance *r* from the centre of Earth. Increasing the speed twice will make the satellite move in a circle of radius

(a) 2 *r* (b) *r*/4
(c) 4 *r* (d) *r*/2

16. When a stone is whirled in a vertical circle by a string, the tension in the string is maximum at the

(a) centre (b)top
(c) bottom (d) neither of these points

17. Moment of inertia has the dimensions

(a) [MLT] (b) $[ML^2T^{-2}]$
(c) $[ML^2]$ (d) $[ML^2T^{-1}]$

18. Rotational analogue of force is

(a) angular momentum (b) moment of inertia
(c) moment of force (d) torque

19. The moment of inertia of a body depends upon

(a) mass of a body and its size
(b) its angular momentum
(c) mass of a body and its angular speed
(d) mass as well as its distribution about the axis of rotation.

20. The angular momentum L is given by

(a) $m\omega$ (b) $\boldsymbol{\omega} \times \mathbf{r}$
(c) $\mathbf{r} \times \mathbf{F}$ (d) $\mathbf{r} \times \mathbf{p}$

21. Rate of change of angular momentum is equal to

(a) force (b) impulse
(c) torque (d) inertia

22. In the absence of any external torque, a decrease in the moment of inertia results in an increase in the angular velocity such that

(a) $\frac{1}{2} I\omega^2 = \text{constant}$ (b) $I\omega = \text{constant}$
(c) $\frac{I}{\omega} = \text{constant}$ (d) $I\omega^2 = \text{constant}$

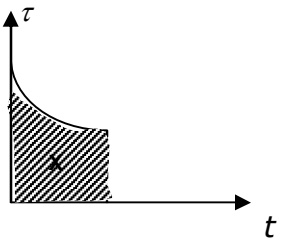
23. If Earth shrinks half of its present size, its new angular velocity of rotation about its axis of rotation becomes

(a) twice (b) three times
(c) four times (d) six times

24. If a steel ball of mass *m* and radius *r* is moving with angular velocity ω, its rotational kinetic energy is

(a) $\frac{1}{2} m\omega r$ (b) $\frac{1}{2} m\omega^2 r$
(c) $\frac{1}{2} m\omega r^2$ (d) $\frac{1}{2} m\omega^2 r^2$

25. The graph shows the variation of torque τ acting on a wheel with time. The area X represents



(a) θ
(b) α
(c) gain in angular momentum
(d) gain in angular velocity

26. The weight of a man in an elevator descending with an acceleration of 4.9 ms^{-2} will become

(a) twice (b) half

(c) zero (d) unchanged

27. An astronaut of mass 100 kg is orbiting in a spaceship at an altitude $h = \frac{R}{2}$ (R = radius of Earth). Taking g = 10 ms^{-2}, his weight inside the spaceship is

(a) 500 N (b) 250 N
(c) 125 N (d) 0 N

28. The orbital speed of a satellite is related to its orbital radius r by

(a) $v \propto r$ (b) $v \propto \frac{1}{\sqrt{r}}$

(c) $v \propto \sqrt{r}$ (d) $v \propto \frac{1}{r}$

29. The frequency of rotation of a spaceship about its own axis to produce artificial gravity like that on Earth is

(a) $f = \frac{1}{2\pi}\sqrt{\frac{R}{g}}$ (b) $f = \frac{1}{2\pi}\sqrt{\frac{g}{R}}$

(c) $f = 2\pi\sqrt{\frac{R}{g}}$ (d) $f = 2\pi\sqrt{\frac{g}{R}}$

30. The rotational kinetic energy of a hoop of mass m moving down an inclined plane with velocity v will be

(a) $\frac{1}{4}mv^2$ (b) $\frac{1}{2}mv^2$

(c) $\frac{3}{4}mv^2$ (d) $\frac{4}{3}mv^2$

31. The linear velocity of a disc moving down an inclined plane is

(a) $\sqrt{gh}$ (b) $\sqrt{\frac{4gh}{3}}$

(c) $\sqrt{\frac{2gh}{3}}$ (d) $\sqrt{\frac{gh}{2}}$

32. The physical quantity which produces angular acceleration in a body is called

(a) angular velocity (b) momentum
(c) centripetal force (d) torque

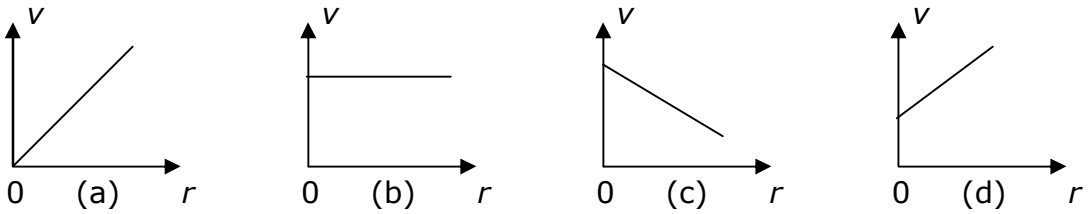
33. The rate of change of angular momentum of a body is called

(a) applied torque (b) force
(c) impulse (d) moment of force

34. Angular momentum of a body under the central force is

(a) zero (b) maximum
(c) minimum (d) constant

35. A bicycle wheel is rotating at a constant angular velocity. Which graph represents the relation between the speed *v* of a point on the wheel and its distance from the centre of rotation?



36. The number of geostationary satellites required for global TV transmission is
(a) 2 (b) 3
(c) 4 (d) 6

37. A geostationary satellite completes one revolution around the Earth in
(a) 6 hr (b) 12 hr
(c) 18 hr (d) 24 hr

38. Moment of inertia of a solid sphere of mass *M* and radius *R* about an axis passing through its centre is
(a) $\frac{2}{5}MR$ (b) $\frac{2}{5}MR^2$
(c) $\frac{4}{5}MR^2$ (d) MR^2

39. A body of mass *m* moves with angular velocity ω in a circle of radius *r* about point O. If moment of inertia of the body about O is *I* and *v* is its linear speed, then its angular momentum about O is
(a) Iv (b) $I\omega$
(c) mv^2r (d) $mr\omega^2$

40. Finite angular displacement of a rotating body is taken as
(a) vectors (b) scalars
(c) neither scalars nor vectors (d) both scalars as well as vectors

Key to Test Chapter 5

1	**a**	21	**c**
2	**d**	22	**b**
3	**c**	23	**c**
4	**b**	24	**d**
5	**b**	25	**c**
6	**a**	26	**b**
7	**d**	27	**d**
8	**b**	28	**b**
9	**b**	29	**b**
10	**d**	30	**b**
11	**c**	31	**b**
12	**b**	32	**d**
13	**a**	33	**a**
14	**b**	34	**d**
15	**b**	35	**a**
16	**c**	36	**b**
17	**c**	37	**d**
18	**d**	38	**b**
19	**d**	39	**b**
20	**d**	40	**b**