Q.1 A wheel starts rotating from rest and attains an angular velocity of 60 rad/sec in 5 seconds. The total angular displacement in radians will be-

(1) 60   (2) 80   (3) 100   (4) 150

Q.2 A body rotates at 300 rotations per minute. The value in radian of the angle described in 1 sec is-

(1) 5   (2) 5p   (3) 10   (4) 10p

Q.3 A chain couples and rotates two wheels in a bicycle. The radii of bigger and smaller wheels in a bicycle. The radii of bigger and smaller wheels are 0.5m and 0.1. respectively. The bigger wheel rotates at the rate of 200 rotations per minute, then the rate of rotation of smaller wheel will be -

(1) 1000 rpm   (2) 50/3 rpm

(3) 200 rmp   (4) 40 rpm

Q.4 If the position vector of a particle is

$\hat{r} = (3\hat{i} + 4\hat{j})$ metre and its angular velocity is $\vec{\omega} = (\hat{j} + 2\hat{k})$ rad/sec then its linear velocity is (in m/s) -

(1) $-(8\hat{i} - 6\hat{j} + 3\hat{k})$

(2) $(3\hat{i} + 6\hat{j} + 8\hat{k})$

(3) $-(3\hat{i} + 6\hat{j} + 6\hat{k})$

(4) $(6\hat{i} + 8\hat{j} + 3\hat{k})$

Q.5 A car is moving with a speed of 72 Km/hour. The diameter of its wheels is 50cm. If its wheels come to rest after 20 rotations as a result of application of brakes, then the angular retardation produced in the car will be -

(1) 25.5 Radians/sec^2

(2) 0.25 Radians/sec^2

(3) 2.55 Radians/sec^2 (4) 0

Q.6 A particle, situated in an object, moves with angular acceleration of 6 rad/sec^2 and with 2 rad/sec angular velocity. If the radius of the circular path is 1m, its total acceleration in m/sec^2 will be -

(1) 1   (2) 100

(3) 10   (4) $\sqrt{10}$

Q.7 A particle starts from rest under the effect of an angular acceleration of 5 rad/sec^2. The value of angular displacement in 2 seconds in radian will be ?

(1) 10   (2) 20

(3) $20\,\pi$ (4) 50

Q.8 When a body rotates about an axis the quantity which remains same for all its particles, is

(1) linear velocity   (2) angular velocity   (3) linear acceleration (4) angular momentum

Q.9 A wheel of an engine executes 4800 revolutions per minute. Its angular velocity (in rad/sec) would be -

(1) $4800\,\pi$ (2) $2400\,\pi$ (3) $160\,\pi$ (4) $80\,\pi$

Q.10 A fan is rotating with a frequency 50Hz, its angular speed would be -

(1) $50\,\pi$ rad/sec   (2) $200\,\pi$ rad/sec

(3) $100\,\pi$ rad/sec   (4) $\left(\dfrac{100}{\pi}\right)$ rad/sec

Q.11 A particle moves by 1 cm in 1 sec in a path of radius 10cm. Its angular speed would be-

(1) 10°/sec   (2) 10 rad/sec   (3) 0.1 rad/sec   (4) 1 rad/sec

Q.12 Two particles of masses m_1 and m_2 complete one revolution of respective radii r_1 and r_2 in same time. The ratio of their angular speeds would be

(1) $m_1 r_1{}^2 : m_2 r_2{}^2$ (2) $r_1 : r_2$

(3) $r_2 : r_1$ (4) $1 : 1$

Q.13 When a mass rotates about any axis, the direction of the angular velocity will be -

(1) towards radius   (2) towards the tangent to the orbit

(3) at an angle of 45° to the plane of rotation   (4) along the direction of axis of rotation

Q.14 If a rigid body a point rotates 60º in 6 minutes the angular velocity of the body is -

(1) 1/6 rad/s   (2) 3.14/18 rad/s

(3) 3.14/180×6 rad/s   (4) None of these

Q.15 A particle, moving along a circular path has equal magnitudes of linear and angular acceleration. The diameter of the path is (in metre) -

(1) 1   (2) π (3) 2   (4) 2π

Q.16 The moment of inertia of a body depends upon -

(1) mass only   (2) angular velocity only

(3) distribution of particles only

(4) mass and distribution of mass about the axis

Q.17 On account of melting of ice at the north pole the moment of inertia of spinning earth -

(1) increases   (2) decreases

(3) remains unchanged   (4) depends on the time

Q.18 Two spheres of same mass and radius are in contact with each other. If the moment of inertia of a sphere about its diameter is I, then the moment of inertia of both the spheres about the tangent at their common point would be -

(1) 3I   (2) 7I   (3) 4I   (4) 5I

Q.19 Moment of inertia of a cylindrical shell of mass M, radius R and length L about its geometrical axis would be -

(1) MR^2 (2) $\dfrac{1}{2}MR^2$

(3) $M\left(\dfrac{R^2}{4}+\dfrac{L^2}{12}\right)$ (4) $\dfrac{ML^2}{12}$

Q.20 The moment of inertia of a sphere of radius R about an axis passing through its centre is proportional to -

(1) R^2 (2) R^3 (3) R^4 (4) R^5

Q.21 The moment of inertia of a body does not depend on -

(1) its mass

(2) angular velocity

(3) distribution of its particles

(4) its axis of rotation

Q.22 The moment of inertia of NaCl molecule with bond length r about an axis perpendicular to the bond and passing through the centre of mass is

(1) $(m_{Na} + m_{Cl})r^2$

(2) $\dfrac{M_{Na} + M_{Cl}}{M_{Na} \times M_{Cl}} r^2$

(3) $\dfrac{M_{Na} \times M_{Cl}}{M_{Na} + M_{Cl}} r^2$

(4) $\dfrac{M_{Na} + M_{Cl}}{M_{Na} - M_{Cl}} r^2$

Q.23 A disc of metal is melted to recast in the form of a solid sphere. The moment of inertia about a vertical axis passing through the centre would -

(1) decrease

(2) increase

(3) remains same

(4) nothing can be said

Q.24 Which of the following quantity is direction less-

(1) moment of momentum

(2) Moment of force

(3) Moment of charge

(4) Moment of inertia

Q.25 The M.I. of a disc about its diameter is 2 units. Its M.I. about axis through a point on its rim and in the plane of the disc is -

(1) 4 units.
(2) 6 units
(3) 8 units
(4) 10 units

Q.26 A solid sphere and a hollow sphere of the same mass have the same moments of inertia about their respective diameters, the ratio of their radii is -

(1) $(5)^{1/2} : (3)^{1/2}$

(2) $(3)^{1/2} : (5)^{1/2}$

(3) 3 : 2

(4) 2 : 3

Q.27 The physical significance of mass in translational motion is same as that of the following in rotational motion -

(1) moment of inertia   (2) angular momentum

(3) torque   (4) angular acceleration

Q.28 A stone of mass 4kg is whirled in a horizontal circle of radius 1m and makes 2 rev/sec. The moment of inertia of the stone about the axis of rotation is -

(1) $64 \text{ kg} \times \text{m}^2$ (2) $4 \text{ kg} \times \text{m}^2$ (3) $16 \text{ kg} \times \text{m}^2$ (4) $1 \text{ kg} \times \text{m}^2$

Q.29 In an arrangement four particles, each of mass 2 gram are situated at the coordinate points (3, 2, 0), (1, –1, 0), (0, 0, 0) and (–1, 1, 0). The moment of inertia of this arrangement about the Z-axis will be -

(1) 8 units   (2) 16 units   (3) 43 units   (4) 34 units

Q.30 Two discs have same mass and thickness. Their materials are of densities r_1 and r_2. The ratio of their moment of inertia about central axis will be-

(1) $\rho_1 : \rho_2$ (2) $\rho_1 \rho_2 : 1$ (3) $1 : \rho_1 \rho_2$ (4) $\rho_2 : \rho_1$

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	4	4	1	1	1	3	1	2	3	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	3	4	4	3	3	4	1	2	1	4
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	2	3	1	4	4	1	1	2	4	4