



CIRCULAR MOTION

Each question has four possible answers, encircle the correct answer:

- 10.** Angular displacement is a:
- (a) Scalar
 - (b) Vector
 - (c) Neither scalar nor vector
 - (d) None of these
- 11.** Radian is defined as the angle subtended at the center of a circle by an:
- (a) Arc whose length equal to radius of circle
 - (b) Arc whose length less than radius of circle
 - (c) Arc whose length greater than radius of circle
 - (d) None of these
- 12.** Which one is the correct relation for angular displacement θ , radius r and length of arc S is:
- (a) $S = r\theta$
 - (b) $\frac{S}{r} = \theta$
 - (c) $Sr = \theta$
 - (d) $S\theta = r$
- 13.** The rate of change of angular displacement is called:
- (a) Angular speed
 - (b) Angular acceleration
 - (c) Angular velocity
 - (d) None of these
- 14.** Angular velocity is a:
- (a) Scalar
 - (b) Vector
 - (c) Neither scalar nor vector
 - (d) None of these
- 15.** The direction of angular velocity of a body moving in a circle is:
- (a) Towards the axis of rotation
 - (b) Away from the axis of rotation
 - (c) Along the axis of rotation
 - (d) None of these
- 16.** Average angular velocity is defined by the relation:
- (a) $\langle \omega \rangle = \theta t$
 - (b) $\langle \omega \rangle = \frac{\theta}{t}$
 - (c) $\langle \omega \rangle = \frac{t}{\theta}$
 - (d) $\langle \omega \rangle = \frac{\theta^2}{t}$
- 17.** When an object moves in a circle, the angle between angular velocity ω and linear velocity v is:
- (a) 90°
 - (b) 0°
 - (c) 45°
 - (d) 60°
- 18.** The angular velocity at any instant is called:
- (a) Instantaneous angular velocity
 - (b) Instantaneous angular speed
 - (c) Instantaneous angular displacement
 - (d) None of these
- 19.** If a particle moves in a circle of radius r with uniform angular velocity ω then the angle between radius r and linear velocity v is:
- (a) 45°
 - (b) 90°
 - (c) 60°
 - (d) 180°

20. The rate of change of angular velocity is called:
- (a) Angular velocity
 - (b) Angular acceleration
 - (c) Angular displacement
 - (d) None of these
21. SI unit of angular acceleration is:
- (a) rad/s²
 - (b) rad/s
 - (c) rad.s²
 - (d) rad.s
22. The relation between linear acceleration and angular acceleration is:
- (a) $\vec{\alpha} = \vec{a} \times \vec{r}$
 - (b) $\vec{a} = \vec{r} \times \vec{\alpha}$
 - (c) $\vec{r} = \vec{a} \times \vec{\alpha}$
 - (d) $\vec{a} = \vec{\alpha} \times \vec{r}$
23. The dimensions of angular acceleration are:
- (a) [LT⁻²]
 - (b) [T⁻²]
 - (c) [LT⁻¹]
 - (d) [T⁻³]
24. The relation between linear velocity and angular velocity is:
- (a) $\vec{v} = \vec{r} \times \vec{\omega}$
 - (b) $\vec{v} = \vec{\omega} \times \vec{r}$
 - (c) $\vec{\omega} = \vec{v} \times \vec{r}$
 - (d) $\vec{r} = \vec{v} \times \vec{\omega}$
25. The dimensions of angular velocity are:
- (a) [LT⁻¹]
 - (b) [LT]
 - (c) [LT⁻²]
 - (d) [T⁻¹]
26. If a rotating body is moving anti-clockwise, the direction of angular velocity is:
- (a) Towards the centre
 - (b) Along the linear velocity
 - (c) Away from the centre
 - (d) Perpendicular to both radius and linear velocity
27. Angular acceleration is produced due to:
- (a) Centripetal force
 - (b) Torque
 - (c) Force
 - (d) None of these
28. The period of circular motion is given by:
- (a) $T = \frac{2\pi}{\omega}$
 - (b) $T = \frac{\omega}{2\pi}$
 - (c) $T = 2\pi\omega$
 - (d) None of these
29. The force needed to bend the normally straight path of particle into a circular path is called:
- (a) Inertia
 - (b) Torque
 - (c) Centripetal force
 - (d) None of these
30. When a body is moving in a circle of radius r with constant linear velocity v, its centripetal force is:
- (a) $\frac{mv^2}{r}$
 - (b) $\frac{m^2v}{r}$
 - (c) $\frac{mv}{r^2}$
 - (d) None of these

31. When a body moves in a circle of radius r with angular speed ω , its centripetal force is:

(a) $\frac{m\omega}{r}$

(b) $mr\omega^2$

(c) $\frac{mr}{\omega^2}$

(d) $\frac{m\omega^2}{r}$

32. A body is moving in a circle of radius r with constant speed v , its centripetal acceleration is:

(a) $\frac{v^2}{r}$

(b) v^2r

(c) $\frac{r}{v^2}$

(d) $\frac{v}{r}$

33. A body is moving in a circle of radius r with constant angular velocity ω , its centripetal acceleration is:

(a) $\frac{\omega}{r}$

(b) ωr

(c) $\omega^2 r$

(d) ωr^2

34. The force required to keep a body into a circle is called:

(a) Centrifugal force

(b) Centripetal force

(c) Gravitational force

(d) None of these

35. A body is moving in a circle at constant speed. Which of the following statement is correct:

(a) There is no force acting away from the centre of the circle

(b) There is no force acting towards the centre of the circle

(c) There is no acceleration

(d) None of these

36. The vectorial form of centripetal force is:

(a) $-m\omega^2 \vec{r}$

(b) $m\omega^2 \vec{r}$

(c) $-m\omega \vec{r}$

(d) $m^2 \omega \vec{r}$

37. An object is traveling in a circle with constant speed. Its acceleration is constant in:

(a) Direction only

(b) Magnitude only

(c) Both magnitude and direction

(d) None of these

38. A body of mass 4 kg moves along a circle of radius 2m with a constant speed of 4 m/s. The centripetal force is:

(a) 32 N

(b) 16 N

(c) 20 N

(d) 64 N

39. In case of planets, the necessary acceleration is provided by:

(a) Coulombs force

(b) Centripetal force

(c) Gravitation force

(d) None of these

40. The necessary centripetal force to the moving car round a corner track is provided by:
- (a) Centrifugal force
 - (b) Gravitational force
 - (c) Coulombs force
 - (d) Frictional force
41. The mud flies off the tyre of a moving bicycle in the direction of:
- (a) Towards the centre
 - (b) Tangent to the tyre
 - (c) Along the radius
 - (d) Along the motion
42. The angular momentum is defined as:
- (a) $\vec{L} = m \vec{v}$
 - (b) $\vec{L} = \vec{r} \times \vec{F}$
 - (c) $\vec{L} = \vec{r} \times \vec{P}$
 - (d) $\vec{L} = \vec{P} \times \vec{r}$
43. The SI unit of angular momentum is:
- (a) $\text{kg m}^2/\text{s}$
 - (b) $\text{kg m}^2/\text{s}^2$
 - (c) $\text{kg}^2 \text{m/s}$
 - (d) kg m/s
44. The dimensions of angular momentum \vec{L} are:
- (a) $[\text{M}^2\text{LT}^{-1}]$
 - (b) $[\text{M}^2\text{L}^2\text{T}]$
 - (c) $[\text{ML}^2\text{T}^2]$
 - (d) $[\text{ML}^2\text{T}^{-2}]$
45. Angular momentum of a body under central force is:
- (a) Minimum
 - (b) Zero
 - (c) Maximum
 - (d) Constant
46. A body rotating in a circle of radius 1 m with an angular speed 10 rad/s has the tangential velocity:
- (a) 2 m/s
 - (b) 5 m/s
 - (c) 10 m/s
 - (d) 15 m/s
47. The rate of change of angular momentum of a body is:
- (a) The applied torque
 - (b) The applied force
 - (c) Both (a) and (b)
 - (d) None of these
48. Angular momentum is conserved under:
- (a) Variable force
 - (b) Constant force
 - (c) Central force
 - (d) None of these
49. The direction of angular momentum \vec{L} is:
- (a) Along the direction of \vec{P}
 - (b) Along the direction \vec{r}
 - (c) Parallel to the plane containing \vec{r} and \vec{P}
 - (d) Perpendicular to the plane containing \vec{r} and \vec{P}

60. The moment of inertia of a body comes in action in:
- (a) Circular motion
 - (b) Straight line motion
 - (c) Curved path
 - (d) None of these
61. The SI unit of angular momentum is:
- (a) kgm^3
 - (b) kgm
 - (c) kgm^2
 - (d) kgm^{-2}
62. The physical quantity which plays the same part in angular motion as mass does in linear motion is called:
- (a) Moment of inertia
 - (b) Momentum
 - (c) Torque
 - (d) None of these
63. The physical quantity which produces angular acceleration is known as:
- (a) Force
 - (b) Torque
 - (c) Inertia
 - (d) None of these
64. Moment of inertia of a solid disc about its axis is:
- (a) $\frac{1}{2}mr^2$
 - (b) $\frac{2}{5}mr^3$
 - (c) $\frac{2}{3}mr^2$
 - (d) $\frac{1}{3}mr^2$
65. Moment of inertia of a sphere is:
- (a) $\frac{1}{2}mr^2$
 - (b) $\frac{2}{5}mr^3$
 - (c) $\frac{2}{5}mr^2$
 - (d) $\frac{1}{3}mr^2$
66. The dimensions of moment of inertia are:
- (a) $[\text{ML}^2]$
 - (b) $[\text{ML}^{-2}]$
 - (c) $[\text{ML}^{-1}]$
 - (d) $[\text{M}^2\text{L}]$
67. The force and torque are analogues to:
- (a) Each other
 - (b) Moment of inertia
 - (c) Velocity
 - (d) None of these
68. The total weight of the body acts at:
- (a) its center of gravity
 - (b) its centre
 - (c) its one end
 - (d) its other end
69. The center of gravity is also called:
- (a) Centre of body
 - (b) Centre of mass
 - (c) Both (a) and (b)
 - (d) None of these
70. The acceleration due to gravity:
- (a) Same value at every place
 - (b) Same value everywhere on the surface of earth
 - (c) Varies with altitude
 - (d) None of these

80. Suppose a body of cylindrical shape is called down on an inclined plane of height h . It contains:
- (a) Translation K.E
 - (b) Rotational K.E
 - (c) Both (a) and (b)
 - (d) None of these
81. Speed of hoop at the bottom can be given by:
- (a) $v = \sqrt{gh}$
 - (b) $v = \sqrt{2gh}$
 - (c) $v = \sqrt{\frac{3}{4} gh}$
 - (d) None of these
82. Orbital velocity of a satellite orbiting closer to the planet is given by:
- (a) $v = \sqrt{\frac{GM}{R}}$
 - (b) $v = \sqrt{\frac{GMm}{R}}$
 - (c) $v = \sqrt{gR}$
 - (d) None of these
83. If the earth stops rotating weight of a body on the equator:
- (a) Increases
 - (b) Remains constant
 - (c) Decreases
 - (d) None of these
84. A body becomes weightless:
- (a) Spaceship orbiting the earth
 - (b) Outside the field free region
 - (c) On the earth's centre
 - (d) All of above
85. The axis of rotation of a rotating body in the absence of external torque:
- (a) Continuously changes
 - (b) Remain fixed in direction
 - (c) Both (a) and (b)
 - (d) None of these
86. The number of satellite included in the Global positioning system is:
- (a) 20
 - (b) 48
 - (c) 24
 - (d) None of these
87. Orbital speed of a satellite at large enough height h above the earth's surface is:
- (a) \sqrt{gR}
 - (b) $\sqrt{\frac{GM}{R+h}}$
 - (c) $\sqrt{\frac{GM}{R}}$
 - (d) None of these
88. In a spaceship orbiting the earth, the apparent weight of the body in it is:
- (a) Less than its real weight
 - (b) Greater than its real weight
 - (c) Weightlessness
 - (d) None of these
89. One communication satellite covers:
- (a) 240 longitudinal lines
 - (b) 360 longitudinal lines
 - (c) 120 longitudinal lines
 - (d) None of these

90. International telecommunication in satellite organization (INTELSAT):
- (a) Operates at microwave frequency 4.611 and 149 Hz
 - (b) Has capability of 30,000 two-way telephone circuits
 - (c) Provides facility of three T.V channels
 - (d) All of above
91. Height of the closest orbit of the satellite above the earth is:
- (a) 300 km
 - (b) 250 km
 - (c) 500 km
 - (d) 400 km
92. Radius of the geo-stationary orbit from the earth's center is:
- (a) 4.24×10^4 km
 - (b) 3.23×10^4 km
 - (c) 4.23×10^3 km
 - (d) None of these
93. Height of geo-stationary satellite above the equator is:
- (a) 40,000 km
 - (b) 24,000 km
 - (c) 30,000 km
 - (d) 36,000 km
94. Entire populated earth, surface is covered by:
- (a) Four
 - (b) Three
 - (c) Two
 - (d) None of these
95. The geo-stationary satellites are used for:
- (a) World communications
 - (b) Weather observations
 - (c) Navigation
 - (d) All of above
96. Einstein theory was considered as a:
- (a) Scientific trump
 - (b) Simple trump
 - (c) Natural trump
 - (d) None of these
97. Which theory of gravitation is better:
- (a) Newton
 - (b) Einstein
 - (c) Compton
 - (d) Plank
98. The time period T of the artificial satellite is given by:
- (a) $T = \frac{2\pi v}{R}$
 - (b) $T = \frac{2v}{\pi R}$
 - (c) $T = \frac{2\pi R}{v}$
 - (d) None of these
99. $1^\circ = \text{_____ radian.}$
- (a) 0.01745
 - (b) 57
 - (c) 0.1745
 - (d) 0.2
100. If $r = 1$ m and $\theta = 1^\circ$ then what is value of S:
- (a) 0.01745 m
 - (b) 1 m
 - (c) 2 m
 - (d) None

- 101.** Dimensions of angular velocity:
- (a) $[LT^{-1}]$ (b) $[T^{-1}]$
 (c) $[LT]$ (d) None
- 102.** An electric fan rotating at 3 rev/s is switched off. It comes to rest in 18 s. Assuming deceleration to be uniform. What is its value?
- (a) 0.167 rev/s^2 (b) -0.167 rev/s^2
 (c) -0.176 rev/s^2 (d) 0.176 rev/s^2
- 103.** Unit of moment of inertia is:
- (a) kg/m^2 (b) kg m^2
 (c) gm^2 (d) kg cm^2
- 104.** The product of linear momentum and moment arm for momentum is called:
- (a) Momentum (b) Angular momentum
 (c) Torque (d) Moment of inertia
- 105.** The axis of rotation of an object will not change its orientation unless an external _____ causes it to do so.
- (a) Force (b) Torque
 (c) Both (a), (b) (d) None
- 106.** Moment of inertia of a thin rod of mass 'm' and length 'L' is:
- (a) $\frac{2}{5} mL^2$ (b) $\frac{1}{12} mL^2$
 (c) $\frac{1}{12} mL$ (d) $\frac{1}{12} m^2L$
- 107.** If an artificial satellite move with 30000 km/h then it follow:
- (a) Circular orbit (b) Elliptical orbit
 (c) Escape (d) None of these
- 108.** Global positioning system can be formed by _____ artificial satellites.
- (a) 22 (b) 42
 (c) 3 (d) 24
- 109.** When the lift is moving upwards with an acceleration \vec{a} then weight of the object appears to be _____ than real weight.
- (a) Less (b) More
 (c) No change (d) None
- 110.** If distance between satellite and centre of Earth is $2R$ then orbital velocity of satellite:
- (a) $\sqrt{2gR}$ (b) $\sqrt{\frac{gR}{2}}$
 (c) $\sqrt{\frac{GM}{r}}$ (d) None of these

111. To create artificial gravity spaceship rotates with frequency:

(a) $2\pi \sqrt{\frac{g}{R}}$

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

(c) $\frac{1}{2\pi} \sqrt{\frac{g}{R}}$

(d) All

112. The Earth rotates on its axis once a day. Suppose by some process the Earth contracts so that its radius is only half as large as at present. The Earth would complete its rotation in:

(a) 24 h

(b) 6 h

(c) 12 h

(d) 18 h

113. The minute hand of a large clock is 3.0 m long. What is its mean angular speed?

(a) $1.4 \times 10^{-4} \text{ rad s}^{-1}$

(b) $1.7 \times 10^{-3} \text{ rad s}^{-1}$

(c) $5.2 \times 10^{-3} \text{ rad s}^{-1}$

(d) $1.0 \times 10^{-1} \text{ rad s}^{-1}$

114. When an aircraft is moving in a horizontal plane at a constant speed of 650 ms^{-1} , its turning circle has a radius of 80 km. What is the ratio of the centripetal force to the weight of the aircraft?

(a) 8.3×10^{-4}

(b) 0.54

(c) 1.9

(d) 52

115. An object travels at constant speed around a circle of radius 1.0 m in 1.0 s. What is the magnitude of its acceleration?

(a) Zero

(b) 1.0 ms^{-2}

(c) $2\pi \text{ ms}^{-2}$

(d) $4\pi^2 \text{ ms}^{-2}$

116. A ball of mass 0.10 kg is attached to a string and swung in a vertical circle of radius 0.50 m, as shown. Its speed at the top of the circle is 6.0 ms^{-1} . (Take g as 10 ms^{-2})

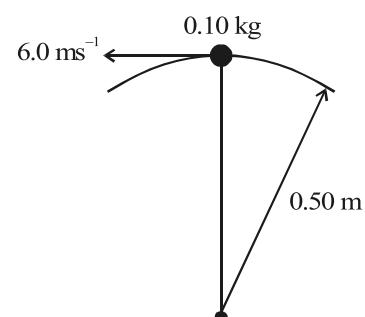
What is the tension in the string at this moment?

(a) 1.0 N

(b) 6.2 N

(c) 7.2 N

(d) 8.2 N



117. An object on the end of a spring oscillates with simple harmonic motion of angular frequency 2.0 rad s^{-1} . What is the period of the oscillation?

(a) 0.080 s

(b) 0.32 s

(c) 0.50 s

(d) 3.1 s

118. An object is travelling in a circle of radius r with angular velocity ω and speed v . Which expression gives the centripetal acceleration?

(a) $r\omega$

(b) $v\omega$

(c) v/r

(d) v/r^2

- 119.** When brakes of a car are applied, angular velocity of a flywheel reduces from 900 cycle/min. to 720 cycle/min. in 6sec. Angular retardation is:

(a) $\pi \text{ rad/s}^2$ (b) $9\pi \text{ rad/s}^2$
(c) $8\pi \text{ rad/s}^2$ (d) None of these

120. A motor operates at 20 rev/s. What is power delivered by it? If it supply a torque of 75 Nm:

(a) 75 W (b) 85 W
(c) 90 W (d) $9.4 \times 10^3 \text{ W}$

121. A wheel starts from rest and gets a rotational speed of 240 rev/s in time 2 min. Its average acceleration will be:

(a) 1 rev/s² (b) 2 rev/s²
(c) 5 rev/s² (d) 8 rev/s²

122. Ratio of magnitude of angular velocity of hour hand of a watch to that of earth's rotation about its own axis is:

(a) 3 : 1 (b) 1 : 3
(c) 2 : 1 (d) 1 : 4

123. If a solid sphere rolls on a horizontal surface, the ratio of its rotational K.E. to its total K.E. is:

(a) 1 : 3 (b) 2 : 7
(c) 7 : 3 (d) None of these

124. A solid cylinder rolls down an inclined plane of height 1 m in 10 s. Its acceleration is:

(a) 0.3 m/s^2 (b) 0.7 m/s^2
(c) 5 m/s^2 (d) 1 m/s^2

125. A particle of mass m tied to a string of length l is rotating in a circular path with constant speed v . Torque on it is:

(a) Zero (b) mv/l
(c) $\frac{mv}{l}$ (d) $\frac{mv^2}{l}$

126. A motor runs at 20 rev/s and supplies a torque of 75 Nm. Power delivered by it is:

(a) 6.12 hp (b) 12.6 hp
(c) 7.3 hp (d) 8.3 hp

127. A body is executing uniform circular motion. Its angular acceleration is:

(a) 2 (b) 4
(c) Zero (d) None of these

ANSWERS

1.	(b)	2.	(b)	3.	(a)	4.	(c)
5.	(a)	6.	(b)	7.	(d)	8.	(b)
9.	(c)	10.	(b)	11.	(a)	12.	(a)
13.	(c)	14.	(b)	15.	(c)	16.	(b)
17.	(a)	18.	(a)	19.	(b)	20.	(b)
21.	(a)	22.	(d)	23.	(b)	24.	(a)
25.	(d)	26.	(d)	27.	(b)	28.	(a)
29.	(c)	30.	(a)	31.	(b)	32.	(a)
33.	(c)	34.	(b)	35.	(b)	36.	(b)
37.	(b)	38.	(a)	39.	(c)	40.	(d)
41.	(b)	42.	(c)	43.	(a)	44.	(d)
45.	(d)	46.	(c)	47.	(a)	48.	(c)
49.	(d)	50.	(b)	51.	(a)	52.	(c)
53.	(d)	54.	(a)	55.	(a)	56.	(a)
57.	(d)	58.	(a)	59.	(b)	60.	(a)
61.	(c)	62.	(a)	63.	(b)	64.	(a)
65.	(c)	66.	(a)	67.	(a)	68.	(a)
69.	(b)	70.	(c)	71.	(c)	72.	(c)
73.	(b)	74.	(b)	75.	(c)	76.	(b)
77.	(d)	78.	(b)	79.	(a)	80.	(c)
81.	(a)	82.	(c)	83.	(c)	84.	(d)
85.	(b)	86.	(c)	87.	(b)	88.	(c)
89.	(c)	90.	(d)	91.	(d)	92.	(a)
93.	(d)	94.	(b)	95.	(d)	96.	(a)
97.	(b)	98.	(c)	99.	(a)	100.	(a)
101.	(b)	102.	(b)	103.	(b)	104.	(b)
105.	(b)	106.	(b)	107.	(a)	108.	(d)
109.	(b)	110.	(b)	111.	(c)	112.	(b)
113.	(b)	114.	(b)	115.	(d)	116.	(b)
117.	(d)	118.	(b)	119.	(a)	120.	(d)
121.	(b)	122.	(c)	123.	(c)	124.	(a)
125.	(a)	126.	(b)	127.	(c)		