PHYSICS

BOOKS - NIKITA PHYSICS (HINGLISH)

CIRCULAR MOTION

Multiple Choice Question

1. A particle moving along a circule path of radius 'r' with uniform angular velocity ω. Its angular acceleration is

A. $r\omega^2$

B. r/ω

C. zero

D. ω/r

Answer: C

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2. When a particle is recolving around a circular path with uniform angular velocity , then its acceleration is

A. along the tangent drawn at any poit

B. along the circumference of the circle

C. along the radius towards the centre of the circle

D. zero

Answer: C

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3. When a particle is moving along a circular path with uniforme speed , the physical quantity which remains constant both in magnitude and direction is

A. velocity

B. centripetal force

C. centripetal acceleration

D. angular velocity

Answer: D

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4. For a particle moving along a circular path with a constant speed, the accelerationis constant in

A. magnitude only

B. direction only

C. both magnitude and direction

D. neither magnitude nor direction

Answer: A

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5. For uniform circular motion, the quantity that does remain constant is

A. centripetal acceleration

B. kinetic energy

C. angular momentum

D. angular velocity

Answer: A

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6. A mass is revolving along a circle which ia in the plane of the paper. The direction of tangential acceleration is

A. toward the centre of the circle

B. away from the centre of the circle

C. tangent to the circular path

D. parallel to angular velocity

Answer: C

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7. Identify the increase in order of the angular velocities of the following

(A) earth rotating about its own axis

(b) hour's hand of a clock

(c) second's hand of a clock

(d) flywheel of radius 2 m making 300 rpm

A. A,B,C,D

B. B,C,D,A

C. C,D,A,B

D. D,A,B,C

Answer: A

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8. The motion of the particle along the circumference of the circle is a

A. projectile motion

B. uniforme circular motion

C. non uniform circular motion

D. circular motion

Answer: D

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9. The motion of the particle along the circumference of the circle with constant angular speed is

A. uniforme circular motion

B. projectile motion

C. non accelerated motion

D. non uniform circular motion

Answer: A

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10. The circle of the particle along the circumference of the circle with variable speed is a

A. uniform circular motion

B. non uniform circular motion

C. accelerated motion

D. rotational motion

Answer: B

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11. In a uniforme circular motion, the velocity of linear velocity of a particle

A. changes instantaneously

B. cahnges periodically

C. constant

D. changes abruptly

Answer: A

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12. In a uniform circular motion , the direction of linear velocity is along the

A. radius vector away from centre

B. radius vector towards the centre

C. prependicular to the plane of the circular motion

D. tangent to the curve path

Answer: d

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13. In UCM, the radius vector has

A. variable magnitude and changes direction continously

B. unique direction

C. constant in magnitude and same direction

D. constant magnitude but continuously changing direction

Answer: D

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14. A particle performing a U.C.M. has a

A. radial velocity

B. radial accelerationdirection towards the centre

C. tangential acceleration

D. radial acceleration , direction away from the centre

Answer: B

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15. The direction of velocity continuously changes in

A. uniforme circular motion

B. nonuniforme circular motion

C. oscillatory motion

D. uniforme and non uniforme circular motion

Answer: D

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16. The particle is performing uniform circular motion, the true statement/s/are/is

(A) the direction of linear velocity, acceleration and force changes instantaneously

(B) the magnitude of linear velocity, acceleration and force instantaneously.

(C) the magnitude of linear velocity, acceleration and force remains constant.

(D) linear velocity, acceleration and force are in the same direction

A. A and D

B. A and C

C. B,C and D

D. A,B and C

Answer: B

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17. The work done on a particle performing UCM is

A. constant but non zero

B. $\frac{mv^2}{r} \times 2\pi r$

C. zero

D. infinity

Answer: C

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18. A particle is performing uniforme circular motion, has constant

A. velocity

B. kinetic energy

C. momentum

D. acceleration

Answer: C

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19. For a particle performing UCM, the phisical quantities are constant

A. speed and angular velocity

B. kinetic energy and radius vector

C. angular velocity and kinetic energy

D. a and c

Answer: B

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20. In a uniform circular motion , the direction of linear velocity is along the

A. work done is zero

B. torque is zero

C. angular speed constant

D. all of the above

Answer: D

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21. In a uniform circular motion , the velocity, position vector and angular velocity are

A. parallel to each other

B. mutually prependicular to each other

C. they are co-planer

D. the angle between them is 45°

Answer: B

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22. A particle performing UCM, the particle is acted upon by

A. gravitational acceleration

B. radial acceleration

C. the resultant acceleration

D. angular acceleration

Answer: B

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23. If a body is moving with a uniform speed v in a circle of radius 'r', then the angular acceleration of the body will be

A. v/r

B. $\frac{v^2}{r}$ along the radius and away from the centre

C. $\frac{v^2}{r}$ along radius and toward centre

D. zero

Answer: D

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24. If a particle moves in a circle, describing equal angles in aqual intervals of time in a plane about a fixed point, its velocity vector

A. changes in direction

B. remains constant

C. changes in magnitude

D. changes both in magnitude and direction.

Answer: A

25. A particle is moving in a circle with a constant speed, the acceleration of the particle has

A. constant magnitude

B. constant magnitude and direction

C. both magnitude and direction changes

D. neither magnitude nor direction changes

Answer: A

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26. A particle is moving an a uniform circular motion with radius 'r' Then the distance covered by the particle on one revoution will be

A. $2\pi r$

B. 2π

C. πr

D. πr^2

Answer: A

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27. A particle is moving in a uniform circular motion with radius'r' in half revolution the displacement and distance covered by the particle are

A. $2r, 2\pi r$

B. $1.414r, 3.142r$

C. $2r, \pi r$

D. $\pi r, 2r$

Answer: C

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28. When a particle moves in a circle with unifoem speed then,

A. velocity and acceleration are constant

B. both velocity and acceleration change

C. acceleration is constant but celocity change

D. magnitude of angular celocity constant but its direction change

Answer: B

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29. A vector drown from centre of the circle to any position of the particle on circumference of the circle is

A. radius vector

B. position vector

C. velocity vector

D. both 'a' and 'b'

Answer: D

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30. In a non uniform circular motion, the acceleration on the particle is

A. centripetal acceleration only

B. tangential acceleration only

C. the resultant centripetal and tangential acceleration

D. centrifugal acceleration

Answer: C

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31. The relation between linear velocity and angular velocity of a body moving in circle in vector from is

A. $\overrightarrow{a}_r = \overrightarrow{\omega}.\overrightarrow{v}$

B. $\overrightarrow{a}_r = \overrightarrow{\omega} \times \overrightarrow{v}$

C. $\overrightarrow{a}_r = \overrightarrow{v} \times \overrightarrow{\omega}$

D. $\overrightarrow{a}_r = \overrightarrow{v}.\overrightarrow{\omega}$

Answer: B

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32. The uniform circular motion is accelerated motion, because

A. the motion accelerates due to the change in velocity

B. the motion accelerates due to the change in angular velocity

C. the motion accelerates due to the force

D. all of these

Answer: A

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33. If the angle between tangential acceleration and resultant acceleration in non ucm is a, then direction of the resultant acceleration will be

A. $\tan^{-1}\left(\frac{a_T}{a_r}\right)$

B. $\tan^{-1}\left(\frac{a_r}{a_T}\right)$

C. $\tan^{-1}\left(\frac{a_r}{a_\alpha}\right)$

D. $\tan^{-1}\left(\frac{a_T}{a_\alpha}\right)$

Answer: B

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34. The angular displacement in circular motion is

A. dimensional quantity

B. dimensionless quantity

C. unitless quantity and dimensionless quantity

D. unitless quantity

Answer: B

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35. The infinitesimally angular displacement $\delta\theta$ in uniform circular motion is

A. vector quantity

B. scalar quantity

C. neither scalar non vector

D. tensor quantity

Answer: A

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36. The direction of angular displacement $\overrightarrow{\delta\theta}$ in U.C.M. is given by

A. left hand rule

B. right hand thumb rule

C. right handed screw rule

D. either 'b' or 'c'

Answer: D

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37. According to right hand thumb rule, the direction of angular displacement when a particle is performing uniform circular motion is

A. paraller to radius vector direction away

B. tangent to circular path

C. path prependicular to plane of circular path

D. directed along radius towards centre

Answer: C

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38. The rate of change of angular displacement in uniform circular motion is .

A. angular velocity $\left(\vec{\omega}\right)$

B. angular speed (ω)

C. angular acceleration $\left(\vec{\theta}\right)$

D. radial acceleration

Answer: A

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39. The rate change of angular velocity w.r to t

in uniform circular motion is a

A. radial acceleration

B. angular acceleration $\left(\vec{\theta}\right)$

C. angular displacement

D. angular displacement

Answer: B

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40. Finite angular displacement is not a vector because

A. it do not obey the law of vector addition

B. it obeys the law of addition of vectors

C. its direction is given by right hand rule

D. it changes with time

Answer: A

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41. The infinitesimal angular displacement of a particle performing circular motion is a vetor because its obeys

A. the commutative and associative laws of vector addition

B. do not obeys the laws of vector addition

C. do not obeys the laws of multiplication of vectors

D. all of these

Answer: A

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42. Angular displacement is measured in

A. meter

B. time

C. radian

D. steradian

Answer: C

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43. The angular subtended at the centre of the circle by an arc of length equal to the radius of circle is

A. one radian

B. one degree

C. one steradian

D. 90°

Answer: C

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44. If a particle goes round the circle once in a time period T, then the angular velocity ω will be

A. $2\pi t$

B. $T/2\pi$

C. $2\pi/T$

D. π/T

Answer: D

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45. The angular speed ω is given by

A. $2\pi n$

B. $2\pi / T$

C. $2\pi / n$

D. both 'a' and 'b'

Answer: B

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46. The SI unit of angular velocity is

A. metre/s

B. radian/s

C. $radia\frac{n}{s^2}$

D. s^{-1}

Answer: B

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47. The SI unit of angular acceleration is

A. radian/s

B. radian/s

C. radian $/ s^2$

D. meter $\frac{r}{s^2}$

Answer: C

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48. The relation between linear velocity and angular velocity of a body moving in circle in vector from is

A. $\overrightarrow{v} = \overrightarrow{\omega} \times \overrightarrow{r}$

B. $\overrightarrow{v} = \overrightarrow{r} \times \overrightarrow{\omega}$

C. $\overrightarrow{v} = \overrightarrow{\omega} / \overrightarrow{r}$

D. $\overrightarrow{r} = \overrightarrow{v} \times \overrightarrow{\omega}$

Answer: A

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49. The relation between tangential or linear acceleration and angular acceleration of a body moving in circle is given by

A. $\overrightarrow{a} = \overrightarrow{r} / \overrightarrow{\alpha}$

B. $\overrightarrow{a} = \overrightarrow{\alpha} \times \overrightarrow{r}$

C. $\overrightarrow{a} = \overrightarrow{\alpha} / \overrightarrow{r}$

D. $\overrightarrow{a} = \overrightarrow{r} \times \alpha^{\rightarrow}$

Answer: B

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50. A body performing nonuniform circular motion experiences linear acceleration a_r and tangential acceleration a_T, such that a_r

changes the direction of linear velocity. Then the resultant acceleration 'a' in this case is ,

A. $\sqrt{a_T^3 + a_T^3}$

B. $a = a_r + a_T$

C. $a = \sqrt{a_r^2 + a_T^2}$

D. $a = \sqrt{a_r^2 a_T^2}$

Answer: C

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51. The phisical quantites which reamin constant for a particle performing uniform circular motion in horizontal plane are

A. kinetic energy

B. torque is zero

C. angular momentum

D. 1 and 3

Answer: D

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52. In nonuniform circular motion, the linear acceleration $\vec{a}$, the angular acceleration, $\vec{\alpha}$, the angular velocity $\vec{v}$ the radius vector $\vec{r}$ and the angular velocity $\vec{\omega}$ at any instant are related by the vector equation,

A. $\vec{a} = \vec{\alpha} \times \vec{r} + \vec{\omega} \times \vec{v}$

B. $\vec{a} = \vec{r} \times \vec{\alpha} + \vec{v} \times \vec{\omega}$

C. $\vec{a} = \vec{\alpha} \times r + \vec{v} \times \vec{\omega}$

D. $\vec{a} = \vec{\alpha} \times r - \vec{\omega} \times \vec{v}$

Answer: A

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53. A body is moving along circle at constant speed Which of the following statement is true?

A. body is not accelerated

B. body has a inward radial acceleration

C. body has constant velocity

D. body has outward radial acceleration.

Answer: B

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54. A particle moves along a circule path with a constant angular velocity. This necessarily means that the motion

A. confined to a single plane

B. not confined ro a single plane

C. nothing can be said regarding the plane of motion

D. its motion is one - dimensional

Answer: A

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55. When a body moves in unifor circle motion in a horizontal plane then its angular acceleration will

A. increases

B. decreases

C. be zero

D. be constant

Answer: C

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56. Two particles A and B are located at distances r_A and r_B from the centre of a rotating disc such that $r_A > r_B$. In this case (Angular velocity (ω) of rotation is constant)

A. both A and B do not have any acceleration

B. both A and B have same acceleration

C. A has greater acceleration than B

D. B has greater acceleration than B

Answer: C

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57. A particle is moving an a cirle of radius 'r' and centre O with constant speed . What is the change in velocity in moving from A to B ? (If any angle between two velocity vector is θ.)

A. $2v \sin^2 \theta / 2$

B. $2v \sin \theta / 2$

C. $2v \sin^2 \theta / 2$

D. $2v \cos \theta / 2$

Answer: B

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58. A cycle wheel is rotating with uniform angular velocity ω A graph is plotted between tangential veloities from the axis. The graph is

A. a straight line parallel to velocity axis

B. a straight line parallel to distance axis

C. intersecting both velocity and distance axes

D. passing through origin with a slop `'omega'.

Answer: D

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59. If a graph is plotted between angular velocity ω and distance x of a particle performing uniform circular motion, the graph is a straight line

A. paraller to ω axis

B. paeallel to distance x-axis

C. intersecting both ω and distance axis

D. intersecting only ω axis

Answer: B

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60. When the angular velocity of a particle performing circular motion is decreasing in anticlock wise direction then the direction of angular acceleration will be

A. in the direction of intial angular velocity

B. opposite to the direction of intial angular velocity

C. perpendicular to the direction of intial angular velocity

D. both 'a' and 'c'

Answer: B

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61. A stone is tied to the end of a string of length 1 and whirled in a horizontal circle. When the string breaks then stone

A. flies radially inwoards

B. files radially outwards

C. drops down

D. flies tangent to the circular path

Answer: D

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62. An aeroplane is taking a turn in a horizontal plane. While doing so,

A. it remains horizontal

B. it inclines outwards

C. it inclines inwards

D. it will be vertical

Answer: C

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63. If a body moves along circular path of constant radius, then the magnitude of its acceleration will be

A. uniform

B. zero

C. variable

D. not to be decided from the information

Answer: D

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64. A particle moves along a circle in the plane of the paper clockwise direction. If its angular velocity is gradually increaseing in magnitude, direction of its angular acceleration is

A. normally into the paper

B. normally outwards from the paper

C. zero

D. vertically up

Answer: 2

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65. The speed of revolution of a particle around a circle is halved and its angular speed is doubled what happens to the radial acceleration ?

A. remainsunchanged

B. halved

C. doubled

D. quadrupled

Answer: A

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66. A particle is moving along a circular path. Which of the following statement is not correct?

A. angular velocity is perpendicular to centripetal acceleration

B. angular velocity is perpendicular to linear velocity

C. the linear velocity is perpendicular to centripetal acceleration

D. angular acceleration is perpendicular to angular velocity

Answer: D

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67. A particle is performing non UCM, the acceleration of the particle is $\overrightarrow{a}_R = \overrightarrow{a}_r + \overrightarrow{a}_T$, where $\overrightarrow{a}_r$ is radial component of acceleration. If $\overrightarrow{a}_r = 0$, the motion of the particle is

A. uniform circular motion

B. non uniform circular motion

C. straight line motion along the tangent to curve path

D. spiral motion about centre

Answer: D

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68. A particle moves with uniform speed in a circular path the angle between intantaneous celocity and acceleration is

A. 0°

B. 180°

C. 90°

D. 45°

Answer: C

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69. A particle moves with constant angular velocity in a circle. During the motion its

A. energy is consevedB. momentum is conserved

C. energy and momentum both are conserved

D. non of the above is conserved

Answer: A

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70. A particle moves in a circular orbit under the action of a central attractive force inversely proportional to the distance r. The speed of the particle is

A. propotional to r^2

B. Independent of r

C. Proportional to r

D. Proportional to 1/r

Answer: B

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71. The average acceleration vector for a particle having a uniform circular motion is

A. a constant vector of magnitude v^2/r

B. a vector of magnitude v^2/r directed normal to the plane

C. equal to the instantaneous acceleration vector at the start of the motion

D. a null vector

Answer: D

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72. If a particle covers half the circle of radius R with constant speed then

A. momentum change is mvr

B. chanfe in K.E is $1/2mv^2$

C. change in K.E. is mv^2

D. change in K.E. is zero

Answer: D

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73. If a_r and a_t represent radial and tangential accelerations, the motion of a particle will be uniformly circular if

A. $a_r = 0$ and $a_t = 0$

B. $a_r = 0 \text{but} a_t \neq 0$

C. $a_r \neq 0 \text{but} a_t = 0$

D. $a_r \neq 0$ and $a_t \neq 0$

Answer: C

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74. Two particles of masses m_1 and m_2 are moving in concentric circle of radii r_1 and r_2 such that their period are same. Then the ratio of their centripetal acceleration is

A. r_1^2 / r_2^2

B. r_2^2 / r_1^2

C. r_1 / r_2

D. r_2 / r_1

Answer: C

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75. A particle is moving along a circular path of radius 5 m with uniform speed of $5m / s$. What will be time taken by the particle in half revolution?

A. $\pi / 2s$

B. $2\pi s$

C. πs

D. $3\pi / 2s$

Answer: C

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76. What is the angular displacement of the minute hand in 20 minutes?

A. $\pi / 3rad$

B. $2\pi / 3rad$

C. $\pi / 2rad$

D. $3\pi / 2rad$

Answer: B

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77. The frequency of a particle performing circular motion changes from 60 rpm to 180 rpm in 20 s . Then the angular acceleration is

A. $0.1\pi rad / s^2$

B. $0.2\pi rad / s^2$

C. $0.3\pi rad / s^2$

D. $0.4\pi rad / s^2$

Answer: B

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78. A particle is moving in a circle of a radius 40 cm has a linear speed of $30m / s$ at a certains intant its linear speed is increasesing at the rate of $4m/s^2$. Increasing at the instant will be

A. $200m/s^3$

B. $600m/s^3$

C. $100m/s^2$

D. $300m/s^3$

Answer: B

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79. If a particle is moving in a circular path of radius 'r' with a uniform speed v, then the angle described by it in one second will be

A. vr

B. $1/vr$

C. v/r

D. v/r^2

Answer: C

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80. The angular speed of the minutes hand of a clock in degree per second is

A. 0.01

B. 0.1

C. 0.0

D. $\pi / 1800$

Answer: B

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81. Two racing cars having masse m_1 and m_2 move in concentric circle of radii r_1 and r_2 respectively. If their angular speed are same , then ratio of their linear speed is

A. $m_1 : m_2$

B. $r_1 : r_2$

C. $1 : 1$

D. $m_1 r_1 : m_2 r_2$

Answer: B

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82. If the radius of the rarth is 6400 km, then the linear velocity of a point on the equator will be nearly

A. 1000 km/h

B. 1675 km/h

C. 100 km /h

D. 800 km/h

Answer: B

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83. The angular velocity of a wheel is $70 rad / \sec$. If the radius of the wheel is 0.5 m , then linear velocity of the wheel is

A. 10 m/s

B. 20m/s

C. 35m/s

D. 70m/s

Answer: C

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84. If a small babyof mass m is moving with angular velocity ω in a circle of radius r, then its K.E. will be

A. $\frac{m\omega r}{2}$

B. $(m\omega^2 r)$

C. $\frac{m\omega^2 r^2}{2}$

D. $\frac{m\omega r^2}{2}$

Answer: C

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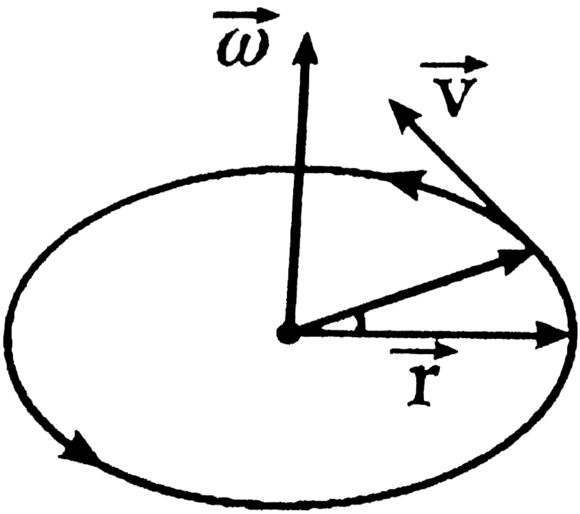
85. If a figure, the linear velocity $\vec{v}$ in terms of polar coordinate is



A. $\vec{v} = \vec{i}\, r \cos \omega t + \vec{j}\, r \sin \omega t$

B. $\vec{v} = \vec{i}\, r \sin \omega t + \vec{j}\, r \cos \omega t$

C. $\overrightarrow{v} = \left(+\overrightarrow{i} r \sin \omega t + \overrightarrow{j} r \cos \omega t\right)\omega$

D. $\overrightarrow{v} = -\overrightarrow{i} r\omega \sin \omega t + \overrightarrow{j} r\omega \cos \omega t$

Answer: D

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86. If a body revolves n times in a circle of radius π cm in one minute, then its linear celocity will be

A. $\frac{60}{2n} cm / s$

B. $\frac{2n}{60} cm / s$

C. $\frac{2\pi^2 n}{60} cm / s$

D. $\frac{60}{2\pi^2} cm / s$

Answer: C

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87. A particle of mass M is moving in a horizontal circle of radius R with uniform speed V. When it moves from one point to a diametrically opposite point, its

A. K.E. changes by $mv^2/4$

B. momentum does not change

C. momentum changes by 2mv

D. K.E. changes by mv^2

Answer: C

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88. If a particle is describing circular path of radus 10 m in every 2s, then the average angular speed of the particleduring 4 s will be

A. $0.5\pi rad / s$

B. $3\pi / 4rad / s$

C. $20\pi rad / s$

D. $\pi rad / s$

Answer: D

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89. A particle moves in a circular path of radius 0.4 m with a constan speed . If it makes 5 revolution in each second of its motion , then the speed of the particle will be

A. $10.6m/s$

B. $11.2m/s$

C. $12.56m/s$

D. $13.6m/s$

Answer: C

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90. If the speed of the tip of the minute hand of a town clock is $1.75 \times 10^{-3} m / s$, then the speed of its second hand of same length will be

A. $1.7 \times 10^{-3} m / s$

B. $10.510^{-3} m / s$

C. $10.5 \times 10^{-2} m / s$

D. $17.5 \times 10^{-3} m / s$

Answer: C

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91. The angular displacement of a particle performing circular motion is

$$\theta = \frac{t^3}{60} - \frac{t}{4}$$

where θ is in radian and 't' is in second .Then the angular velocity and angular acceleraion of a particle at the end of 5 s will be

A. $1 rad / s, 5 rad / s^2$

B. $1 rad / s, 0.5 rad / s^2$

C. $5 rad / s, 1 rad / s^2$

D. $0.1 rad / s, 5 rad / s^2$

Answer: B

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92. A motor car is travelling 20m/s on a circular road of radius 400 m. If it increases its speed at the rate of $1 m / s^2$, then its acceleration will be

A. $2\sqrt{2} m / s^2$

B. $\sqrt{3}m / s^2$

C. $\sqrt{2}m / s^2$

D. $3\sqrt{3}m / s^2$

Answer: C

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93. The angular displacement of a particle performing circular motion is

$$\theta = \frac{t^4}{60} - \frac{t}{4}$$

where θ is radian and 't' is in seconds. Then the acceleration of a particle at the end of 10 s will be

A. $10 rad / s^2$

B. $20 rad / s^2$

C. $30 rad / s^2$

D. $15 rad / s^2$

Answer: B

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94. A particle is performing uniform circular motion with velocity $40m/s$. If the angle between the two velocity vector is 60°, then the change in velocity will be

A. $30m/s$

B. $40m/s$

C. $20m/s$

D. $10m/s$

Answer: B

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95. If a particle is moving with uniform velocity 20 m//s on a circular track of radius 10 m, then the magnitude of change in velocity in half revolution will be

A. $20m/s$

B. $10m/s$

C. $30m/s$

D. $40m/s$

Answer: D

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96. If in aeroplane is moving on a circular path with a uniform speed 300 km /h, then the change in velocity after quarter of the circle will be

A. $150km/h$

B. zero

C. $600km/h$

D. $300\sqrt{2}km / h$

Answer: D

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97. In the above problem, the change in velocity cfter covering an angle of 90° will be

A. zero km//h

B. $300km / h$

C. $600km / h$

D. $300\sqrt{2}km/h$

Answer: D

Watch Video Solution

98. In the above problem No. 96, if angle turned is 270° then the change in velocity will be

A. zero km/h

B. $300km/h$

C. $600km / h$

D. $300\sqrt{2}km / h$

Answer: D

Watch Video Solution

99. An aeroplane moving in a circular path with a speed $250km / h$. The change in velocity in half of the revolution is.

A. zero

B. $100km / h^2$

C. $50km / h^2$

D. $25km / h^2$

Answer: B

Watch Video Solution

100. A particle is moving on a circular path with constant speed v then the change in its velocity after it has desceibed an angle of 60° will be

A. $v\sqrt{2}$

B. 0

C. v

D. 2v

Answer: C

Watch Video Solution

101. A particle P is moving in a circle of radius r with a uniform speed u. C is the centre of the circle and AB is diameter. The angular velocity of P about A and V are in the ratio :

A. $1:1$

B. $1:2$

C. $2:1$

D. $4:2$

Answer: B

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102. The angular displacement of a second of a clock in 15 s in SI unit is

A. π radian

B. 180°

C. 90°

D. $\frac{\pi}{2} radian$

Answer: D

Watch Video Solution

103. If a car is travelling at 20 m//s on a circular road of radius 400m then the radial acceleration will be

A. $1m/s^2$

B. $10m/s^2$

C. $0.1m/s^2$

D. $0.01m/s^2$

Answer: A

Watch Video Solution

104. A car is moving in a circular path of radius $500m$ with a speed of $30m/s$. If the speed is increased at the rate of $2m/s^2$, the resultant acceleration will be .

A. $2m/s^2$

B. $1.8m/s^2$

C. $2.69m/s^2$

D. $9.8m/s^2$

Answer: C

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105. If a body is moving withuniform speed of $10m/s$ on a circular path of diameter 2 m , then the difference between the distance covered by it and displacement un half revolution will be

A. 2 m

B. 1.142 m

C. 3.142 m

D. 6.284 m

Answer: B

Watch Video Solution

106. If a speed man is rotated at the end of a long beam of length 5m and the acceleration of 9g, then the number of revolution performed will be

$(g = 10m/s^2)$

A. $\frac{3}{\sqrt{2}\pi} rps$

B. $\frac{3\pi}{\sqrt{2}} rps$

C. $\frac{2\sqrt{5}}{3} rps$

D. $\frac{\sqrt{3}}{3\pi} rps$

Answer: A

Watch Video Solution

107. What is the angular speed of rotation about its polar axis, so that the bodies on its equator would fell no weight?

$\left(g = 9.8m/s^2, R = 6.4 \times 10^6 m\right)$

A. $1.237 \times 10^{3} rad / s$

B. $1.237 \times 10^{-4} rad / s$

C. $7.27 \times 10^{-3} rad / s$

D. $7.27 \times 10^{-4} rad / s$

Answer: A

Watch Video Solution

108. The hour hand and the minute hand of a clock coincide at every relative peridic time is ,

A. $11/12 hour$

B. $12/11 hour$

C. $11/6 hour$

D. $12/24 hour$

Answer: B

Watch Video Solution

109. If a particle is moving along a circle of radius 3 m with a constant speed $9m/s$, then it covers a quarter of the circle in time of

A. $\pi / 3s$

B. $\pi / 6s$

C. $\pi / 2s$

D. $\pi / 8s$

Answer: B

Watch Video Solution

110. A flywheel rotates about a fixed axis and slows down from 400 rpm to 200 rpm in one minute How many revolutions does the flywheel complete in the same time ?

A. 200 rev

B. 400 rev

C. 300 rev

D. 500 rev

Answer: C

Watch Video Solution

111. A particle is moving along circular path of radius 40 m with a uniform speed of $20m/s$. Then the time taken for the particle to complete half revolution will be

A. $4\pi s$

B. πs

C. $2\pi s$

D. $\pi/2s$

Answer: C

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112. The speed of a motor increases from 1200 rpm to 1800 rpm in 20 s . How many revolutions does it make during these second ?

A. 400

B. 600

C. 500

D. 700

Answer: C

Watch Video Solution

113. If a particle moves on a circular path of radius 4 m with time period 4 s, then the change in magnitude of velocity in one- fourth revolution will be

A. $2\sqrt{2}\pi m / s$

B. $\pi m / s$

C. $3\pi m / s$

D. $4\pi m / s$

Answer: A

Watch Video Solution

114. A particle moves in a circle of radius 25 cm at two revolutions per sec. The acceleration of the particle in m / s^2 is:

A. $12\pi^2$

B. $8\pi^2$

C. $4\pi^2$

D. $2\pi^2$

Answer: C

Watch Video Solution

115. The acceleration of a point on the rim of a flywheel of diameter 1.2 m, if it makes 900 revolutions per minute, will be

A. $540\pi^2 m / s^2$

B. $270m/s^2$

C. $360m/s^2$

D. $540m/s^2$

Answer: A

Watch Video Solution

116. A particle is kept fixed on a turntable rotating uniformly. As seen from the ground the particle goes in a circle, its speed is $20cm/s$ & acceleration is $20cm/s^2$. The particle is now shifted to a new position to make the radius half of the original value. The new values of the speed & acceleration will be:

A. $10cm / s, 10cm / s^2$

B. $10cm / s, 80cm / s^2$

C. $40cm / s, 10cm / s^2$

D. $40cm / s, 40cm / s^2$

Answer: A

Watch Video Solution

117. The speed of a body moving in a circle of radius 15 cm changes from $180 rev / \min \rightarrow 600 rev / \min \text{ in} 11 s$. Then the angular acceleration of the body will be

A. $1 rad / s^2$

B. $2 rad / s^2$

C. $3 rad / s^2$

D. $4 rad / s^2$

Answer: D

Watch Video Solution

118. In the above problem, the linear acceleration will be

A. $0.6m / s^2$

B. $0.5m / s^2$

C. $0.4m / s^2$

D. $0.2m / s^2$

Answer: A

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119. The angular speed of second hand in a watch is

A. $\frac{\pi}{60} rad / s$

B. $\frac{\pi}{30} rad / s$

C. $\frac{\pi}{120} rad / s$

D. $\frac{\pi}{2} rad / s$

Answer: B

Watch Video Solution

120. If a poit on the circumference of a wheel having diameter 4 m has velocity of 1600 cm/s, then the angular velocity of the wheel will be

A. $8rad / s$

B. $4rad / s$

C. $6rad / s$

D. $3rad / s$

Answer: A

Watch Video Solution

121. To simulate the acceleration of large rockets, the astronauts are spun at the end of long rotating beam of radius 9.8 m . What will be angular velocity required for generating centripetal acceleration 8 times the acceleration due to gravity?

A. $2.828 rad / s$

B. $28.28 rad / s$

C. $282.8 rad / s$

D. zero

Answer: A

Watch Video Solution

122. A human body can safely with stand with an acceleration of $10gm/s^2$. What will be the number of revolution that a space traveller can perform on a rotating platform of radius 10 m ?

A. $4.984 rps$

B. $0.4984 rps$

C. $3.142 rps$

D. $49.84 rps$

Answer: B

Watch Video Solution

123. If an electric fan revolving at 600 rps is speeded up uniformly to 1200 rpm in 4 s, then the angular acceleration of a fan will be

A. $\pi / 2 rad / s^2$

B. $2\pi rad / s^2$

C. $3\pi / 2rad / s^2$

D. $5\pi rad / s^2$

Answer: D

Watch Video Solution

124. When a motor cyclist takes a $U - turn$ in $4s$ what is the average angular velocity of the motor cyclist.

A. $\pi/2rad/s$

B. $\pi/4rad/s$

C. $\pi/3rad/s$

D. $\pi/5rad/s$

Answer: B

Watch Video Solution

125. A particle is moving in a circle of radius 20 cm has a linear speed of $10m/s$ at a certain instant and linear speed is increases at the rate of $2m/s^2$. What is the rate at which its acceleration in U.C.M. is increasing at that instant?

A. $400m/s^2$

B. $200m/s^3$

C. $300m/s^3$

D. $100m/s^3$

Answer: B

Watch Video Solution

126. The angular speed of a particle,moving in a circle of radius 20 cm ,increases from $2rad/s \rightarrow 40rad/s$ in 19 s the ratio of its centripetal acceleration to tangential acceleration at the end of 19 s is ,

A. $400:1$

B. $1:800$

C. $1:400$

D. $800:1$

Answer: D

127. The angular speed of second hand in a watch in deg/s is ,

A. $\frac{\pi}{45} deg / s$

B. $\frac{\pi}{60} deg / s$

C. $\frac{\pi}{60} deg / s$

D. $6 deg / s$

Answer: D

128. If the blades of an aeroplane are 4 m long and rotate at the rate of 600 rpm, them the angular velocity will be

A. $10\pi rad / s$

B. $30\pi rad / s$

C. $20\pi rad / s$

D. $40\pi rad / s$

Answer: C

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129. A car of mass m moves in a horizontal circular path of radius r meter. At an instant its speed is Vm/s and is increasing at a rate of a $m/\sec^2$. Then the acceleration of the car is:

A. $\left(a^2 + \frac{v^2}{r}\right)$

B. $\sqrt{a^2 + \left(\frac{v^2}{r}\right)}$

C. $a^2 + \left(\frac{v^2}{r}\right)^2$

D. $\sqrt{(a^2) + \left(\frac{v^2}{r}\right)^2}$

Answer: D

Watch Video Solution

130. A flywheel rotates about a fixed axis and slows down from 200 rpm to 100 rpm in one minute. How many revolution does the wheel complete in one minute?

A. 50

B. 100

C. 150

D. 200

Answer: C

Watch Video Solution

131. In 1 s, a particle goes from poitn A to point B, moving in a semicircle of radius 1 m. The magnitude of the average velocity of the particle is

A. $3.14m/s$

B. $2m/s$

C. $1m/s$

D. zero

Answer: B

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132. A racing completes three rounds on a circular racing track in one minute . If the car has a uniform centripetal acceleration of $\pi^2 m/s$ then radius of the track will be

A. 100m

B. 10m

C. 1000 m

D. 125m

Answer: A

Watch Video Solution

133. The extremity of the hour hand of a clock moves $(1/20)^{th}$ as the minute hand. If the minute hand is 10 cm long , then the length of the hour hand will be

A. 3 cm

B. 6 cm

C. 12 cm

D. 18 cm

Answer: B

Watch Video Solution

134. A particle goes round a circular path with uniform speed v.After describing half the circle, what is the change in its centripetal acceleration?

A. $\frac{v^2}{r}$

B. $\frac{2v^2}{r}$

C. $\frac{2v^2}{\pi r}$

D. $\frac{v^2}{\pi r}$

Answer: B

Watch Video Solution

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135. The ratio of angular speeds of minute hand and hour hand of a watch is

A. $1:12$

B. $6:1$

C. $12:1$

D. $1:6$

Answer: C

Watch Video Solution

136. A glass marble moves from one end of a semiciecular arc of radius R to the other end of the arc, The ratio of distance travelled by the marble to its displacement is

A. π / R

B. R / π

C. 2π

D. $\pi / 2$

Answer: D

Watch Video Solution

137. If an automobile moves round a curve of radius 300 m at constant speed of $60m/s$, then the change of velocity round a curve of 60° will be

A. zero

B. $30m/s$

C. $120m/s$

D. $60m/s$

Answer: D

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138. In the above question , the manitude of the instantaneous acceleration is

A. $10m/s^2$

B. $11m/s^2$

C. $12m/s^2$

D. $11.5m/s^2$

Answer: C

Watch Video Solution

139. In the above question, the magnitude of the average acceleration over the arc of 60° is

A. $10m/s^2$

B. $11m/s^2$

C. $11.5m/s^2$

D. $12m/s^2$

Answer: C

Watch Video Solution

140. Ration of angular velocity of hour hand of a clock to self rotation of the earth is

A. $1:2$

B. $2:1$

C. $1:12$

D. $12:1$

Answer: B

Watch Video Solution

141. If a car moves with a velocity of 45 kmph, angular velocity of its wheel of diameter 50 cm is

A. $50 rad / s$

B. $25 rad / s$

C. $100 rad / s$

D. $5 rad / s$

Answer: a

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142. The acceleration of an athlete running at 36 kmph when neotiating a turn of radius 25 m is

A. $1m/s^2$

B. $2m/s^2$

C. $4m/s^2$

D. $8m/s^2$

Answer: D

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143. A motor car is travelling at $30m/s$ on a circular track of radius 450 m . If its speed is increasing at the rate of $2m/s^2$, then its acceleration will be

A. $1/\sqrt{2}m/s^2$

B. $2m/s^2$

C. $\sqrt{2}m/s^2$

D. $2\sqrt{2}m / s^2$

Answer: D

Watch Video Solution

144. The speed of the wheel of an engine changes from 600 rpm to 1200 rpm in 5 s. Then its angular acceleration in rad / s^2

A. π

B. 2π

C. 3π

D. 4π

Answer: D

Watch Video Solution

145. The length of second's hand in watch is $1cm$. The change in Velocity of its tip in 15 seconds is

A. zero

B. $\dfrac{\pi}{30\sqrt{2}} cm / s$

C. $\dfrac{\pi}{30} cm / s$

D. $\dfrac{\pi\sqrt{2}}{30} cm / s$

Answer: D

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146. A mass 2 kg is whirled in a horizontal circle by means of a string at an initial speed of 5 revolutions per minute . Keeping the radius constant the tension in the string is doubled. The new speed is nearly

A. 14 rpm

B. 10 rpm

C. 2.25 rpm

D. 7 rpm

Answer: D

Watch Video Solution

147. The second 's hand of a watch has length 6 cm. Speed of end point and magnitude of difference of velocities at two perpendicular possition will be

A. $6.28 \text{ and } 0mm/s$

B. $8.88 \text{ and } 4.44mm/s$

C. $8.88 \text{ and } 6.28mm/s$

D. $6.28 \text{ and } 8.88mm/s$

Answer: D

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148. A particle comes round a circle of radius 1 m once. The time taken by it is 10 sec . The average velocity of motion is

A. $0.2\pi m/s$

B. $(r/100)m/s$

C. $(100/r)m/s$

D. zero

Answer: D

Watch Video Solution

149. A wheel completes 2000 revolutions to cover the 9.5 km. distance. then the diameter of the wheel is

A. 1.5 m

B. 1.5 cm

C. 7.5 cm

D. 7.5 m

Answer: A

Watch Video Solution

150. A belt passes over a wheel of radius 25 cm. If a point on the belt has a speed of $5m/s$, the belt is moving with an angular velocity of

A. $3.2 rad/s$

B. $0.32 rad/s$

C. $20 rad/s$

D. $0.032 rad/s$

Answer: C

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151. Two bodies of masses 8 kg and 4 kg are moving in concentric circular orbits of radii r_1 and r_2 respectively . If their time periods are same , the ration of their centripetal accelerations is

A. $r_1 : r_2$

B. $2r_1 : r_2$

C. $r_1 : 2r_2$

D. $r_1 : r_2$

Answer: A

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152. A stone tied to the end of a 20 cm long string is whriled in a horizontal ciecle with a constant angular speed .If the centripetal acceleration is $980cm/s^2$, its angular speed is

.

A. $7rad/s$

B. $14rad/s$

C. $\pi rad/s$

D. $20rad/s$

Answer: A

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153. A disc of radius 0.1 m starts from rest with an angular acceleration of $4.4rad/s^2$ .Then linear velocity of the point on its after 5 s is

A. $0.22 / s$

B. $2.2m / s$

C. $4.4m / s$

D. $1.1m / s$

Answer: B

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154. The acceleration of a body moving round a curve of radius 160 m at $20ms^{-1}$ is

A. $5m/s^{-2}$

B. $2.2m/s$

C. $2.5m/s$

D. $1.1m/s$

Answer: C

Watch Video Solution

155. The ratio of angular speeds of minutes hand and seconds hand in a watch is

A. $60:1$

B. $30:1$

C. $1:30$

D. $1:60$

Answer: D

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156. A wheel increases its speed from 60 rpm to 120 rpm in 10 s. Number of rotation made by it in 10 s is

A. 10

B. 15

C. 25

D. 20

Answer: B

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157. A particle is moving along a circle of radius 3 m .If its centripetal acceleration is $3ms^{-2}$, its angular velocity in $rads^{-1}$ is

A. 1

B. $1/3$

C. 3

D. 0.5

Answer: A

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158. A particle tied to a string of negligible weight and length l is swung in a horizontal circular path with constant angular velocity having time period T. If the string length is shortened by $l/2$ while the particle is in motion , the time period is .

A. 4T

B. 2T

C. $T/2$

D. $T/4$

Answer: D

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159. Two racing cars of masses m_1 and m_2 are moving in circles of radii r_1 and r_2 respectively. Their speeds are such that each makes a complete circle in the same duration of time t. The ratio of the angular speed of the first to the second car is

A. $m_{1 : m_2}$

B. $M_1 r_1 : m_2 r_2$

C. $m_1 r_2 : m_2 r_1$

D. $1 : 1$

Answer: D

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160. A body is revoving with a constant speed along a circle. If its direction of motion is reversed but the speed remains the same, then which of the following statement is true

A. the centrifugal force will suffer change in direction in word

B. the centripetal force will not suffer any change in direction

C. the centripetal force will have its direction revesed

D. both 'a' and 'b'

Answer: B

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161. The force acts ona particle perfoming uniform circular motion and which is directed towards centre along radius of circle is

A. centrifugal force

B. centripetal force

C. pseudo force

D. gravitational force

Answer: B

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162. The centripetal force in magnitude and direction is given by

A. $\frac{mv^2}{r}\overrightarrow{r}$

B. $-mr\omega^2\overrightarrow{r}_0$

C. $-\frac{mv^2}{r}\overrightarrow{r}_0$

D. both 'b' and 'c'

Answer: D

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163. The direction of centripetal acceleration or radian acceleration

A. opposite to $\overrightarrow{r}$

B. along radius

C. upwards prpendicular to the plane

D. perpendicular to the plane of circular path

Answer: A

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164. A stone tied at the end of sring is whirled in a circle. If the string break , the stone flies away tangentially . Why ?

A. tension in the string

B. mass of the string weight of string

C. mass of stone

D. mass of stone

Answer: A

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165. If the earth revolves round the sun in a circular orbit, then the necessary entripetal force will be provided by

A. weight of the earth

B. acceleration due to gravity

C. gravitational force of attaction between the sun and the earth

D. presence of atmosphere around the earth

Answer: C

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166. Centripetal force is a real force because its origing can

A. not be explained

B. be explained

C. lies in revolving changes

D. be at centre of mass of a body

Answer: B

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167. A force which is equal and opposite to centripetal force in uniform circular motion , is called

A. centrifugal force

B. restoring force

C. nuclear force

D. cohesive force

Answer: A

Watch Video Solution

168. Centrifugal force is pseudo force because

A. its magnitude is equal to centripetal force

B. origin can not be imaginary

C. its direction is outward along radius

D. it is not provided by any real force but it arises due to acceleration frame of reference

Answer: A

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169. A satellite of the earth is revolving in a circular orbit with a uniform speed v. If the gravitational force suddenly disappears, the satellite will

A. continue to move the velocity v along the original orbit

B. move with a velocity v, tangentially to the original orbit

C. fall down with increasing velocity

D. ultimately come to rest somewhere on the origenal orbit

Answer: B

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170. Centrifuges are speed to separate the particles of

A. light masses

B. light and heavy masses

C. heavy masses

D. all the above are true

Answer: B

Watch Video Solution

171. Select the wrong statement

A. centrifugal force has same magnitude as that of centripetal force

B. centrifugal force is along the radius, away from the centre

C. centrifugal force exist in inertial frame of reference

D. centrifugal force is called pseudo force as its origin cannot be explained .

Answer: C

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172. The driver of a car travelling at velocity v suddenly see a broad wall in front of him at a distance d. He should

A. brake sharply

B. turn sharply

C. both 'a' and 'b'

D. none

Answer: A

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173. A person on a rotating table, if remains at rest, then he will assume the existance of

A. centrifugal force

B. gravitational force

C. restoring force

D. Coulomb's force

Answer: A

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174. Aithough the centrifugal force is equal and opposite to centripetal force, it is not the reaction of centripetal force because

A. they acts on the same body due to two different frames

B. centrifugal force can exist without centripetal force

C. reaction can exist with action

D. both 'a' and 'b'

Answer: A

Watch Video Solution

175. A body of mass m is tied to free end of dtring and whiled in a circle about the other end .If the string suddenly breaks , then

A. centripetal force will vanish

B. the body will move along tangent to circle

C. the body will move towards or away the centre

D. both 'a' and 'b'

Answer: D

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176. If the centripetal force acting on a body performing U.C.G. is slowly decreased, then the body will move

A. along ellipitical path

B. towards centre along spiral path

C. towards centre along radius

D. outwards the centre along radius

Answer: B

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177. The centripetal force is real force which provides with the real interacting force of

A. mechanical

B. electrical

C. magnetic or gravitational

D. all of these

Answer: D

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178. A steel ball is place on the boundary of circular disc when the disc rotates, the ball will fall down, because

A. the force of friction between ball surface and disc will not provides necessary centripetal force

B. it will experience sufficient centripetal force

C. both 'a' and 'b'

D. neither 'a' or 'b'

Answer: A

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179. Which of then following statements are true for cream separators ?

A. the particles of cream are lighter so that they will experience less centripetal force and will follow circular path of smaller radius

B. the particles of milk are heavier so thet they will experience large centripetal force and will follow the circular path of large radius

C. cream particle will collect near the axis of rotation

D. all of the above

Answer: D

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180. If the speed of a body in uniform circular motion and radius of circular path is doubled then the centripetal force will be

A. halved

B. doubled

C. quadrupled

D. tripled

Answer: B

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181. If the Newton's laws of motion are to hold true in an accelerated frame of reference then the observer in this frame of reference will assume the existence of pseudo force known as

A. gravitation force

B. centripetal force

C. centrifugal force

D. restoring force

Answer: c

Watch Video Solution

182. Centrifugal force is not a real force, but it arises due to

A. accelerated frame of referance

B. mass of rotating body

C. presence of centrifugal force

D. non accelerated frame of referance

Answer: A

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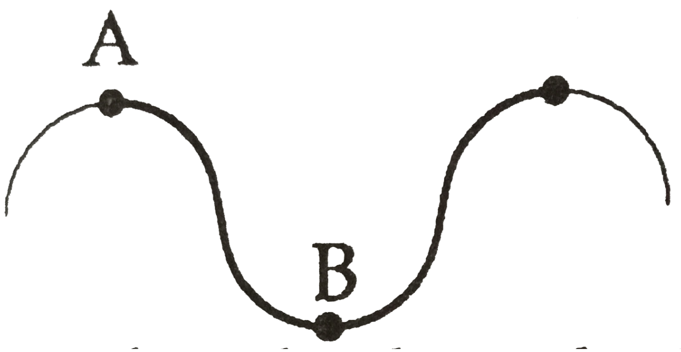
183. A car moves with a constant speed on a road. The normal reaction exerted by the road on the car is N_A and N_B when it is at the points A and B respectively, then



A. $N_A = N_B$

B. $N_A > N_B$

C. $N_A < N_B$

D. insufficient information to decide the relation of N_A and N_B

Answer: C

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184. The work done by the centripetal force in quarter revolution would be,

A. infinity

B. increases

C. zero

D. decreases

Answer: C

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185. If the centripetal force acting on body is suddenly removed then the body will fly away in a straight line , tangential to that point. The final path be parabola due to

A. radian force

B. tangential force

C. gravitational force

D. centrifugal force

Answer: c

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186. When the car is turning round a curve, the person sitting in the will experience

A. tangential force

B. centrifugal force

C. frictional force

D. centripetal foce

Answer: B

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187. A paticle of mass m is executing uniform circular motion on a path of radius r. If p is the magnitude of its linear momentum, then the radial force acting on the particle is

A. $\frac{P^2}{rm}$

B. $\frac{rP}{m}$

C. $\frac{rm}{P^2}$

D. $\frac{rm}{P(2)}$

Answer: B

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188. A body is moving along a circular path with constant speed. If the direction of rotation is reversed and the speed is doubled,

A. direction of centripetal acceleration is reversed

B. direction of centripetal acceleration is remains unchange

C. magnitude of centripetal acceleration is doubled

D. magnitude of centripetal acceleration is halved

Answer: B

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189. The passenger in car are thrown outwards when the car negotiates a curve, but the cyclist bends inwards, while negotiating the same curve. .Then this happens due to

A. the car is heavoer than the cycle

B. the cycle moves slower than the car

C. the car moves faster then the cycle

D. cyclist counteracts the centrifugal force, which throws the passegers in the car outwards

Answer: D

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190. A spirit level is placed at the edge of a turn table along its radius . The bubble will be

A. at the centre of the container

B. at the outer edge of the container

C. at the inner edge of the container

D. will oscillate about the centre of the container

Answer: C

Watch Video Solution

191. A stone tied to a string is rotated in a circle. If the string is cut, the stone flies away from the circle because

A. a centrifugal force acts on the stone

B. a centrifugal force acts on the stone

C. of its ineratia of motion

D. dreaction of the centripetal

Answer: C

Watch Video Solution

192. If the overbridge is concave instead of being convex, the thrust on the road at the lowest position will be

A. $mg+\frac{mv^2}{r}$

B. $mg-\frac{mv^2}{r}$

C. $\frac{m^2v^2g}{r}$

D. $\frac{v^2g}{r}$

Answer: A

Watch Video Solution

193. A car sometimes overturns while taking a turn. When it overturns, it is

A. the inner wheel leaves the ground first

B. the outer wheel leaves the ground first

C. both the wheel leaves the ground simutaneously

D. either wheel which leaves the ground first

Answer: A

Watch Video Solution

194. A car moving on a horizontal road may be thrown out of the road in taking a turn.

A. by the gravitational force

B. due to lack of centripetal force

C. due to rolling frictional force between tyre road

D. due to the reaction of the ground

Answer: B

Watch Video Solution

195. On a railway curve, the outside rail is laid higher than the inside one so that resultant force exerted on the wheels of the rail car by the tops of the rails will

A. have a horizontal component inwards

B. be verticle components

C. equal to the centripetal

D. be decreased

Answer: A

Watch Video Solution

196. A car travels north with a uniform velocity. It goes over a piece of mud which sticks to the tyre. The particles of the mud, as it leaves the ground are thrown

A. vertically upwards

B. vertically inwards

C. towards north

D. towards south

Answer: D

Watch Video Solution

197. A mass 2 kg describes a circle of radius 1 m on a smooth horizontal table at a uniform speed .If is joined to the centre of the circle by a string, which can just withstand 32 N, then the greatest number of revolution per minute , perfomed by the mass would be

A. 38

B. 4

C. 76

D. 16

Answer: A

Watch Video Solution

198. A mass is supported on a frictionless horizontal surface. It Is attached to a string and rotates about a fixed center at an angular velocity ω_0.If the length of the string and angular velocity both are doubled, the tension in the string which was initially T_0 is now

A. T

B. $T/2$

C. 4 T

D. 8 T

Answer: D

Watch Video Solution

199. A small coin is kept at the rim of a horizontal circular disc which is set into rotation about verticle axis passing through its centre. If radius of the disc is $5cm$ and $\mu_s = 0.25$, then the angular speed at which the coin will just slip off at

A. $5rad/s$

B. $7 rad / s$

C. $10 rad / s$

D. $4.9 rad / s$

Answer: B

Watch Video Solution

200. The radius of the circular path of a particle is doubled but its frecuency of rotation remains unchanged . If the initial centripetal force be F, then the final centripetal force will be

A. 2F

B. F

C. 4F

D. $F/2$

Answer: A

Watch Video Solution

201. If a body of mass 500 gm is revolving in a horizontal circle od radius 0.49 m , then the centripetal force acting on it (if its period is 11 s), will be

A. 0.008N

B. 8.0 N

C. 0.8N

D. 0.08 N

Answer: D

Watch Video Solution

202. The change in the centripetal force of a body moving in a circular path , if speed is made half and radius is made 4 times the origenal value , will

A. increacese by $\frac{16}{15}$

B. decrease by $\frac{15}{16}$

C. decrease by $\frac{8}{15}$

D. increase by $\frac{8}{15}$

Answer: B

Watch Video Solution

203. The angular frecuancy needed for a centrifugal to produce an acceleration of 1000 g at a radius arm of 10 cm ,is

A. $1.99 \times 10^3 rev / \min$

B. $3.99 \times 10^3 rev / \min$

C. $4.99 \times 10^3 rev / \min$

D. $2.99 \times 10^3 rev / \min$

Answer: D

Watch Video Solution

204. A body of mass 1 kg is rotating in a verticle circle of radius 1 m .What will be the difference in its kinetic energy at the top and bottom of the circle ?

$\left(g = 10m/s^2\right)$

A. 10 j

B. 20 j

C. 30 j

D. 50 j

Answer: B

Watch Video Solution

205. If a particle moves in a circle of radius r with constant speed under centripetal force F, then the work done in completing full circle will be ,

A. $2\pi r F$

B. $4\pi r f$

C. $\pi r^2 F$

D. zero

Answer: D

Watch Video Solution

206. The centripetal force required to hold 1 kg object in circular path by means of a string 1 m long, if the object is moving at constant speed of $2m/s$ will be

A. 2 N

B. 8 N

C. 4 N

D. 12 N

Answer: C

Watch Video Solution

207. An object of mass 50 kg is moving in a horizontal circle of radius 8 m . If the centripetal force is 40 N, then the kinetic energy of an object will be

A. 320 j

B. 260 j

C. 220 j

D. 160 j

Answer: D

Watch Video Solution

Watch Video Solution

208. A body of mass 2 kg is tied to the end od a string 2 m long and revolved in horizontal circle .If the breaking tension of the string is 400 N, then the maximum velocity of the body will be

A. $10mm/s$

B. $30m/s$

C. $20m/s$

D. $40m/s$

Answer: C

Watch Video Solution

209. A particle of mass 20 kg executing uniform circular motion on a path of radius 4.5 m , if the $30kgm/s$ is the magnitude of licear momentum . Then the radian force acting on the particle is

A. 40 N

B. 20 N

C. 30 N

D. 10 N

Answer: D

Watch Video Solution

210. A body is tied at the end of a string and whirled round in a horizontal circle . At any instant, its kinetic energy is found to be numerically equal to the centripetal force acting on it . Then the radius of the circle will be

A. $1/2m$

B. 1 m

C. 2 m

D. 4 m

Answer: C

Watch Video Solution

211. Two particles of equal masses are revolving in circular paths of radii 2 m and 8 m respectively with the same period .Then ratio of their centripetal forces is ,

A. $8:1$

B. $2:1$

C. $1:4$

D. $1:1$

Answer: C

Watch Video Solution

Watch Video Solution

212. If the kinetic energy of a particle moving with a constant speed on a circular path of radius 4 m is 100 j .Then the centripetal force will be

A. 30 N

B. 50 N

C. 40 N

D. 60 N

Answer: B

Watch Video Solution

213. A coin placed on a rotating table just slip when it is placed at a distance 4 r from the centre, on doubling the angular velocity of the table , the coin will just slip now the coin is at a distance from centre is

A. 4 r

B. $r/4$

C. r

D. 2 r

Answer: C

Watch Video Solution

214. A body of mass 5 kg is moving in a circle of radius 1m with an angular velocity of 2 radian/sec . The centripetal force is

A. 40 N

B. 20 N

C. 30 N

D. 10 N

Answer: B

Watch Video Solution

215. A stone is tied to one end of a steing and rotated in horizontal circle with a uniform angular velocity. The tension in the string is T, if the lrngth of the string is halved and its angular velocity is doubled , the tension in the string will be

A. 4 T

B. $T/2$

C. $T/4$

D. 2 T

Answer: D

Watch Video Solution

216. A string can withstand a tention of 25 N. What is the greatest speed at which a body of mass 1 kg can be whiled in a horizontal circle using 1 m lengt of the string?

A. $2.5m / s$

B. $5m / s$

C. $7.5m / s$

D. $10m / s$

Answer: B

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Watch Video Solution

217. A coin is place at a distance 9 cm from centre on a rotating turn table slip. If the angular velocity of the turn table is tripled, then the distance ofn the coin from the centre will be

A. 9 cm

B. 3cm

C. 1.5 cm

D. 1 cm

Answer: D

Watch Video Solution

218. A car of mass 1000 kg moves on a circular path with constant speed of 16 m/s. It is turned by 90 after travelling 628 m on the road. The centripetal force acting on the car is-

A. 64 N

B. 3 cm

C. 1.5 cm

D. 1 cm

Answer: B

Watch Video Solution

219. A toy car weighing 1 kg tied at the end of a tring 1 m long moves in a circle on the ground. What is the maximum possible speed of the car if the string has a breaking strength of 9 N?

A. $9m/s$

B. $3m / s$

C. $1.5m / s$

D. $0.75s$

Answer: B

Watch Video Solution

220. A body of mass 1 kg is suspended by a string 1 m long .The body is rotate in a vertical with a constant speed of $1m / s$. The tension in the steing when it is at horizontal position will be

A. 1 N

B. 2 N

C. 3 N

D. 4 N

Answer: C

Watch Video Solution

221. A particle of mass m is moving in a horizontal circle of radius r, under a centripetal force equal to $\left(-K/r^{2}\right)$, where k is a constant. The total energy of the particle is -

A. $-K/r$

B. $-K/2r$

C. $K/2r$

D. $-2K/r$

Answer: B

Watch Video Solution

222. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 respectively with the same speed. The ratio of their centripetal force is

A. $\frac{r_2}{r_1}$

B. $\sqrt{\frac{r_2}{r_1}}$

C. $\left(\frac{r_1}{r_2}\right)$

D. $\left(\frac{r_2}{r_1}\right)^2$

Answer: A

Watch Video Solution

223. A string breaks if its tension exceeds 10 newtons . A stone of mass 250 gm tied to this string of length 10 cm is rotated in a horizontal circle. The maximum angular velocity of rotation can be

A. $20 rad / s$

B. $40 rad / s$

C. $100 rad / s$

D. $200 rad / s$

Answer: A

Watch Video Solution

224. A 500 kg car takes a round turn of radius 50 m with a velocity of 36 km/hr . The centripetal force is

A. 250 N

B. 750 N

C. 1000 N

D. 1200 N

Answer: C

Watch Video Solution

225. A ball of mass 0.25 kg attached to the end of a string of length 1.96 m is moving in a horizontal circle. The string will break if the tension is more than 25 N . What is the maximum speed with which the ball can be moved

A. $14m / s$

B. $3m / s$

C. $3.92m / s$

D. $5m / s$

Answer: A

Watch Video Solution

226. A body of mass 10 kg is moving in a circle of radian 1 m with an angular velocity of $2rad/s$ the centripetal force is

A. 10 N

B. 40 N

C. 30 N

D. 20 N

Answer: B

Watch Video Solution

227. A stone of mass of 16 kg is attached to a string 144 m long and is whirled in a horizontal circle. The maximum tension the string can withstand is 16 Newton . The maximum velocity of revolution that can be given to the stone without breaking it, will be

A. $20m / s$

B. $16m / s$

C. $14m / s$

D. $12m / s$

Answer: D

Watch Video Solution

228. A ball of mass 0.1 Kg. is whirled in a horizontal circle of radius 1 m . by means of a string at an initial speed of 10 R.P.M. Keeping the radius constant, the tension in the string is reduced to one quarter of its initial value. The new speed is

A. 5 r.p.m

B. 10 r. p. m

C. 20 r.p.m

D. 14 r.p.m

Answer: A

Watch Video Solution

229. If the radius of curvature of the path of two particles of same masses are in the ratio $1:2$, then in order to have same centripetal force, their velocity, should be in the ratio of

A. $1:4$

B. $4:1$

C. $\sqrt{2}:1$

D. $1:\sqrt{2}$

Answer: D

Watch Video Solution

230. A 500 kg crave takes a turne of radius 50 m wiyh velocity of ` 54 km//h.The centripetal force is

A. 1200 N

B. 2250 V

C. 750 N

D. 250 N

Answer: B

Watch Video Solution

231. A particle describes a horizontal circle in a conical funne whoses inner surface is smooth with speed of $0.5m / s$. What is the height of the plane of circle from vertex the funnel?

A. 0.25 cm

B. 2 cm

C. 4 cm

D. 2.5 cm

Answer: D

Watch Video Solution

232. The string of pendulum of length l is displaced through 90° from the vertical and released. Then the minimum strength of the string in order to withstand the tension, as the pendulum passes through the mean position is

A. mg

B. 3 mg

C. 5 mg

D. 6 mg

Answer: B

Watch Video Solution

233. A stone of mass $1/2$ kg is whriled round the end of a piece of string in a horizontal circle of radius half a meter with a uniform speed of $1m/s$. The tension in the string is

A. 25×10^3 dynes

B. 10^5 dynes

C. 5×10^4 dynes

D. 4×10^5 dynes

Answer: B

Watch Video Solution

234. A stone of mass 50 g is tied to the end of a string 2 m long and is set into rotation in a horizontal circle with a uniforn speed of $2m/s$ .Then tension in the string is

A. 0.1 N

B. 0.2 N

C. 0.4 N

D. 0.8 N

Answer: A

Watch Video Solution

235. A chain of 100 links is 1 m long and has a mass of 2 kg . With the ends fastened together it is set roation at 3000 rpm.then centripetal force on each link is

A. 3.14 N

B. 31.4 N

C. 314 N

D. 3140 N

Answer: C

Watch Video Solution

236. A gramophone disc rotates with a uniform angular velocity of $6rad/s$. A coins of mass 2 gm is placed 5 cm from the centre .The centripetal force acting on the coin is

A. 3.6 dynes

B. 36 dynes

C. 360 dynes

D. 3600 dynes

Answer: C

Watch Video Solution

237. A boy is sitting on a horizontal platform of joy wheel at a distance of 5 m from its centre .The joy wheel begins to rotate and when the angular speed exceeds 10 revolutions per minute, the boy just slip , the cofficient of friction between

$(g = 10m / s^2)$

A. $\pi^2 / 6$

B. $\pi^2 / 18$

C. $\pi / 6$

D. $\pi / 2$

Answer: B

Watch Video Solution

238. For a body travelling along a circle of radius 4 m and with a speed of m / s, the force acting on the body towards the centre is 16 N.If the radius is 2 m and the speed is $3m / s$ the force towards the centre is

A. 18 N

B. 36 N

C. 9 N

D. 27 N

Answer: A

Watch Video Solution

239. A body moves along a circle of radius 1 m with a constant kinetic energy 25 j . Then force acting on it is `

A. 25 N

B. 50 N

C. 10 N

D. 5 N

Answer: B

Watch Video Solution

240. A vehicle is moving with uniform speed along horizontal, concave and convex surface roads. The surface on which, the normal reaction on the vehicle is maximum is

A. horizontal

B. concave

C. convex

D. same on all surfaces

Answer: B

Watch Video Solution

241. Two particles of masses in the ratio 2:1 are moving in circular paths of radii in the ratio 3:2 with time period in the ratio 2:3 .The ratio of their centripetal forces is

A. $9:2$

B. $27:4$

C. $4:3$

D. $27:16$

Answer: B

Watch Video Solution

242. A car moves at a constant speed on a road as shown in figure. The normal force by the road on the car is N_A and N_B when it is at the points A and B respectively

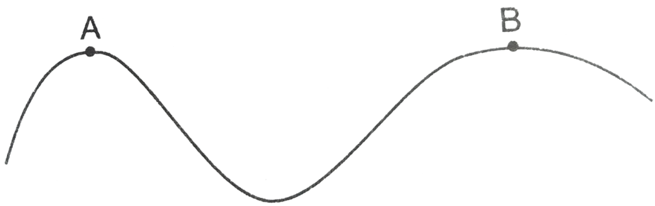

Figure 7-Q2

A. $R_A > R_B$

B. $R_A < R_B$

C. $R_A = R_B$

D. $R_A = R_B = 0$

Answer: B

Watch Video Solution

243. A coin placed on a gramophone record at $100/3$ rpm flies off when it is place at a distance grater than 16 cm from the axis of rotation. If the record is rotating at $200/3$

A. 3 cm

B. 4 cm

C. 2 cm

D. 1 cm

Answer: B

Watch Video Solution

244. A ball of mass $0.6kg$ attached to a light inextensible string rotates in a vertical circle of radius $0.75m$ such that it has speed of

$5ms^{-1}$ when the string is horizontal. Tension in the string when it is horizontal on other side is $(g = 10ms^{-2})$.

A. 30 N

B. 26 N

C. 20 N

D. 6 N

Answer: C

Watch Video Solution

245. Four point size metal spheres each of mass 1 kg are placed on a turn table and are connected by four strings of equare. If the spheres are rotated with an angular velocity $\frac{1}{\pi}$ rps, the tention in the connecting strings is

A. 4 N

B. 2 N

C. 1 N

D. 3 N

Answer: B

Watch Video Solution

246. The 'well of death' in a circus consists of a vertical hollow cylinder of radius 9 m A motor cyclist rides on its wall with sufficient speed to prevent him from sliding down . If coefficient of friction is 0.9, the minimum speed the motor cyclist should he is

$(g = 10ms^{-2})$

A. $5ms^{-2}$

B. $10ms^{-1}$

C. $15ms^{-1}$

D. $20ms^{-1}$

Answer: B

Watch Video Solution

247. If a car is taking turn along a circular track, then the necessary force reqyired to go round circular track will be

A. gravitational force

B. restoring force

C. centripetal force

D. centrifugal force

Answer: C

Watch Video Solution

248. A car is moving along a horizontal curve road, the necessary centripetal force is provided by

A. weight of car

B. nature of road surface

C. a force of friction between tyre and road surface

D. all of these

Answer: C

Watch Video Solution

249. On a horizontal curved road, the maximum safe speed of a vehicle to move along the road without overturning is (where mu is the coefficient of friction)

A. $v = \mu r g$

B. $v = \sqrt{\mu r g}$

C. $v = \sqrt{\frac{\mu}{r g}}$

D. $v = \sqrt{\frac{r g}{\mu}}$

Answer: B

Watch Video Solution

Watch Video Solution

250. On a horizontal curved road , the skidding or overturning of a vehicle will occur when

A. $v > \sqrt{\mu r g}$

B. the radius r is small

C. coefficient of friction μ is small

D. all of these

Answer: D

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251. For the safe driving on unbanked curved road, the minimum radius of curved road is

A. $r = \frac{v^2}{\mu g}$

B. $r = v^2 \mu g$

C. $r = \sqrt{v} \mu g$

D. $r = \frac{\mu g}{v^2}$

Answer: A

Watch Video Solution

252. Sometimes the overturning of vehicle on horizontal curved road takes place , it is due to

A. centripetal force

B. centrifugal force

C. heavy weight of vehicle

D. all of these

Answer: B

Watch Video Solution

253. The radius of the curved road on a national highway is R. The width of the road is b. The outer edge of the road is raised by h with respect to the inner edge so that a car with velocity v can pass safe over it. The value of h is

A. $\frac{v^2 \times R}{g}$

B. $\frac{v^2 b}{R}$

C. $\left(v^2\right) \frac{b}{Rg}$

D. $\frac{v}{Rgb}$

Answer: C

Watch Video Solution

254. Select the wrong statement

A. when a car moves along a curved road the centripetal force changes its direction continuously

B. centripetal force is provided by friction between the tyres and the surface of the road

C. in absence of friction, the car skids towards the centre of the curved road

D. banking of road is required to negotiate a sharp turn

Answer: C

Watch Video Solution

255. If a body of mass m is moving along a horizontalcircle of radius R, under the action of centripetal force equal to $K / R^2$where K is constant then the kinetic energy of the particle will be

A. $K^2 R$

B. $K / 2R$

C. K / R

D. K / R^3

Answer: B

Watch Video Solution

256. An aeroplane is taking a turn in a horizontal plane. While doing so,

A. remains horizontal

B. inclines inwards

C. inclines outwards

D. makes wings vertical

Answer: B

Watch Video Solution

257. A coin is placed on a rotating platform at distance 'r' from its axis of rotation . To avoid the skidding of coin from rotating platform , the maximum angular velocity ω is

A. $\sqrt{r} / \mu g$

B. $\sqrt{\mu g / r}$

C. $\sqrt{\mu} r g$

D. $\frac{rg}{\mu}$

Answer: D

Watch Video Solution

258. The arrangement of kepping outer road surface included with the horizontal by raising its outer edge through certain height 'h' than inner edge when the road is curved is called as

A. turning of road

B. bending of roads

C. banking of roads

D. folding of roads

Answer: C

Watch Video Solution

259. The angle of inclination with the horizontal is

A. angle of banking

B. banking angle

C. angle of contact

D. both 'a' and 'b'

Answer: B

Watch Video Solution

260. Banking of roads at curve is necessary so as to avoid

A. the dependence of centripetal force on the force of friction

B. overurning of vehicle moving with maximum safe speed

C. rough nature of road surface which increases the force of friction and causes the wear and tears of tyre of vhicle

D. can not be predicted

Answer: b

Watch Video Solution

261. The maximum speed with which a vehicle can be safely driven along curved road of radius r, banked at angle θ is

A. $\sqrt{rg\tan\theta}$

B. $rg\tan\theta$

C. $\sqrt{\tan\theta}$

D. both 'a' and 'b'

Answer: A

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262. A car is moving with maximum speed on a curved banked road. The statement is /are correct

A. only A

B. only C

C. only A and C

D. A,B and C

Answer: D

View Text Solution

263. The angle of banking θ is

(A) independent of mass of vehicle

(B)depending on speed of vehicle

(C)depending on radius of curvature of curved

road.

The correct statement (s) is /are

A. A and C

B. A,B and C

C. only A and C

D. only B

Answer: B

Watch Video Solution

264. For a body moving in a circular path, a condition for no skidding if μ is the coefficient of friction, is

A. $\frac{m^2}{r} \geq \mu mg$

B. $\frac{mv^2}{r} \leq \mu mg$

C. $\frac{mv^2}{r} = \mu mg$

D. $v = r\mu g$

Answer: B

Watch Video Solution

265. The angle of banking increases when

A. the radius of circular track decreases

B. the speed of vehicle increases

C. the radius of circular track increases and speed of vehicle decreases

D. both 'a' and 'b'

Answer: D

Watch Video Solution

266. A motor car with a mass m moving with uniform speed v on a

(A) horizontal level bridge

(B) convex bridge

(C) concave bridge

The force exerted by the motor car when it is at centre of the bridge is

A. highest in case (A)

B. lowest in case (B) and highest in case (C)

C. highest in case (B) and lowest in case (C)

D. same in three cases

Answer: B

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267. Banking of roads at curve is necessary so as to avoid

(A) overturning of vehicle moving with

maximum speed

(B) the dependence of centripetal force on the force of friction

(c) rough nature of road surface which increases the force of friction and causes the wear and tear of tyres of vehicle .

(D) skidding of the vehicle.

the correct statements is /are

A. A and D

B. A,B and D

C. A,B and C

D. B and C

Answer: a

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268. A car is moving along the horizontal banked curved road . At banked curvve road, the normal reaction is

A. equal to weight

B. greater than weight

C. less than weight

D. less than or equal to weight

Answer: B

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269. A car is moving along the horizontal curved road .

Then the normal reaction is

A. equal to weight

B. greater than weight

C. less than weight

D. less than or equal to weight

Answer: A

Watch Video Solution

270. Keeping the banking angle same , to increase the maximum speed with which a vehicle can traveln on the curve road by 10% , the radius of curvature of the road has to be changed from 20 m to

A. 16 m

B. 18 m

C. 24.2 m

D. 30.5 m

Answer: C

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271. A cyclist with combined mass 80 kg going around a curved road with a uniform speed $20m/s$. He has to bend inward by an angle $\theta = \tan^{-1}$(0.50) with the verticle , then the force of friction between road surface and tyres will be

$(g = 10m/s^2$

A. 300 N

B. 400 N

C. 800 N

D. 250 N

Answer: B

Watch Video Solution

272. What will be maximum speed of a car on a curved road of radius 30 m , If the coefficient of friction between the tyres and the road is 0.4?

$(g = 9.8m/s^2)$

A. $10.84m/s$

B. $9.84m/s$

C. $8.84m/s$

D. $6.84m/s$

Answer: A

Watch Video Solution

273. A cyclist on the ground goes round a ciruclar path of circumference 34.3 m in $\sqrt{22}$ second. The angle made by him, with the vertical, will be:-

A. 42°

B. 43°

C. 49°

D. 6.84°

Answer: D

Watch Video Solution

274. The slope of the smooth banked horizontal road is ρ .If the radius of the curve road is 'r' then the maximum velocity with which a car can negotiate the curve will be

A. $\rho r g$

B. $\sqrt{\rho r g}$

C. $\rho / r g$

D. $\sqrt{\rho} / r g$

Answer: B

Watch Video Solution

275. A train has to negotiate a curve of radius 400 m .The speed of the train is 72 km//h. If the distance between the two rails is 1 m ,then the outer rail will be raised over the inner rail by $\left(g = 10m / s^2\right)$

A. 15 cm

B. 10 cm

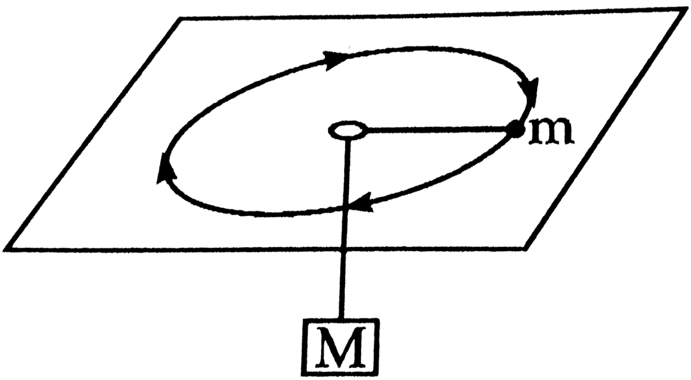
C. 5 cm

D. 2.5 cm

Answer: B

Watch Video Solution

276. A mass m on a friction less table is attached to a hanging mass M by a cord through a hole in the table . Then the angular speed with which m must spin for M stay at rest will be



A. $\sqrt{\frac{Mg}{mr}}$

B. $\sqrt{\frac{mg}{Mr}}$

C. $\sqrt{\frac{mr}{Mg}}$

D. $\sqrt{\frac{g}{r}}$

Answer: A

Watch Video Solution

277. If a bodyof mass 1000 gm is tied to free end of string of length 100 cm and whirled in a horizontal circle in a second, then the tecsion in the string will be

A. $4\pi^2 N$

B. $2\pi^2 N$

C. $3\pi^2 N$

D. $\pi^2 N$

Answer: A

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278. A coin of 4 g mass is placed at a distance of 2 cm from the axis of rotation a disc,. If the frequancy of disc is 180 rpm, then the coefficient of friction between the coin at rest and disc will be

A. 0.07249

B. 7.249

C. 72.49

D. 0.7250

Answer: D

Watch Video Solution

279. What will be the maximum speed of a car when it safely driven along a curved road of radius 100 m ? $(\mu = 0.2)$

A. $14m/s$

B. $12m/s$

C. $13m/s$

D. $11m/s$

Answer: A

Watch Video Solution

280. On a railway track of radius of curvature 1600 m. If the distance between two trackes is 1.8 m, then the elevation of the outer track above the inner track will be $\left(g = 10m/s^2\right)$

A. $0.450m$

B. $0.0450m$

C. $4.50m$

D. $4.0m$

Answer: B

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281. A motor cyclist going round on unbanked circular race course has to lean inwards, making an angle $21^\circ 49'$ with the vertical , in order to keep his balance. If the curve is 1 km long , then the speed of the cyclist will be,

$\left(\tan 21^\circ 49 = 0.4003' g = 9.8 m / s^2\right)$

A. $15 m / s$

B. $35m / s$

C. $25m / s$

D. $45m / s$

Answer: B

Watch Video Solution

282. A motor cyclist rides along a horizontal circle on the certicle cylindrical wall of a metal cylinder the radius of the cylinder is 10 m .If the speed is $20m / s$ and accele ration due to gravity is $10m/s^2$ then the least value of the coefficient of friction will be ,

A. 0.25

B. 0.45

C. 0.35

D. 0.15

Answer: a

Watch Video Solution

283. A cyclist turns around a curve at $50 km / h$., If it rounds the curve to double the speed its tendency to overturn would be ,

A. halved

B. tripled

C. doubled

D. four times

Answer: A

Watch Video Solution

284. The maximum speed of a car which can be safely driven along a curve of radius 10 m , If the coefficient of friction between the tyres and the road is 0.5, is $(g = 9.8 m / s^2)$

A. $7 m / s$

B. $14 m / s$

C. $49 m / s$

D. $21 m / s$

Answer: D

Watch Video Solution

285. At a curved path of a road, the road bed is raised the curved path, the slop of the road bed is given by the equation .

A. $\tan\theta = \frac{v^2}{rg}$

B. $\tan\theta \frac{v^2 r}{g}$

C. $\tan\theta = \frac{rg}{v^2}$

D. $\tan\theta = \frac{g}{vr^2}$

Answer: A

Watch Video Solution

286. A coins kept on a horizontal rotating disc has its centre at a distance of 0.25 m from the axis of rotation of the disc .If $\mu is 0.2$, then the angular velocity of the disc at which the coion will slip off, $\left(g = 9.8m/s^2\right)$

A. $3.8rad/s$

B. $2.8rad/s$

C. $4.8rad/s$

D. $5.8rad/s$

Answer: B

Watch Video Solution

287. A vehicle moves on a horizontal curved road of radius of curvature 50 m height of centre of gravity 1.5 m the distance between the two wheels 2 m and acceleration due to gravity $9.8m/s^2$. Then the maximum velocity with which it can travel on the road will be

A. $18m/s$

B. $20m/s$

C. $19m/s$

D. $17m/s$

Answer: A

Watch Video Solution

288. The height of the centre of gravity of the truck above the ground is 1.5 m and the distance between the wheel is 1.5 m .If the maximum velocity at which a truck can safely tavel along the horizontal track withiout toppling on a curve of radius 250 m will be

A. $30m/s$

B. $35m/s$

C. $40m/s$

D. $45m/s$

Answer: B

Watch Video Solution

289. The radius of curvature of a metre gauge railway line at a place where the train is moving at $36km/h$ is 50 m .If there is no side thrust on the rails , then the elevation of the outer rail above the inner rail will be $(g = 10m/s^2)$

A. 5 m

B. 2 m

C. 0.5 m

D. 0.2 m

Answer: D

Watch Video Solution

290. A cyclist is riding with a speed of $27kmh^{-1}$. As he approaches a circular turn on the road of radius 80 m, he applies brakes and reduces his speed at the constant rate $0.5ms^{-1}$. What is the magnitude and direction of the net acceleration of the cyclist on the circular turn ?

A. $0.86m/s^2$

B. $0.43m/s^2$

C. $1.24m/s^2$

D. $1.76m/s^2$

Answer: A

Watch Video Solution

291. A car is moving with speed of $10m/s$ in a concave road of radius 100 m .If the mass of the car is 700 kg, then the reaction on the car tyres when it is at the lowest position will be

A. 4560 N

B. 5560 N

C. 6560 N

D. 7560 N

Answer: D

Watch Video Solution

292. A road is banked with an angle 0.01 radian .If the radiaus of the road is $80m(g=10m/s^2)$ then the safe velocity for the drive will be

A. $4.8m/s$

B. $2.8m/s$

C. $3.8m/s$

D. $5.8m/s$

Answer: B

Watch Video Solution

Watch Video Solution

293. The maximum safe speed of a vehicle over a curved road of radius 150 m is $10m/s$. If the width of road is 7.5 m, the height of the outer edge will be

A. 0.25 m

B. 0.50 m

C. 0.30 m

D. 0.60 m

Answer: B

Watch Video Solution

294. The maximum safe speed of a vehicle on a circulartrack is $15km/h$. When the track becomes wet, the maximum safe speed is $10km/h$ .The ratio of coefficient of friction of dry track to that o0f the wet track is

A. $2:3$

B. $3:2$

C. $9:4$

D. $1:1$

Answer: C

Watch Video Solution

295. A curved road of 50m in radius is banked to correct angle for a given speed. If the speed is to be double keeping the same banking angle, the radius of curvature of the road should be changed to.

A. 25 m

B. 100 m

C. 200 m

D. 400 m

Answer: C

Watch Video Solution

296. A motorcycle is travelling on a curved track of radius 500 m. If the coefficient of friction between road and tyres is 0.5, the speed avoiding skidding will be

A. $500 m / s$

B. $250 m / s$

C. $50 m / s$

D. $19 m / s$

Answer: C

Watch Video Solution

297. When the road is dry and the coefficient of friction is μ, the maximum speed of a car in a circular path is 10 m/s. if the road becomes wet and $\mu' = \frac{\mu}{2}$, what is the maximum speed permitted?

A. $5m / s$

B. $10m / s$

C. $5\sqrt{2}m / s$

D. $10\sqrt{2}m / s$

Answer: C

Watch Video Solution

298. A person stands in contact against a wall of cylindrical drum of radius 'r' rotating with an angular velocity ω. If μ is coefficient ofn static fiction between the wall and the person , then the minimum rotational speed which enables the person to remain struck to the wall will be

A. $\sqrt{\frac{g}{\mu r}}$

B. $\sqrt{\frac{\mu r}{g}}$

C. $\sqrt{\frac{2g}{\mu r}}$

D. $\sqrt{\frac{gr}{\mu}}$

Answer: A

Watch Video Solution

299. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A plumb bob is suspended from the roof of the car by a light rigid rod. The angle made by the rod with the vertical is

$(g = 10m / s^2)$

A. Zero

B. 30°

C. 45°

D. 60°

Answer: C

Watch Video Solution

300. A road is 10 m wide. Its radius of curvature is 50 m . The outer edge is above the lower edge by a distance of 1.5 m . This road is most suited for the velocity

A. $2.5m / s$

B. $4.5m / s$

C. $6.5m / s$

D. $8.5m / s$

Answer: D

Watch Video Solution

Watch Video Solution

301. A circular road of radius 1000 m has banking angle 45°. IF the coefficient of friction is between tyre and road is 0.5, then the maximum safe speed of a car having mass 2000 kg will be

A. $172m/s$

B. $124m/s$

C. $99m/s$

D. $86m/s$

Answer: A

Watch Video Solution

302. An unbanked curve has a radius of 60m. The maximum speed at which a car can make a turn if the coefficient of static friction is 0.75, is

A. $2.1m/s$

B. $14m/s$

C. $21m/s$

D. $7m/s$

Answer: C

Watch Video Solution

303. A $100kg$ car is moving with a maximum velocity of $9m/s$ across a circular track of radius 30 m . The maximum force of friction between the road and the car is

A. 1000 N

B. 706 N

C. 270 N

D. 200 N

Answer: C

Watch Video Solution

304. the coefficient of friction between the rubber tyres and the roadway is 0.25 . Find the maximum speed with which a car can be driven round a curve of radius 20 m without skidding

A. $7m/s$

B. $8m/s$

C. $9m/s$

D. $10m/s$

Answer: A

Watch Video Solution

305. The radius of curvature of railway line at a place is 200 m. If the distance between the rail is 1.6 m and the outer rail is raised by 0.08 m above the inner rail .The speed of the train for which there is no side pressure on the rails $(g = 10m/s^2)$

A. $5m/s$

B. $10m/s$

C. $15m/s$

D. $20m/s$

Answer: B

Watch Video Solution

306. A small ball descibes a horozontal circle on the smooth inner surface of a conical funnel. If the height of the plane of the circle above the vertex be 10 cm what is the speed of the particle?

A. $2m/s$

B. $1m/s$

C. $4m / s$

D. $10m / s$

Answer: B

Watch Video Solution

307. A road is 10 m wide . Its radius of curvature is 50 m .The outer edge is above the lower edge by a 2 m .If $g = 10m / s^2$ for what velocity of a vehicle is the road suited

A. 2.5

B. $5m/s$

C. $25m/s$

D. $10m/s$

Answer: D

Watch Video Solution

308. A car is travelling at 36 kmph on a road . The maximum turning radius of the car is 20 m ans $g = 10 m/s^2$ .Then the coefficient of friction between its tyres and the road is

A. 0.2

B. 0.4

C. 0.5

D. 0.8

Answer: C

Watch Video Solution

309. At what angle should a road be banked so that the vehicle may take a bend of radius 10 m travelling with a speed of $10m/s$

$(g = 10m/s^2)$

A. 80°

B. 45°

C. 60°

D. 90°

Answer: B

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Watch Video Solution

310. A simple pendulum of length 1 m the bob performs circular motion in horizontal plane if its string making an angle 60° with the verticle , then the period of rotation of the bob will be $\left(g = 10m/s^2\right.$

A. $2s$

B. $1.4s$

C. $1, 98s$

D. $4s$

Answer: B

Watch Video Solution

311. In the above problem, the centripetal acceleration experienced by the bob will be

A. $17.3m/s^2$

B. $5.8m/s^2$

C. $10m/s^2$

D. $5m/s$

Answer: A

Watch Video Solution

312. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 ms/s A plumb bob is suspended from the roof of the car by a light rigid rod of length 1m. The angle made by the rod with the track is (Take g= 10m/s^2

A. zero

B. 30°

C. 45°

D. 60°

Answer: C

Watch Video Solution

313. Each rod of a centrifugal governor is 10 cm long then the number of revolutions per second made when the rod include at an angle of 60° will be $(g = 9.8m/s^2)$

A. 22

B. 49

C. $22/49$

D. $49/22$

Answer: D

Watch Video Solution

314. A simple pendulum has a length l . What minimum velocity should be imparted to its bob at the mean position so that bob reaches a height equal to l above the point of suspension?

A. $\sqrt{gr}$

B. $\sqrt{5gl}$

C. $\sqrt{2gl}$

D. $\sqrt{\frac{l}{g}}$

Answer: B

Watch Video Solution

315. A bob is suspended from an ideal string makes an angle 60° to the verticle and whirled along a horizontal circle.Then its perod of revolution is

A. $\pi\sqrt{\frac{l}{g}}$

B. $\pi\sqrt{\frac{l}{2g}}$

C. $\pi\sqrt{\frac{2l}{g}}$

D. $2\pi\sqrt{\frac{l}{g}}$

Answer: C

Watch Video Solution

316. A pendulum bob on a 2 m string is displaced 60° from the verticle and then released . What is the speed of the bob as it passes through the lowest point in its path?

A. $\sqrt{2}m / s$

B. $\sqrt{9.8}m / s$

C. $4.43m / s$

D. $1 / \sqrt{2}m / s$

Answer: C

Watch Video Solution

317. Length of a simple pendulum is 2 m and mass of its bob is 0.2 kg .If the tension in the string exceeds 4 N, it will break. If $g = 10 m / s^2$ and the bobis whirled in a horizontal plane , the maximum angle through which the sting can make with vertical during rotation is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

Watch Video Solution

318. A particle describes a horizontal circle on the smooth inner surface of a conical funnel as shown in Fig. If the height of the plane of the circle above the vertex is $9.8cm$, find the speed of the particle.

A. $\sqrt{9.8}ms^{-1}$

B. $0.98ms^{-1}$

C. $19.6ms^{-1}$

D. $4.9ms^{-1}$

Answer: B

Watch Video Solution

319. A particle moving in a verticle circle its

A. kinetic energy is constant

B. potential energy is constant

C. neither K.E nor P.E. constant

D. both kinetic energy and potential energy constant

Answer: C

320. Kinetic energy of a body moving in verticle ircle is

A. constant at all points on a circle

B. different at different points on a circle

C. Zero at all the point on a circle .

D. negative at all the points.

Answer: B

Watch Video Solution

321. When a particle is moved , in a verticle it has

A. constant radial and tangential acceleration

B. variable tanggential and radian acceleration

C. only constant radial acceleration

D. only constant tangential acceleration

Answer: B

Watch Video Solution

322. A motor cyclist rides around the well with a round vertical wall and does not fall down while riding because

A. the force of gravity disappears

B. the frictional force of the wall balances his weight

C. he loses weight somehow

D. the force exerted by the surrounding

Answer: B

Watch Video Solution

323. A pilot of mass 81 kg loops the loop with steady speed of $300 km / h$. If the radius is 0.5 km then the force with which the pilot is pressed into the seat at the highest point of the loop ,is $\left(g = 10 m / s^2\right)$

A. $3.15 \times 10^2 N$

B. zero

C. $8.10 \times 10^2 N$

D. $19.35 \times 10^2 N$

Answer: A

Watch Video Solution

324. In the above problem, the force exerted by the seat on the pilot at lowest point is ,

A. zero

B. $1.25 \times 10^3 N$

C. $8.10 \times 10^2 N$

D. $19.35 \times 10^2 N$

Answer: D

Watch Video Solution

325. In the section of a bridge on a river is an arc of a circle of radius 88.2m, then the maximum speed with which a car can travel over the bridge without losing contact with the ground level will be

A. $29.4m/s$

B. $9m/s$

C. $81m/s$

D. $18m/s$

Answer: A

Watch Video Solution

326. A can filled with water is revolved in vertical circle of radius 16 m and water just does not fall down. The time period of revolution will be

A. 1 s

B. 10 s

C. 8 s

D. 4 s

Answer: D

Watch Video Solution

327. A motor cycle rides in a hollow sphere in a verticle circle of radius 30 m .What will be the minimum speed required so that he does not lose contact with the surface of sphere at the highest point?

A. $5.442km / s$

B. $17.422cm / s$

C. $17.32m / s$

D. $54.22m / s$

Answer: C

Watch Video Solution

328. In a cylindrical well of death , a motor cyclist rides around the inner wall in horizontal circles. If the diameter of well of death is 18 m , then the minimum speed of cyclist , so as to prevent him from sliding down will be $\left(\mu = 0.8 \text{ and } g = 10m/s^2\right)$

A. $1.06m/s$

B. $10.6km/s$

C. $0.106m/s$

D. $10.6m/s$

Answer: D

Watch Video Solution

329. The vertical section of a road over the bridge is in the from of circle of radius 15.5 m What will be the maximum velocity with which a car whose centre of gravity is 0.5 m above the ground can cross the bridge without losing contact with the surface of bridge at the highest point ? $(g = 9.8m/s^2)$

A. $10.56m/s$

B. $12.56m/s$

C. $14.56m/s$

D. $1.256m/s$

Answer: B

Watch Video Solution

330. A body rest on the top of a hemisphere of radius R. What will be the least horizontal velocity imparted to it , if it has to leave the hemisphere without sliding down?

A. $\sqrt{2gR}$

B. $\sqrt{5gR}$

C. $\sqrt{gR}$

D. $\sqrt{3gR}$

Answer: C

Watch Video Solution

Watch Video Solution

331. In a well of death, motor cycle rides round the inner wall of a hollow cylindrical chamber. If the radius of the cylindrical chamber is 8 m . What would be minimum speed of the rider to prevent him from sliding down? $\left(g = 10m/s^2, \mu = 0.2\right)$

A. $10m/s$

B. $20m/s$

C. $30m/s$

D. $40m/s$

Answer: B

Watch Video Solution

332. If a body of mass 0.1 kg tied with a string of length 1 m, is rotated in vertical circle, then the energy of the body at the highesst position will be $(g=9.8m/s)$

A. $2.45j$

B. $1.25j$

C. $3.45j$

D. $4.45j$

Answer: A

Watch Video Solution

333. A bucket full of water is tied at the end of rope of length 1.6 m. It is rotated in vertical circle with constant speed around the other end . What should be the minimum speed of bucket so that water does not spill out at the highest position of the water circle?

A. $16m / s$

B. $4m / s$

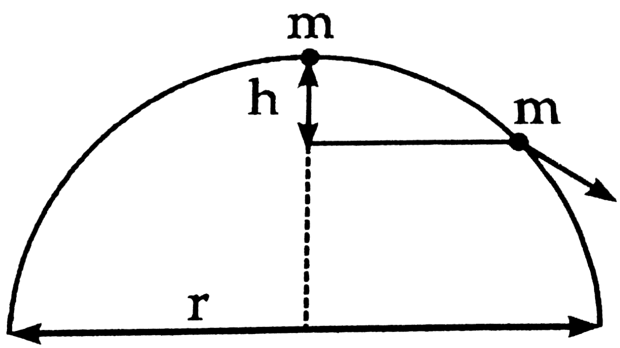
C. $8m / s$

D. $2m / s$

Answer: D

Watch Video Solution

334. A small body of mass m slide without friction from the top of a hemispherical cup of radius r as shown in figure. If leaves the surface to the cup at vertial distance h below the highest point then



A. $h = r$

B. $h = r / 2$

C. $h = r / 3$

D. $2r / 3$

Answer: C

Watch Video Solution

335. A body of mass 2 kg attached to a cord and whirled in a verticle circle of radius 2 m. The minimum speed at the bottom of the circle so that the cord will not slacken when the body rounds the top of the circle will be $(g = 10m / s^2)$

A. $10m / s$

B. $6.3m / s$

C. $7m / s$

D. $5m / s$

Answer: A

Watch Video Solution

336. A body of mass 0.5 kg is whirled in a verticle circle an angular frequancy of $10 rad / s$.If the radius of the circle is 0.5 m . What is the tension in the string when the body is at the top of the circle? $\left(Giveng = 10 m / s^{2}\right)$

A. 10N

B. 20 N

C. 30 N

D. 40 N

Answer: B

Watch Video Solution

337. A boy is deated on the top of a hemispherical mound of ice of radius R . He is given a little pucsh and starts sliding down the ice. If ice is frictionless , the boy will leave the ice at a point whose height is

A. $\frac{3R}{4}$

B. $\frac{2R}{\sqrt{3}}$

C. $\frac{2R}{3}$

D. $\frac{R}{3}$

Answer: C

Watch Video Solution

338. A body of mass m is on the top point of a smooth hemisphere of radius 5 m It is released to slide down the surface when its velocity is $5m/s$. At this instant the angle made by the radius vector of the body with verticle is $\left(g = 10m / s^2\right)$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

Watch Video Solution

339. A body of mass 4 kg is moved in a vertical circle with sufficient speed .Its tangential acceleration , when the string makes an angle of 30° with the verticle downward is $\left(g=10m\frac{m}{s^2}\right)$

A. $4m/s$

B. $5m/s$

C. $8m/s$

D. $7.8m/s$

Answer: B

Watch Video Solution

340. The pilot of an aircraft, who is not tied to his seat, can loop a verticle circle in air without falling out at the top of the loop . What is the minimum speed required so that he can successfully negotitate a loop of radius 4 km ? $(g = 10m/s^2)$

A. $100m/s$

B. $200m/s$

C. $300m/s$

D. $400m / s$

Answer: B

Watch Video Solution

341. A stone tied to a string of length L is whirled in a vertical circle with the other end of the string at the centre. At a certain instant of time the stone is at lowest position and has a speed u. Find the magnitude of the change in its velocity as it reaches a position, where the string is horizontal.

A. $\sqrt{u}^{2} - 2gL$

B. $\sqrt{2}gL$

C. $\sqrt{u}^{2} - gL$

D. $\sqrt{2\left(u^{2} - gL\right)}$

Answer: D

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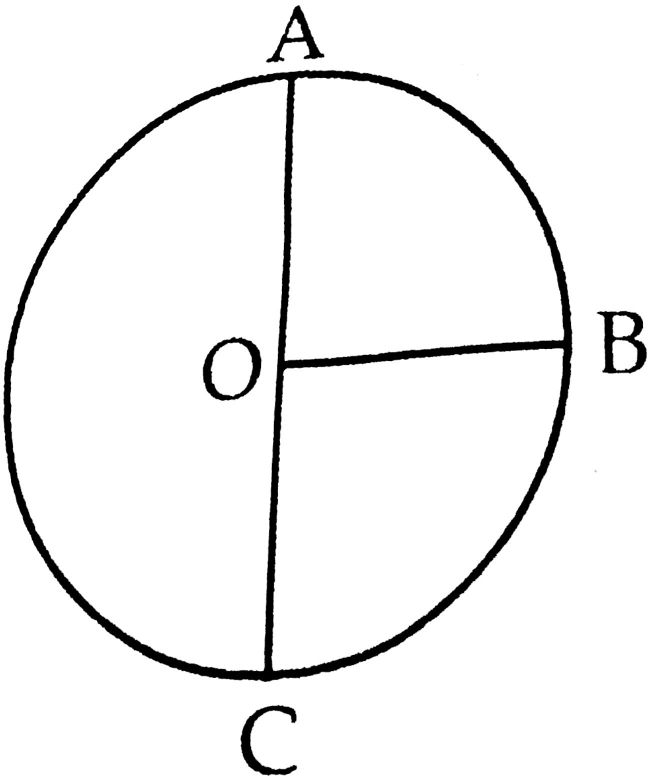
342. The ratio of velocities at points A,B and C in vertical circular motion



A. $1:9:24$

B. $1:2:3$

C. $1 : 3 : 5$

D. $1 : \sqrt{3} : \sqrt{5}$

Answer: D

Watch Video Solution

343. A can filled with water is revolved in vertical circle of radius 16 m and water just does not fall down. The time period of revolution will be

A. 1 s

B. 10 s

C. 4 s

D. 8 s

Answer: D

Watch Video Solution

344. An object of mass 2 kg is whirled rround in a verticle circle of radius 1m with a constant speed of $4m/s$ .Then the maximum tension in the string is $(g = 10m/s^2)$

A. 32 N

B. 52 N

C. 72 N

D. 92 N

Answer: B

Watch Video Solution

345. A small particle rest on the top of a hemisphere of radius 20 cm .The smallest horizontal velocity os given to it , if it is to leave the hemisphere without sliding down to its surface ,is

A. $0.7m / s$

B. $1.4m / s$

C. $2.8m / s$

D. $5.6m / s$

Answer: B

Watch Video Solution

346. A mass of 2 kg tied to a string 1 m length is rotate in a verticle circle with a uniform speed of $4m/s$. The tension in the string will be 52 N, when the mass is at $\left(g = 10m/s^2\right)$

A. bottom

B. highest point

C. midway

D. horizontal position

Answer: A

Watch Video Solution

347. A particle performs verticle circular motion along the circular path . If the ratio of kinetic energy to potential energy of a particle at any position is (If the particle makes an angle θ wityh vertical at the position .)

A. $\dfrac{3+2\cos\theta}{1-\cos\theta}$

B. $\dfrac{1}{2}\dfrac{(3+2\cos\theta)}{(1-\cos\theta)}$

C. $\dfrac{1-\cos\theta}{3+2\cos\theta}$

D. $\dfrac{1+\cos\theta}{3-2\cos\theta}$

Answer: B

Watch Video Solution

348. A body of mass m tied to a string of lrngth r is at its lowest position . What should be the minimum speed given to it so as just to complete one revolution ?

A. $\sqrt{gr}$

B. $\sqrt{3}gr$

C. $\sqrt{5}gr$

D. $\sqrt{7}gr$

Answer: C

Watch Video Solution

349. A mass m is hanging by a string of length l. The velocity v_0 which must be imparted to it to just reach the top is

A. $\sqrt{3}gl$

B. $\sqrt{4}gl$

C. $\sqrt{5}gl$

D. $\sqrt{6}gl$

Answer: C

Watch Video Solution

350. In a 'well of death' a ride drives round the inner wall of a hollow cylindrical chamber of siameter 20 m .If the coefficient of force friction between tyres and inner wall of a hollow cylinder is 0.5, then the minimum speed of the rider without sliding down will be

A. $7m / s$

B. $14m / s$

C. $2\sqrt{7}m / s$

D. $7\sqrt{2}m / s$

Answer: B

Watch Video Solution

351. A sphere is suspended by a thread of length l. What minimum horizontal velocity has to be imparted the ball for it to reach the height of the suspension?

A. g l

B. 2 g l

C. $\sqrt{g}l$

D. $\sqrt{2}gl$

Answer: D

Watch Video Solution

352. A $1kg$ stone at the end of $1m$ long string is whirled in a vertical circle at a constant speed of $4m/s$. The tension in the string is $6N$, when the stone is at $\left(g = 10m/s^2\right)$

A. top of the circle

B. bottom of the circle

C. half way down

D. non of the above

Answer: A

Watch Video Solution

353. A body of mass m hangs at one end of a string of length l , the other end of which is fixed. It is given a horizontal velocity so that the string would just reach where it makes an angle of 60° with the vertical. The tension in the string at mean position is

A. 2 mg

B. mg

C. 3 mg

D. $\sqrt{3}mg$

Answer: A

Watch Video Solution

354. The tension in the string revolving in a vertical circle with a mass m at the end which is at the lowest position

A. $\frac{mv^2}{r}$

B. $\frac{mv^2}{r} - mg$

C. $\frac{mv^2}{r} + mg$

D. mg

Answer: C

Watch Video Solution

355. A hollow sphere has radius 6.4 m. Minimum velocity required by a motor cyclist at bottom to complete the circle will be.

A. $17.7m/s$

B. $10.2m/s$

C. 12.4

D. $16.0m/s$

Answer: A

Watch Video Solution

356. A Particle is kept at rest at the top of a sphere of diameter $42m$.when disturbed slightly, it slides down. At what height h from the bottom, the particle will leave the sphere

A. 14 m

B. 28 m

C. 35 m

D. 7 m

Answer: C

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357. A bucket full of water is revolved in vertical circle of radius 2 m . What should be the maximum time-period of revolution so that the water doesn't fall off the bucket

A. 1 s

B. 2 s

C. 3 s

D. 4 s

Answer: C

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358. A body of mass m is rotated in a vertical circle with help of light string such that velocity of body at a point is equal to critical velocity at that point. If T_1, T_2 be the tensions in the string when the body is crossing the highest and the lowest positions then the following relation is correct

A. $T_2 - T_1 = 6mg$

B. $T_2 - T_1 = 4mg$

C. $T_2 - T_1 = 3mg$

D. $T_2 - T(1) = 2mg$

Answer: A

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359. A body of mass m is revolving along a vertical circle of radius r such that the sum of its kinetic speed of the body at the highest point is $\sqrt{2}rg$ then the speed of the body at the lowest point is

A. $\sqrt{4gr}$

B. $\sqrt{6gr}$

C. $\sqrt{2gr}$

D. $\sqrt{gr}$

Answer: B

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360. A body of mass m is rotating in a verticle circle of diameter '2r' with critical speed. The difference in its kinetic energy at the highest and lowest points on the verticle circle is

A. mg r

B. 3 mgr

C. 2 mgr

D. 4 mgr

Answer: C

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361. A body of mass 'm' is rotated by means of a string along a verticle of radius 'r' with constant speed .The difference in tension when the body is at the bottom and at the top of the verticle circle is

A. 6 mg

B. 4 mg

C. 2 mg

D. zero

Answer: C

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362. A stone of mass 1 kg tied at the end of a string of length 1 m and is whirled in a verticle circle at a constant speed of $3ms^{-1}$. The tension in the string will be 19 N when the stone is $\left(g = 10ms^{-1}\right)$

A. at the top most point on the vertical circle

B. at the bottom most point on the vertical circle

C. half way down

D. making an angle 30° with the vertical

Answer: B

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363. When a ball tied to a string is swung along a vertical circle , quantity which remains constant is

A. tension in the string

B. speed of the ball

C. centripetal force

D. earth's pull on the ball

Answer: D

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364. A simple pendulum with a bob of mass 'm' swings with angular amplitude of 60°. When its angular displacement is 30°, the tension in the strings would be

A. $\frac{1}{2}mg(3\sqrt{3}-2)N$1

B. $1mg(2\sqrt{3}-2)N$

C. $mg(3\sqrt{3}-2)N$

D. $2mg(3\sqrt{3}-2)N$

Answer: A

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365. A ball of mass 100 g released down an inclined plane describes a circle of radius 10 cm in the vertical plane on reaching the bottom of the inclined plane . The minimum height of the incline is

A. $25cm$

B. $15cm$

C. $30cm$

D. $10cm$

Answer: A

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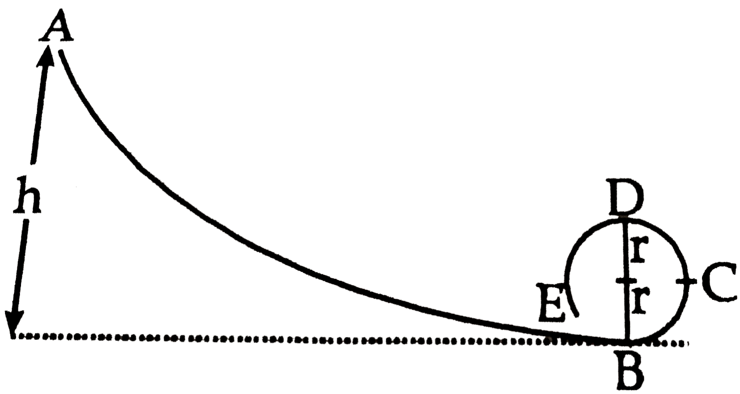
366. A frictionless tracke ABCDE ends in a circular loop of radius 'r' A body slides down the track from the point 'A' which is at a height h=10 cm . The maximum value of 'r' for the body to successful complete the loop is



A. 2 cm

B. 1 cm

C. 4 cm

D. 6 cm

Answer: C

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367. The kinematical equation of motion are applied to solve the problems of circular motion , because of

A. the acceleration is non uniform

B. the acceleration is uniform

C. the acceleration and velocity are uniform

D. the motion is circular

Answer: B

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368. A wheel is subjected to uniform angular acceleration about its axis with its angular velocity is zero . In the first two seconds , it rotates through an angle θ_1 and in the next two seconds , it rotates through an angle θ_2

then the ratio of θ_2 / θ_1

A. $1:1$

B. $2:1$

C. $3:1$

D. $4:1$

Answer: C

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369. A wheel which is innitially at rest is subjected to an angular acceleration and it completed 10 rotation in time 't' .Then the time taken by it to complete the next 10 rotation is

A. $2t$

B. $\sqrt{2}t$

C. $(\sqrt{2}-1)t$

D. $(\sqrt{2}+1)t$

Answer: C

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370. The angular velocity of a particle increases from O to ω as it completest x rotations .Then number of rotation completes by it when its angular velocity becomes 2 ω.

A. $\times$

B. $2 \times$

C. $3 \times$

D. $4 \times$

Answer: D

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371. The shaft of a motor car rotates at constant angular frequancy of 3000 revolutions //min .The angle through which it has turned in one second in radians is

A. 100π

B. 50π

C. 25π

D. 125π

Answer: A

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372. A simple pendulum is suspended from the ceiling of a train which is moving with an acceleration a .The angular of inclination of the pendulum from the vertical will be

A. 90°

B. 0°

C. $\tan^{-1}\left(\frac{a}{g}\right)$

D. $\tan^{-1}\left(\frac{g}{a}\right)$

Answer: B

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373. A car accelerates uniformly from rest to a speed of $10m/s$ in a time of 5 s .The number of revolutions made by one of its wheels during this motion if the radius of the wheel is $1/\pi$ m.

A. 50

B. 25

C. 12.5

D. 6.25

Answer: C

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374. A wheel starts from rest and acquires an angular velocity of $60 rad / s$ in half a minute . Then its angular acceleration is

A. $4 rad / s^2$

B. $2 rad / s^2$

C. $1 rad / s^2$

D. $0.5 rad / s^2$

Answer: B

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375. The wheel of a car makes $10 rev / s$. It is stopped in 14 s .Then the number of revolutions it makes before it stops

A. 10

B. 20

C. 40

D. 70

Answer: D

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376. A flywheel is revolving at 150 revolutions per minutes .If deccelerates at a constant rate of $2\pi rad / s^2$, then time requred to stop it is

A. $10s$

B. $5s$

C. $2.5s$

D. $1.25s$

Answer: C

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377. In 20 seconds, the speed of a motor changes from 1200 rpm to 1800 .In this period , of number of revoutions completed by it is

A. 500

B. 400

C. 200

D. 100

Answer: A

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378. A car wheel 60 cm in diameter is turning at 8 revolutions per seconds .When the car begins to slow uniformly to rest in a time of 14 seconds Distance travelled by the car in this time is

A. 211.2 m

B. 105.6 m

C. 52.8 m

D. 422. 4 m

Answer: B

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379. An automobile engine starting from rest is given an angular acceleration of $20 rad/s^2$ for 10 s .Find the angle turned during this period

A. $10 rad$

B. $100 rad$

C. $1000 rad$

D. $0.1 rad$

Answer: C

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380. Two identical particles A and B are situated respectively at the midpoint and at the end of a string. The particles always remain collinear and move in concentric circles. The ratio of the tensions

T_1 and T_2 will be

A. $1:1$

B. $1:3$

C. $2:3$

D. $3:2$

Answer: B

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381. A car is moving with speed $30m/\sec$ on a circular path of radius 500 m . Its speed is increasing at the rate of , $2m/\sec^2$, What is the acceleration of the car

A. $2m/s^2$

B. $2.7m/s^2$

C. $1.8m/s^2$

D. $9.8m/s^2$

Answer: B

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382. Initial angular velocity of a wheel is $2rad/s$ .It rotates with a constant angular acceleration of $3.5 rad / s^2$ .Its angular displacement in 2 s is

A. 4 rad

B. 7 rad

C. 8 rad

D. 11 rad

Answer: B

Watch Video Solution

383. The angular velocity of a wheel increases from 120 to 480 rpm in 10 s .The number of revolutions made during this time is

A. 10

B. 25

C. 50

D. 100

Answer: C

Watch Video Solution

384. A body of mass 1 kg is rotating in a verticle circle of radius 1 m .What will be the difference in its kinetic energy at the top and bottom of the circle ?

$(g = 10m / s^2)$

A. 10 j

B. 30 j

C. 20 j

D. 50 j

Answer: C

Watch Video Solution

385. A body starts rotating from rest and completes 10 revolutions in 4 s .Find its angular acceleration

A. $2.5\pi rad/s^2$

B. $5\pi rad/s^2$

C. $7.5\pi rad/s^2$

D. $10\pi rad/s^2$

Answer: A

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386. The car of a wheel rotating with certain angular velocity is stopped in 7 seconds and before it stops , it makes 35 revolutions . Then initially it was rotating with the frequancy .

A. $10Hz$

B. $20Hz$

C. $15Hz$

D. $30Hz$

Answer: A

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387. A pendulum consisting of a small sphere of mass m, suspended by a inextensible and massless string of length 1 , is made to swing in a verticle plane. If the breaking strength of the string is 2 mg, then the maximum angular amplitude of the displacement from the verticle can be

A. 90°

B. 60°

C. 30°

D. 0°

Answer: B

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388. A cycle wheel of radius 0.4 m completes one revolution in one second then the acceleration of a point on the cycle wheel will be

A. $0.4\pi m / s^2$

B. $0.8\pi m / s^2$

C. $0.4\pi m / s^2$

D. $1.6\pi^2 m / s^2$

Answer: D

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389. What will be maximum speed of a car on a curved road of radius 30 m , If the coefficient of friction between the tyres and the road is 0.4?

$(g = 9.8m/s^2)$

A. $10.84m/s$

B. $9.84m/s$

C. $8.84m/s$

D. $6.84m/s$

Answer: A

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390. A cyclist on the ground goes round a ciruclar path of circumference 34.3 m in $\sqrt{22}$ second. The angle made by him, with the vertical, will be:-

A. 42°

B. 43°

C. 44°

D. 45°

Answer: D

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391. The angular velocity of a wheel is $70 rad / \sec$. If the radius of the wheel is 0.5 m, then linear velocity of the wheel is

A. $10 m / s$

B. $20 m / s$

C. $35 m / s$

D. $70 m / s$

Answer: C

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392. A vac moving with a speed of $108 km / h$ on level road where coefficient of friction between tyres and rod is 0.5 .For the safe driving of van the minimum radius of curvature of the rod will be $\left(g = 10 m / s^2\right)$

A. 80 m

B. 40 m

C. 180 m

D. 20

Answer: C

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393. A sphere of mass 200 g is attached to an inextensible string of length 130 cm whose upper end is fixed to the ceilling . The sphere is made to describe a horizontal circle of radius 50 cm Calculate the periodic time of this conical pendulum and the tension in the string .

A. $1.2s$

B. $2.2s$

C. $1.5s$

D. $3s$

Answer: B

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394. A fighter aeroplane flying in the sky dives with a speed of $360km/h$ in a vertical circle of radius 200 m .Weight of the pilot sitting in it is 75 kg . What will be the value of force with which the pilot presses his seat when the aeroplane is at highest position ? $(g = 10m/s^2)$

A. 3000 N

B. 4500 N

C. $(75 \times g)N$

D. 300 N

Answer: A

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395. A mass of 5 kg is tied to a string of length 1.0 m is rotated in vertical circle with a uniform speed of $4m/s$. The tension in the string will be 170 N when the mass is at $(g = 10m/s^2)$

A. highest point

B. mid way

C. bottom

D. cannot be justified

Answer: B

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396. A car is moving with speed $30m/\sec$ on a circular path of radius 500 m . Its speed is increasing at the rate of , $2m/\sec^2$, What is the acceleration of the car

A. $9.8m / s^2$

B. $1.8m / s^2$

C. $2m / s^2$

D. $2.7m / s^2$

Answer: D

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397. The ratio of angular speeds of minute hand and hour hand of a watch is

A. $6:1$

B. $1:6$

C. $1:12$

D. $12:1$

Answer: D

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398. When particle revolves with uniform speed on a circular path

A. no force acts on it

B. no acceleration acts on it

C. no work is done by it

D. its velocity is constant

Answer: C

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399. A car of mass 800 kg moves on a circular track of radius 40 m . If the coefficient of friction is 0.5, then maximum velocity with which the car can move is

A. $7m/s$

B. $14m/s$

C. $8m/s$

D. $12m/s$

Answer: B

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400. A simple pendulum of mass m and length l stands in equilibrium in vertical position .The maximum horizontal velocity that should be given to the bob at the bottom so that it completes on revolution is

A. $\sqrt{lg}$

B. $\sqrt{2lg}$

C. $\sqrt{3lg}$

D. $\sqrt{5lg}$

Answer: D

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401. A wheel of diameter 20 cm is rotating 600 rpm. The linear velocity of particle at its rim is

A. $6.28cm/s$

B. $62.8cm/s$

C. $0.628cm/s$

D. $628.4cm/s$

Answer: D

402. Centripetal force in velocity from can be expressed as

A. $\overrightarrow{F} = \frac{mv^2}{r}$

B. $\overrightarrow{F} = -\frac{mv^2}{r^2}\overrightarrow{r}$

C. $\overrightarrow{F} = -m\omega^2\overrightarrow{r}$

D. $\overrightarrow{F} = -\frac{mv^2\overrightarrow{r}}{\overrightarrow{r}}$

Answer: C

403. The banking angle is independednt of

A. velocity of vehicle

B. mass of vehicle

C. radius of curvature of road

D. height of inclination

Answer: B

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404. Calculate the average angular velocity of the hour hand of the of a clock.

A. $\frac{\pi}{43200} rad / s$

B. $\frac{\pi}{21600} rad / s$

C. $\frac{\pi}{30} rad / s$

D. $\frac{\pi}{1800} rad / s$

Answer: B

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405. When a vehicle is moving along the horizontal curve road, centripetal force is provided by

A. vertical component of normal reaction

B. horizontal component of normal reaction

C. frictional component road surface and tyres

D. all of these

Answer: C

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406. A body of mass m performing UCM with frequency n along the circumference of circle having radius r, force is given by

A. $4\pi nm^2$

B. $4\pi^2 n^2 mr$

C. $\pi^2 n^2 mr$

D. $1/2\pi nm^2$

Answer: B

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407. Maximum safe speed does not depended upon,

A. radius of curvature

B. angle of inclination with the horizontal

C. mass of the vehicle

D. acceleration due to gravity

Answer: C

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408. A car is moving along a horizontal curve of radius 20 m , and coefficient of friction between the road and wheels of the car is 0.25 . If acceleration due to gravity is $(9.8m/s^2)$, then its maximum speed is

A. $3m/s$

B. $5m/s$

C. $7m / s$

D. $9m / s$

Answer: C

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409. If a particle moves with uniform speed its tangntial acceleration will be

A. v^2 / r

B. $r\omega^2$

C. zero

D. infinite

Answer: C

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410. Tension of a string is 6.4 N and load is applied to it at its lower end of a string is 0.1 kg .If the length of string is 6 m , then its angular velocity will be `

A. $3 rad / s$

B. $4 rad / s$

C. $2 rad / s$

D. $1 rad / s$

Answer: A

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411. An electron revolve round the nucleous with the radius of the circular orbit is 'r' . To double the kinetic energy of the electron its orbital radius will be

A. $v/\sqrt{2}$

B. $\sqrt{2}r$

C. $2r$

D. $r/2$

Answer: B

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412. A body performing uniform circular motion has

A. constant velocity

B. constant acceleration

C. constant kinetic energy

D. constant displacement

Answer: C

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413. A motorcycle is going on an overbridge of radius R. The driver maintains a constant speed. As the motorcycle is ascending on the overbridge, the normal force on it

A. increases

B. decreases

C. remains the same

D. fluctuates

Answer: A

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414. If a particle is moving in a circular path of radius 'r' with a uniform speed v, then the angle described by it in one second will be

A. v r

B. $1/vr$

C. v/r

D. v/r^2

Answer: C

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415. A particle performing circular motion with its diameter d and velocity v. Then the angular displacement of the particle in time t is

A. $\frac{vt}{d}$

B. $\frac{2vt}{d}$

C. $\frac{vt}{2d}$

D. $\frac{d}{vt}$

Answer: B

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416. An object of mass M is tied to a string of l and revolve in a horizontal circle .If length is reduced by $l/2$, then period is

A. $T/\sqrt{2}$

B. $2\sqrt{2}T$

C. $T/4$

D. $2T$

Answer: C

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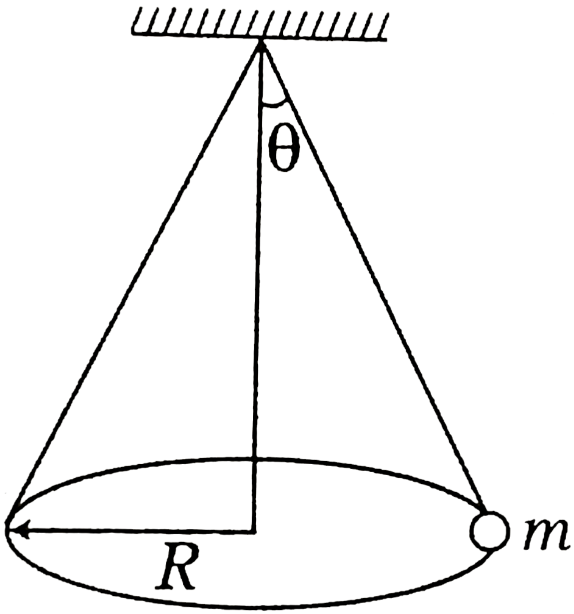
417. A conical pendulum of length L makes an angle θ with the vertical. The time period will be



A. $\frac{1}{2\pi}\sqrt{\frac{l\cos\theta}{g}}$

B. $\frac{10}{2\pi}\sqrt{\frac{l\sin\theta}{g}}$

C. $4\pi\sqrt{\frac{l\cos\theta}{4g}}$

D. $4\pi\sqrt{\frac{l\tan\theta}{g}}$

Answer: C

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418. What is the angular velocity of a second hand and minute hand of a clock ?

A. $\frac{59\pi}{900} rad / s$

B. $\frac{59\pi}{1800} rad / s$

C. $\frac{59}{2400} rad / s$

D. $\frac{59\pi}{3600} rad / s$

Answer: B

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419. A particle of mass m is moving in a circular path of constant radius r such that its centripetal acceleration a_c is varying with time t as $a_c = k^2 r t^2$, where k is a constant. The power delivered to the particle by the forces acting on it is :

A. $m^2 K^2 r^2 t^2$

B. $m K^2 r^2 t^2$

C. $m K^2 r t^2$

D. $m K r^2 t^2$

Answer: B

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420. Toy cart tied to the end of an unstretched string of length a, when revolved moves in a horizontal circle of radius 2a with a time period T. Now the toy cart is speeded up until it moves in a horizontal circle of radius 3a with a period T. If Hooke's law (F=kx) holds, then

A. $T_1 = \frac{2}{\sqrt{3}}T$

B. $T_1 = \sqrt{\frac{3}{2}}T$

C. $T_1 = \sqrt{\frac{2}{3}}T$

D. $T_1 = \left(\frac{\sqrt{3}}{2}\right)T$

Answer: D

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421. A particle moves along a circle of radius R with a constant angular speed ω. Its displacement (only magnitude) in time t will be

A. vt

B. $\left(\frac{v}{D}\right)-t$

C. $\frac{vt}{2D}$

D. $\frac{2vt}{D}$

Answer: D

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