Uniform Circular Motion

101. In uniform circular motion

(a) Both the angular velocity and the angular momentum vary

(b) The angular velocity varies but the angular momentum remains constant

(c) Both the angular velocity and the angular momentum stay constant

(d) The angular momentum varies but the angular velocity remains constant

102. When a body moves in a circular path, no work is done by the force since,

(a) There is no displacement

(b) There is no net force

(c) Force and displacement are perpendicular to each other

(d) The force is always away from the centre

103. Which of the following statements is false for a particle moving in a circle with a constant angular speed

(a) The velocity vector is tangent to the circle

(b) The acceleration vector is tangent to the circle

(c) The acceleration vector points to the centre of the circle

(d) The velocity and acceleration vectors are perpendicular to each other

104. 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) $a_r = 0$ but $a_t \neq 0$

(c) $a_r \neq 0$ but $a_t = 0$

(d) $a_r \neq 0$ and $a_t \neq 0$

105. A person with his hands in his pockets is skating on ice at the velocity of 10 *m/s* and describes a circle of radius 50 *m*. What is his inclination with vertical

(a) $\frac{\sqrt{3}}{2}$. (b) $tan^{-1}\left(\frac{3}{5}\right)$

(c) $tan^{-1}(1)$ (d) $tan^{-1}\left(\frac{1}{5}\right)$

106. 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 constant centripetal force, their velocity, should be in the ratio of

(a) 1 : 4 (b) 4 : 1

(c) $\sqrt{2}:1$ (d) $1:\sqrt{2}$

107. An object is moving in a circle of radius 100 *m* with a constant speed of 31.4 *m/s*. What is its average speed for one complete revolution

(a) Zero (b) 31.4 *m/s*

(c) 3.14 *m/s* (d) $\sqrt{2} \times 31.4 m/s$

108. A body of mass 1 *kg* tied to one end of string is revolved in a horizontal circle of radius 0.1 *m* with a speed of 3 *revolution/sec*, assuming the effect of gravity is negligible, then linear velocity, acceleration and tension in the string will be

(a) $1.88 m/s, 35.5 m/s^2, 35.5 N$

(b) $2.88 m/s, 45.5 m/s^2, 45.5 N$

(c) $3.88 m/s, 55.5 m/s^2, 55.5 N$

(d) None of these

109. The acceleration of a train travelling with speed of 400 *m/s* as it goes round a curve of radius 160 *m*, is

(a) $1 km/s^2$ (b) $\mathbf{100 m/s^2}$

(c) $10 m/s^2$ (d) $1 m/s^2$

110. 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) 7 *m/s* (b) 14 *m/s*

(c) 8 *m/s* (d) 12 *m/s*

111. A 500 *kg* crane takes a turn of radius 50 *m* with velocity of 36 *km/hr.* The centripetal force is

(a) 1200 *N* (b) 1000 *N*

(c) 750 *N* (d) 250 *N*

112. Two bodies of equal masses revolve in circular orbits of radii R_1 and R_2 with the same period. Their centripetal forces are in the ratio

(a) $\left(\frac{R_2}{R_1}\right)^2$ (b) $\frac{\boldsymbol{R_1}}{\boldsymbol{R_2}}$

(c) $\left(\frac{R_1}{R_2}\right)^2$ (d) $\sqrt{R_1 R_2}$

113. In case of uniform circular motion which of the following physical quantity do not remain constant

(a) Speed (b)Momentum

(c) Kinetic energy (d) Mass

114. What happens to the centripetal acceleration of a revolving body if you double the orbital speed v and half the angular velocity ω

(a) The centripetal acceleration remains unchanged

(b) The centripetal acceleration is halved

(c) The centripetal acceleration is doubled

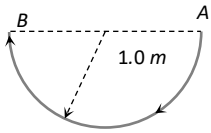
(d) The centripetal acceleration is quadrupled

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

(a) T_0 (b) $T_0/2$

(c) $4T_0$ (d) $8T_0$

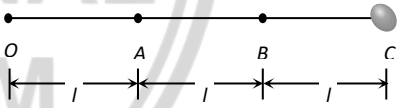
116. In 1.0 *s*, a particle goes from point *A* to point *B*, moving in a semicircle of radius 1.0 *m* (see figure). The magnitude of the average velocity is



(a) $3.14 m/s$ (b) 2.0 m/s

(c) 1.0 m/s (d) Zero

117. Three identical particles are joined together by a thread as shown in figure. All the three particles are moving in a horizontal plane. If the velocity of the outermost particle is v_0, then the ratio of tensions in the three sections of the string is



(a) 3 : 5 : 7 (b) 3 : 4 : 5

(c) 7 : 11 : 6 (d) 3 : 5 : 6

118. A particle is moving in a circle of radius *R* with constant speed *v,* if radius is double then its centripetal force to keep the same speed should be

(a) Doubled (b) Halved

(c) Quadrupled (d)Unchanged

119. A stone ties to the end of a string $1m$ long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolution in 44 seconds, what is the magnitude and direction of acceleration of the stone

(a) $\frac{\pi^2}{4} ms^{-2}$ and direction along the radius towards the centre

(b) $\pi^2 ms^{-2}$ and direction along the radius away from the centre

(c) $\pi^2 ms^{-2}$ and direction along the radius towards the centre

(d) $\pi^2 ms^{-2}$ and direction along the tangent to the circle

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

(a) 0.25 *cm* (b) 2 *cm*

(c) 4 *cm* (d) 2.5 *cm*

121. What is the angular velocity of earth

(a) $\frac{2\pi}{86400} rad/sec$

(b) $\frac{2\pi}{3600} rad/sec$

(c) $\frac{2\pi}{24} rad/sec$

(d) $\frac{2\pi}{6400} rad/sec$

122. If the length of the second's hand in a stop clock is 3 *cm* the angular velocity and linear velocity of the tip is

(a) 0.2047 *rad/sec.*, 0.0314 *m/sec*

(b) 0.2547 *rad/sec.*, 0.314 *m/sec*

(c) 0.1472 *rad/sec.*, 0.06314 *m/sec*

(d) 0.1047 *rad/sec.*, 0.00314 *m/sec*