Uniform Circular Motion

81. 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) Kinetic energy changes by $MV^2/4$

(b) Momentum does not change

(c) Momentum changes by $2MV$

(d) Kinetic energy changes by MV^2

82. 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.*

83. A cyclist riding the bicycle at a speed of $14\sqrt{3}$ ms^{-1} takes a turn around a circular road of radius $20\sqrt{3}$ *m* without skidding. Given $g = 9.8$ ms^{-2}, what is his inclination to the vertical

(a) 30^o (b) 90^o

(c) 45^o (d) 60^o

84. If a cycle wheel of radius 4 *m* completes one revolution in two seconds. Then acceleration of a point on the cycle wheel will be

(a) $\pi^2 m/s^2$ (b) $2\pi^2 m/s^2$

(c) $4\pi^2 m/s^2$ (d) $8\pi m/s^2$

85. A bob of mass 10 *kg* is attached to wire 0.3 *m* long. Its breaking stress is 4.8×10^7 N/m^2. The area of cross section of the wire is 10^{-6} m^2. The maximum angular velocity with which it can be rotated in a horizontal circle +-

(a) 8 *rad/sec* (b) 4 *rad/sec*

(c) 2 *rad/sec* (d) 1 *rad/sec*

86. In uniform circular motion, the velocity vector and acceleration vector are

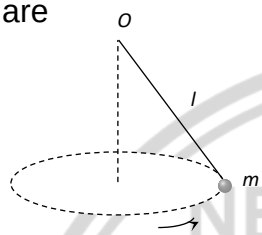
(a) Perpendicular to each other

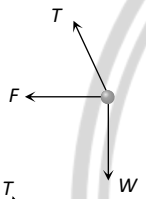
(b) Same direction

(c) Opposite direction

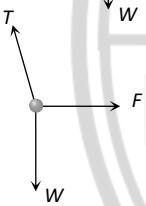
(d) Not related to each other

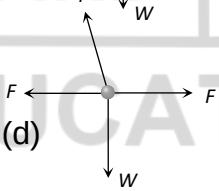
87. A point mass *m* is suspended from a light thread of length *l*, fixed at *O*, is whirled in a horizontal circle at constant speed as shown. From your point of view, stationary with respect to the mass, the forces on the mass are



(a) 

(b) 

(c) 

(d) 

88. If a cyclist moving with a speed of 4.9 *m/s* on a level road can take a sharp circular turn of radius 4 *m*, then coefficient of friction between the cycle tyres and road is

(a) 0.41 (b) 0.51

(c) 0.61 (d) 0.71

89. A car moves on a circular road. It describes equal angles about the centre in equal intervals of time. Which of the following statement about the velocity of the car is true

(a) Magnitude of velocity is not constant

(b) Both magnitude and direction of velocity change

(c) Velocity is directed towards the centre of the circle

(d) Magnitude of velocity is constant but direction changes

90. A scooter is going round a circular road of radius 100 *m* at a speed of 10 *m/s*. The angular speed of the scooter will be

(a) 0.01 *rad/s* (b) 0.1 *rad/s*

(c) 1 *rad/s* (d) 10 *rad/s*

91. A particle of mass *M* moves with constant speed along a circular path of radius *r* under the action of a force *F*. Its speed is

(a) $\sqrt{\frac{rF}{m}}$ (b) $\sqrt{\frac{F}{r}}$

(c) $\sqrt{Fmr}$ (d) $\sqrt{\frac{F}{mr}}$

92. In an atom for the electron to revolve around the nucleus, the necessary centripetal force is obtained from the following force exerted by the nucleus on the electron

(a) Nuclear force

(b) Gravitational force

(c) Magnetic force

(d) Electrostatic force

93. A particle moves with constant speed *v* along a circular path of radius *r* and completes the circle in time *T*. The acceleration of the particle is

(a) $2\pi v/T$ (b) $2\pi r/T$

(c) $2\pi r^2/T$ (d) $2\pi v^2/T$

94. The maximum velocity (in ms^{-1}) with which a car driver must traverse a flat curve of radius 150 *m* and coefficient of friction 0.6 to avoid skidding is

(a) 60 (b) 30

(c) 15 (d) 25

95. A car is moving with high velocity when it has a turn. A force acts on it outwardly because of

(a) Centripetal force

(b) Centrifugal force

(c) Gravitational force

(d) All the above

96. A motor cycle driver doubles its velocity when he is having a turn. The force exerted outwardly will be

(a) Double (b) Half

(c) 4 times (d) $\frac{1}{4}$ times

97. The coefficient of friction between the tyres and the road is 0.25. The maximum speed with which a car can be driven round a curve of radius 40 *m* without skidding is (assume $g = 10\ ms^{-2}$)

(a) 40 ms^{-1} (b) 20 ms^{-1}

(c) 15 ms^{-1} (d) 10 ms^{-1}

98. An athlete completes one round of a circular track of radius 10 *m* in 40 *sec*. The distance covered by him in 2 *min* 20 *sec* is

(a) 70 *m* (b) 140 *m*

(c) 110 *m* (d) 220 *m*

99. A proton of mass 1.6×10^{-27} *kg* goes round in a circular orbit of radius 0.10 *m* under a centripetal force of 4×10^{-13} *N*. then the frequency of revolution of the proton is about

(a) 0.08×10^{8} *cycles per sec*

(b) 4×10^{8} *cycles per sec*

(c) 8×10^{8} *cycles per sec*

(d) 12×10^{8} *cycles per sec*

100. A particle is moving in a circle with uniform speed *v*. In moving from a point to another diametrically opposite point

(a) The momentum changes by *mv*

(b) The momentum changes by 2*mv*

(c) The kinetic energy changes by $(1/2)mv^2$

(d) The kinetic energy changes by mv^2