NEET

Q1.

A 1 kg stone is tied to a 1 m long string and rotated in a horizontal circle with frequency 5 rev/s. Assuming horizontal circle, tension in the string is approximately:

(A) 310 N
(B) 500 N
(C) 820 N
(D) 990 N

Q2.

A car of mass 1000 kg takes a flat circular turn of radius 50 m with speed 10 m/s. Minimum coefficient of friction to avoid skidding is (take g = 10 m/s^2):

(A) 0.10
(B) 0.20
(C) 0.40
(D) 0.80

Q3.

A road is banked at angle 30° for a curve of radius 50 m. For which speed will no friction be required? (g = 10 m/s^2)

(A) 10 m/s
(B) 15 m/s
(C) 17 m/s
(D) 25 m/s

Q4.

A small body of mass m is moving in a vertical circle of radius R with a string. Minimum speed at the lowest point so that the string just remains taut throughout the motion is:

(A) $\sqrt{(gR)}$
(B) $\sqrt{(2gR)}$
(C) $\sqrt{(3gR)}$
(D) $\sqrt{(5gR)}$

Q5.

For the same vertical circle of radius R, the minimum speed at the **topmost point** so that the string just remains taut is:

(A) $\sqrt{(gR)}$
(B) $\sqrt{(2gR)}$
(C) $\sqrt{(3gR)}$
(D) $\sqrt{(5gR)}$

Q6.

A 2 kg mass attached to a 1 m long string is moving in a vertical circle. Its speed at the **lowest point** is 10 m/s. The tension in the string at the lowest point is ($g = 10$ m/s²):
(A) 40 N
(B) 120 N
(C) 200 N
(D) 220 N

Q7.
A particle moves in a circle of radius 2 m with angular speed 5 rad/s. Its centripetal acceleration is:
(A) 10 m/s²
(B) 25 m/s²
(C) 50 m/s²
(D) 100 m/s²

Q8.
A particle is in non-uniform circular motion of radius 1 m. Its speed varies with time as $v = 2t$ (in m/s). At $t = 3$ s, magnitude of its **resultant acceleration** is:
(A) 2 m/s²
(B) $\sqrt{10}$ m/s²
(C) 10 m/s²
(D) ≈ 36 m/s²

Q9.
A 0.5 kg particle moves in a horizontal circle of radius 0.5 m with constant speed 4 m/s. Work done by the centripetal force in one complete revolution is:
(A) 0 J
(B) 4π J
(C) 8π J
(D) 16π J

Q10.
A stone is whirled in a vertical circle. At the lowest point, speed is just sufficient for completing the circle. The ratio of tensions at lowest point (T_1) and highest point (T_2) is:
(A) 1 : 2
(B) 2 : 1
(C) 6 : 1
(D) 3 : 1

Q11.
A satellite is revolving around Earth in a circular orbit of radius R with speed v. If the orbital radius is doubled (2R), its new speed will be:
(A) $v/2$
(B) $v/\sqrt{2}$

(C) $v\sqrt{2}$
(D) 2v

Q12.
A car of mass m moves with constant speed v around a bend of radius R on a level road. Maximum frictional force between tyres and road is μmg. For safe turning (no skid), we must have:
(A) $v \le \sqrt{(\mu g R)}$
(B) $v \ge \sqrt{(\mu g R)}$
(C) $v = \mu g R$
(D) $v = \mu R/ g$

Q13.
A bead of mass m can slide without friction on a circular ring of radius R kept vertical. It is released from rest from the top. Its speed when it reaches the **lowest point** is:
(A) $\sqrt{(gR)}$
(B) $\sqrt{(2gR)}$
(C) $\sqrt{(4gR)}$
(D) $\sqrt{(6gR)}$

Q14.
A particle is moving in a circle of radius R with speed v. Angular momentum magnitude about the centre is:
(A) mvR
(B) mv/R
(C) mv^2R
(D) mvR^2

Q15.
A fan rotates with constant angular speed ω. Time period of rotation is:
(A) 2πω
(B) ω/2π
(C) 1/ω
(D) 2π/ω

Q16.
A stone tied to a string of length 1 m is moving in a horizontal circle on a smooth table with speed 4 m/s. If the string can withstand a maximum tension of 40 N, maximum speed possible without breaking is (mass = 0.5 kg):
(A) 4 m/s
(B) $\sqrt{40}$ m/s
(C) 8 m/s
(D) $2\sqrt{10}$ m/s

Q17.

A motorcycle goes over a **convex** circular hill of radius 20 m. What is the maximum speed so that it just remains in contact at the top? ($g = 10\ m/s^2$)
(A) 5 m/s
(B) 10 m/s
(C) $\sqrt{200}$ m/s
(D) 20 m/s

Q18.
A satellite of mass m in a circular orbit of radius R around a planet has total mechanical energy E. If radius of orbit is halved (R/2), its total energy becomes:
(A) 4E
(B) 2E
(C) E/2
(D) 2E
(sign and magnitude dono socho)

Q19.
In a vertical circular motion, the **difference** between the tensions at the lowest and highest points ($T_1 - T_2$) is:
(A) 2mg
(B) mg
(C) mv^2/R
(D) 4mg

Q20.
A car of mass 800 kg is moving on a banked curve of radius 100 m at speed 20 m/s. Required banking angle ($\tan\theta = v^2/Rg$, $g = 10\ m/s^2$) is:
(A) $\tan\theta = 2$
(B) $\tan\theta = 4$
(C) $\tan\theta = 1/2$
(D) $\tan\theta = 1/4$

Q21.
A constant force of 10 N displaces a body by 5 m in the direction of force. Work done is:
(A) 2.5 J
(B) 10 J
(C) 20 J
(D) 50 J

Q22.
A body of mass 2 kg is initially at rest. A constant force acts on it and after moving 10 m its speed becomes 10 m/s. Work done by the force is:
(A) 50 J
(B) 100 J
(C) 200 J
(D) 250 J

Q23.
A particle moves under a variable force $F(x) = 4x$ (N) along x-axis. Work done in moving from $x = 0$ to $x = 3$ m is:
(A) 12 J
(B) 18 J
(C) 24 J
(D) 36 J

Q24.
A block of mass 1 kg slides on a rough horizontal surface with initial speed 4 m/s and comes to rest after travelling 2 m. Magnitude of friction force (assume constant) is:
(A) 2 N
(B) 4 N
(C) 8 N
(D) 16 N

Q25.
A spring of force constant $k = 200$ N/m is compressed by 0.1 m. Stored elastic potential energy is:
(A) 1 J
(B) 0.5 J
(C) 2 J
(D) 5 J

Q26.
A body of mass m falls freely from height h. Just before striking the ground, its kinetic energy is:
(A) mgh/2
(B) mgh
(C) 2mgh
(D) zero

Q27.
A 0.01 kg bullet moving with 500 m/s hits a wooden block of mass 2 kg and gets embedded in it. Speed of block + bullet just after impact is (take no external friction):
(A) 2.5 m/s
(B) 5 m/s
(C) 10 m/s
(D) 20 m/s

Q28.
In Q27, the **loss in kinetic energy** during the process is nearest to:
(A) 600 J

(B) 650 J
(C) 1250 J
(D) 2500 J

Q29.

A ball dropped from height H rebounds to height H/4. Coefficient of restitution e is:
(A) 1/2
(B) 1/4
(C) $1/\sqrt{2}$
(D) $\sqrt{2}/4$

Q30.

A 2 kg block is at rest on smooth horizontal surface attached to a spring (k = 100 N/m). It is pulled to stretch spring by 0.2 m and released. Maximum kinetic energy of block during motion is:
(A) 1 J
(B) 2 J
(C) 4 J
(D) 10 J

Q31.

A body of mass m has momentum p. Its kinetic energy is:
(A) $p^2/2m$
(B) p^2/m
(C) $2p^2/m$
(D) $p^2/4m$

Q32.

A machine delivers constant power P to a body of mass m starting from rest. After time t, the speed of body varies as:
(A) $v \propto t$
(B) $v \propto \sqrt{t}$
(C) $v \propto t^2$
(D) $v \propto 1/t$

Q33.

A block of mass 1 kg is pulled up an incline with constant speed. Angle of incline is 30°, $\mu = 0.2$, $g = 10\ m/s^2$. Work done by pulling force to move the block by 5 m along incline is closest to:
(A) 25 J
(B) 35 J
(C) 45 J
(D) 55 J
(hint: balance component of mg + friction)

Q34.
A particle of mass 0.5 kg has kinetic energy 8 J. Magnitude of its momentum is:
(A) 1 kg m/s
(B) 2 kg m/s
(C) 4 kg m/s
(D) $\sqrt{8}$ kg m/s

Q35.
A ball of mass m moving with speed u makes a **head-on elastic collision** with another identical ball at rest. After collision, their speeds are:
(A) both move with speed u/2
(B) first stops, second moves with speed u
(C) first moves with u, second at rest
(D) both move with speed u

Q36.
In a perfectly inelastic collision between two bodies of masses m and M (M > m), which of the following is always true?
(A) Momentum and kinetic energy both conserved
(B) Momentum conserved, kinetic energy decreases
(C) Kinetic energy conserved, momentum changes
(D) Both momentum and kinetic energy decrease

Q37.
A 0.2 kg stone is thrown vertically upward with speed 20 m/s. Maximum gravitational potential energy gained (taking ground as reference) is:
(A) 20 J
(B) 40 J
(C) 100 J
(D) 400 J

Q38.
A 1 kg block slides down a smooth track from height 2.5 m and moves into a rough horizontal surface where $\mu = 0.2$. Distance travelled on rough surface before coming to rest ($g = 10\ m/s^2$) is:
(A) 4 m
(B) 5 m
(C) 6.25 m
(D) 10 m

Q39.
A body of mass m moves in a circular path of radius R on a rough horizontal surface with **constant speed** under action of some external agent. Power required to overcome friction (coefficient μ, speed v) is:
(A) μmgv
(B) μmgv/R

(C) µmgR/v
(D) µmvgR

Q40.
Work done by gravitational force on a body of mass m moved from ground to height h by any curved path is:
(A) depends on path
(B) always zero
(C) always –mgh
(D) always +mgh
Q41.
A particle is moving in a circular path with **constant speed**. Which statement is **correct**?
(A) Velocity is constant, acceleration is zero
(B) Speed and velocity both are constant
(C) Speed is constant but velocity and acceleration both are changing
(D) Speed and acceleration both are constant

Q42.
Which of the following forces is **necessarily** conservative?
(A) Frictional force
(B) Viscous force
(C) Gravitational force
(D) Air resistance

Q43.
In circular motion, "centrifugal force" experienced in a rotating frame is:
(A) Real force of gravitational origin
(B) Real normal reaction
(C) Pseudo force appearing in non-inertial frame
(D) Magnetic force

Q44.
A body is moving under the influence of a **conservative force** only. Which of the following is always constant?
(A) Kinetic energy
(B) Potential energy
(C) Mechanical energy (K + U)
(D) Momentum

Q45.
Which of the following graphs can represent **potential energy vs displacement** for a **stable equilibrium** at x = 0?
(A) Straight line with positive slope through origin
(B) Straight line with negative slope through origin

(C) U-shaped curve with minimum at $x = 0$
(D) Inverted U-shaped curve with maximum at $x = 0$