Q 1

An advertisement claims that a particular automobile can "stop on a dime." What net force would actually be necessary to stop a 850-kg automobile travelling initially at 45.0 km/h in a distance equal to the diameter of a dime, which is 1.8 cm?

(a) 3.7×10^4 N

(b) 3.7×10^6 N

(c) 8.4×10^5 N

(d) None of these

Ops: A. ○ a

B. ◉ b

C. ○ c

D. ○ d

reset answer

Q 2

You apply equal torques to two different cylinders, one of which has a moment of inertia twice as large as the other cylinder. Each cylinder is initially at rest after one complete rotation, which cylinder has the greater kinetic energy?

(a) The cylinder with the larger moment of inertia

(b) The cylinder with the smaller moment of inertia;

(c) Both cylinders have the same kinetic energy

(d) None of the above.

Ops: A. ○ a

B. ○ b

C. ◉ c

D. ○ d

reset answer

Q 3

A "moving sidewalk" in an airport terminal building moves at 1.0 m/sec and is 35.0 m long. If a woman steps on at one end and walks at 1.5m/sec relative to the moving sidewalk, how much time does she require to reach the opposite end if she walks in the same direction the sidewalk is moving?

(a) 70sec

(b) 14sec

(c) 5 sec

(d) 28sec

Ops: A. ◉ a

B. ○ b

C. ○ c

D. ○ d

reset answer

Q 4

Which is the expression for continuity equation of incompressible fluid?

(a) $\rho_1 v_1 = \rho_1 v_1$

(b) $\rho_1 A_1 v_1 = \rho_2 A_2 v_2$

(c) $A_1 v_1 = A_2 v_2$

(d) None of these

Q 5 An antelope moving with constant acceleration covers the distance between two points 75.0 m apart in 5.0 s. Its speed as it passes the second point is 18m/s . What is its speed at the first point?

(a) 17 m/s

(b) 12 m/s

(c) 10 m/s

(d) None of these

Ops: A. ○ a

B. ◉ b

C. ○ c

D. ○ d

reset answer

Q 6

Two people are carrying a uniform wooden board that is 3.00 m long and weighs 160 N. If one person applies an upward force equal to 60 N at one end, at what point from the same end does the other person lift?

(a) 2.2m

(b) 3.4 m

(c) 3.7 m

(d) 2.4 m

Ops: A. ○ a

B. ○ b

C. ○ c

D. ◉ d

Q 7 At time t = 0, a 2150-kg rocket in outer space fires an engine that exerts an increasing force on it in the + x-direction. This force obeys the equation $F_x = A\,t^2$, where t is time, and has a magnitude of 781.25 N when t = 1.25 s. Find the SI value of the constant A, including its units

(a) 50 dyne/s^2

(b) 50 N/s^2

(c) 500 N/s^2

(d) None of these

Ops: A. ○ a
B. ○ b
C. ◉ c
D. ○ d
reset answer

Q 8 A ball thrown vertically upward with some initial speed reaches a maximum height *h*. If its initial speed becomes 3 times, what is its new maximum height?

(a) 8 h

(b) 9 h

(c) 16 h

(d) None of these

Q 10 A bat hits a ball with a velocity 30 m/s making an angle 30^0 with the horizontal. The time duration it will remain in air is (Use g=10m/sec^2)

(a) 6 s

(b) 3 s

(c) 12 s

(d) 4 s

Ops: A. ○ a

B. ◉ b

C. ○ c

D. ○ d

reset answer

Q 11 The dimensional formula of the Bulk modulus is

(a) $M^1L^1T^{-2}$

(b) $M^1L^{-2}T^{-2}$

(c) $M^1L^{-1}T^{-2}$

(d) None of these

Q 12 Sally is driving along a straight highway. At t=0, when she is moving at 10m/s in the positive x-direction, she passes a signpost at x=50m. Her x-acceleration as a function of time is, $a_x = 2m/s^2 - (0.10m/s^3)\,t$. At what time she will have her maximum velocity?

(a) 25 s

(b) 20 s

(c) 30 s

(d) 35s

Ops: A. ○ a
B. ○ b
C. ○ c
D. ◉ d

reset answer

Q 13 . Two wires A and B are of the same length. The diameters are in the ratio 1 : 2 and the Youngs modulus are in ratio 2 : 1. if they are pulled by the same force, then their elongations will be in ratio

(a) 4 : 1

(b) 1 : 4

(c) 1 : 2

(d) 2 : 1

Q 14

Suppose an astronaut landed on a planet where g= 19.6 m/s^2. Compared to earth, would it be easier, harder, or just as easy for her to walk around?

(a) Easier

(b) Harder

(c) Just as easy to walk

(d) None of these

Ops: A. ○ a

B. ◉ b

Q 16 Vector $\vec{A}$ has magnitude 10.0 m and vector $\vec{B}$ has magnitude 20.0 m. The magnitude of the vector product $|\vec{A} \times \vec{B}|$ is 100 m^2. What is the magnitude of the scalar product between these two vectors?

(a) 0 m^2

(b) 173 m^2

(c) 180 m^2

(d) None of these

Ops: A. ○ a
B. ◉ b
C. ○ c
D. ○ d
reset answer

Q 17 A 700 N man and a 450 N woman have the same momentum. What is the ratio of the man's kinetic energy to that of the woman?

(a) 0.324

(b) 0.641

(c) 0.722

(d) 0.98

Q 18

A waitress shoves a ketchup bottle with mass 0.45 kg to her right along a smooth, level lunch counter. The bottle leaves her hand moving at 2.5 m/sec then slows down as it slides because of a constant horizontal friction force exerted on it by the countertop. It slides for 1.0 m before coming to rest. What is the magnitude of the friction force acting on the bottle?

(a) -3.9 N

(b) 1.4 N

(c) 2.4 N

(d) None of these

Q 19

According to work energy theorem, a particle of mass m when subjected to unbalanced force system, the work done during displacement by all forces is equal to change in

(a) potential energy

(b) kinetic energy

(c) gravitational energy

(d) None of them

Ops: A. ○ a

B. ◉ b

Q 25 A ball is thrown vertically upward from roof of a tall building with an initial speed of 15m/s which is under free fall condition. What is the position of the ball after time t = 1s?

(a) 12.4 m

(b) 13.6 m

(c) 10.1 m

(d) None of these

Ops: A. ○ a
B. ○ b
C. ◉ c
D. ○ d

reset answer

Q 26 The maximum acceleration of a particle moving angular velocity ω and amplitude A in a simple harmonic motion is

(a) ω

(b) ω. A

(c) ω^2. A

(d) ω^2

Ops: A. ○ a
B. ○ b
C. ◉ c

Q 27 A 2.49×10^4 N Phantom traveling in the +x-direction makes an emergency stop; the x-component of the net force acting on it is -1.83×10^4 N. What is its acceleration?

(a) 720 m/s^2

(b) 7.2 m/s^2

(c) -7.2 m/s^2

(d) None of these

Ops: A. ○ a

B. ○ b

C. ◉ c

D. ○ d

reset answer

Q 28 Which is the expression for Bernoulli's equation?

(a) $p_1 + \rho g y_1 + (1/2)\rho v_1^2 = p_2 + \rho g y_2 + (1/2)\rho v_2^2$

Q 29

The statement "The work done by the gravitational force, W_{grav} equals the negative of the change $-\Delta U_{grav}$ in gravitational potential energy," is valid for

(a) a body moving downward and not for upward motion

(b) a body moving upward and not for downward motion

(c) for both upward and downward motion

(d) neither upward nor downward motion

Ops: A. ○ a

B. ○ b

C. ◉ c

D. ○ d

reset answer

Q 30 A soccer ball has a mass of 0.4 Kg. Initially it is moving to the left at 29 m/s, but then kicked. After kicking it is moving at 45^0 upward and to the right with speed 30 m/s. The y-component of the velocity after the kick is

(a) 21.2 m/s

(b) 29.8 m/s

(c) -20 m/s

(d) Zero

Q 31

A robotic vehicle, or rover, is exploring the surface of Mars. The stationary Mars lander is the origin of coordinates, and the surrounding Martian surface lies in the xy-plane. The rover, which we represent as a point, has x- and y-coordinates that vary with time: $x = 2.0\,m - (0.25\,m/s^2)t^2$ and $y = (1.0\,m/s)t + (0.025\ m/s^3)t^3$. What is the magnitude of the velocity at t=2sec?

(a) 2m/sec

(b) 4.2m/sec

(c) 1.6m/sec

(d) 1.1m/sec

Q 32 Which is the expression for continuity equation of compressible fluid?

(a) $A_1v_1 = A_2v_2$

(b) $\rho_1A_1v_1 = \rho_2A_2v_2$

(c) $\rho_1v_1 = \rho_2v_2$

(d) None of these

Ops: A. ○ a

B. ◉ b

C. ○ c

D. ○ d

reset answer

Q 33 A sports car can sustain a maximum centripetal acceleration of $9.4m/sec^2$ along a curved path without skidding. If it is travelling at a constant speed of 40m/sec along a leveled road what should the minimum radius of the curve it can turn without skidding?

(a) 170.21m

(b) 191m

(c) 340m

Q 34 If the position versus time graph is curved downward, then what is the nature of acceleration?

(a) Positive

(b) Negative

(c) Zero

(d) Constant.

Ops: A. ◉ a

B. ○ b

C. ○ c

D. ○ d

reset answer

Q 35 A body of mass 10 kg is moved parallel to the ground, through a distance of 2 m. The work done against gravitational force is

(a) 196 J

(b) -196 J

(c) 20 J

(d) zero

Q 36

The flywheel of an engine has moment of inertia 2.50 kg.m^2 about its rotation axis. The constant torque required to bring it up to an angular speed of 400 rev/min in 8.00 s, starting from rest is

(a) 10.1 N.m

(b) 11.1 N.m

(c) 12.1 N.m

(d) 13.1 N.m

Ops: A. ○ a

B. ○ b

C. ○ c

D. ◉ d

reset answer

Q 37

A bullet of mass 0.025 kg travelling at speed of 100 m/s hit a tree, penetrates through it and gets stopped after passing through distance of 0.15m. What is the uniform retardation of the bullet?

(a) -32000 .26 m/s^2

(b) -33333.33 m/s^2

(c) 31205.6 m/s^2

(d) None of these

Q 38 An athlete completes one round of a circular track of radius R in 30s. What will be the displacement at the end of 2minute?

(a) 0

(b) 2R

(c) $2\pi R$

(d) None of these

Ops: A. ○ a

B. ○ b

C. ○ c

D. ◉ d

Q 39

What is the condition for translational equilibrium state?

(a) $\sum F = 0$

(b) $\sum F = ma$

(c) $\sum F \neq 0$

(d) None of these

Ops: A. ◉ a

B. ○ b

C. ○ c

D. ○ d

reset answer

Q 40 Let a lever is inclined to the horizontal with an angle θ. A force **P** being applied vertically downward to one end of the lever of length **L** . Then the magnitude of the torque of this force about the point where the lever touches the ground is

(a) P L sin θ

(b) P L cos θ

(c) P L tan θ.

Q 41 An electric train leaves a station starting from rest and attains a speed of 72 km/h in 10s. It travels at that speed for 100s. Then it undergoes uniform retardation for 20s to come to a halt at the next station. Calculate the distance between two stations .

(a) 2100 m

(b) 2500 m

(c) 2300 m

(d) None of these

Ops: A. ○ a

B. ○ b

C. ◉ c

Q 42 Two vectors $\vec{A}$ and $\vec{B}$ both lie in the xy-plane. (a) Is it possible for $\vec{A}$ to have the same components as $\vec{B}$ but different magnitude

(a) Yes

(b) No

(c) Can't say Yes or No

(d) None of these

Ops: A. ◉ a

Q 43 Two identical 1.50 kg masses are pressed against opposite ends of a light spring of force constant 1.75 N/cm, compressing the spring by 20.0 cm from its normal length. Find the speed of each mass when it has moved free of the spring on a frictionless horizontal table.

(a) 1.53 m/s

(b) 15.3 m/s

(c) 16 m/s

(d) 28.5 m/s

Ops: A. ◉ a

Q 44

For clockwise rotation, instantaneous angular velocity (ω_{av}) of a body

(a) ω_{av} is positive

(b) ω_{av} is negative

(c) ω_{av} is equal to zero

(d) None of these

Ops: A. ○ a

B. ◉ b

Q 45

A motorbike engine can develop a power of 90000 W in order to keep a constant velocity of 30 m/s. What is the pushing force?

(a) 3000 N

(b) 30000 N

(c) 300000 N

(d) 300 N

Ops: A. ◉ a

Q 46

Condition for rolling without slipping is

(a) $v_{cm} = R_{cm}\omega$

(b) $v_{cm} \leq R\omega$

(c) $v_{cm} = Rv$

(d) $v_{cm} \geq R\omega$

Ops: A. (a)

B. (b)

C. (c)

D. (d)

reset answer

Q 47

A steel rod 2.0 m long has a cross-sectional area of 0.30 cm^2. It is hung by one end from a support, and a 550-kg milling machine is hung from its other end. Determine the resulting strain. (Given; $Y_{steel} = 2 \times 10^{11}$ N/m^2).

(a) 9×10^{-4}

(b) 8×10^{-4}

(c) 8.5×10^{-5}

(d) 9×10^{-3}

Q 49 A car travels a distance with a speed of 20 km/h and returns with a speed of 40 km/h. What is the average speed of car?

(a) 25 km/h

(b) 26.67 km/h

(c) 30 km/h

(d) None of these

Ops: A. ○ a

B. ◉ b

Q 50

If the velocity of the object is increased by 0.1%, the kinetic energy is increased by

(a) 0.10%

(b) 0.01%

(c) 0.02%

(d) 0.20%

Ops: A. ◉ a

Q 51

A body of mass 5 kg starts from the origin with an initial velocity $u = (30i+40j)$ m/s. If the constant force acts on the body $F = -(i+5j)$ N. The time in which y component of the velocity becomes zero is

(a) 5 s

(b) 80 s

(c) 20 s

(d) 40 s

Ops: A. ○ a

B. ○ b

C. ○ c

D. ◉ d

Q 52 When a body is rolling without slipping (i.e. rolling down an incline) the work done is

(a) $\frac{1}{2}mv_{cm}^{2}$

(b) $\frac{1}{2}I_{cm}\omega^{2}$

(c) $\frac{1}{2}mv_{cm}^{2}+\frac{1}{2}I_{cm}\omega^{2}$

(d) 0

Ops: A. ○ a

B. ○ b

C. ○ c

D. ◉ d

Q 53

When the rotation is speeding up the direction of angular acceleration ($\vec{\alpha}$) and angular velocity ($\vec{\omega}$) is

(a) $\vec{\alpha}$ and $\vec{\omega}$ are in the same direction

(b) $\vec{\alpha}$ and $\vec{\omega}$ are in the opposite direction

(c) $\vec{\alpha}$ and $\vec{\omega}$ are in the clockwise direction

(d) none of the above

Ops: A. ◉ a

Q 54 An airplane's compass indicates that it is headed due north, and its airspeed indicator shows that it is moving through the air at 240 km/h. If there is a 100 km/h wind from west to east, the velocity of the airplane relative to the earth is

(a) 260 km/h towards north.

(b) 260 km/h towards east of north.

(c) 218 km/h towards east of north.

(d) 218 km/h towards .

Ops: A. ○ a

B. ◉ b

Q 55

Torque of a rotating rigid object is

(a) $\vec{\tau} = I\,\vec{\alpha}$

(b) $\vec{\tau} = \dfrac{d\vec{L}}{dt}$

(c) $\vec{\tau} = \dfrac{d}{dt}\left(\vec{r} \times \vec{p}\right)$

(d) All of the above

Ops:

A. ○ a

B. ○ b

C. ○ c

D. ◉ d

Q 56

A body loses half of its velocity on penetrating 6 cm in a wooden block. How much will it penetrate more before coming to rest?

(a) 1 cm

(b) 2 cm

(c) 4 cm

(d) 6 cm

Ops: A. ○ a

B. ◉ b

Q 57

What will be the velocity of a body of mass 5 kg at a distance of 2 m from the starting point on which a constant force of 10 N is applied.

(a) 2 m/s

(b) 2.8 m/s

(c) 4 m/s

(d) None of these

Ops: A. ○ a

B. ◉ b

Q 58 A ball is attached to one end of a piece of string. You hold the other end of the string and whirl the ball in a circle around your hand. If the ball moves at a constant speed, then its linear momentum $\vec{p}$ is

(a) Constant

(b) Not constant

(c) Zero

(d) data insufficient

Ops: A. (a)

B. (b)

C. (c)

D. (d)

reset answer

Q 59 Which of the following is represented by the area under force-displacement diagram

(a) work done

(b) power

(c) momentum

(d) impulse

Q 60 What is the phase difference between two consecutive trough and crest in a transverse wave?

(a) 2π

(b) $\pi/2$

(c) π

(d) $\pi/4$

Ops: A. ◉ a