ST. LAWRENCE HIGH SCHOOL

27, BALLYGUNGE CIRCULAR ROAD

Class : 11   **Subject : PHYSICS**   **Term : FIRST TERM**   **Max Marks : 60**

Q 1 : Maximum and minimum values of the resultant of two forces acting at a point are 7N and 3N respectively. The smaller force will be equal to **Marks :** 1

1 . 5N

2 . 4N

3 . 2N   ✅ (This Answer is Correct)

4 . 1N

Q 2 : The resultant of two forces 3P and 2P is R. If the first force is doubled, then the resultant is also doubled. The angle between the two forces is – **Marks :** 1

1 . 30º

2 . 60º

3 . 90º

4 . 120º   ✅ (This Answer is Correct)

Q 3 : The resultant two forces, one double the other in magnitude, is perpendicular to the smaller of the two forces. The angle between the two forces is – **Marks :** 1

1 . 0º

2 . 60º

3 . 90º

4 . 120º   ✅ (This Answer is Correct)

Q 4 : A man wants to run with a speed of 10km/h while it's raining and the rain drops are vertically downward with speed of $10\sqrt{3}$ km/h. At what angle the man should hold his umbrella w.r.t the horizontal? **Marks :** 1

1 . 30°

2 . 37°

3 . 45°

4 . 60°   ✅ (This Answer is Correct)

Q 5 : A balloon of total mass M is descending with a constant acceleration g/3. When a mass m is released from the balloon, it starts rising with same acceleration. The value of m is – **Marks :** 1

1 . M/2   ✅ (This Answer is Correct)

2 . M/4

3 . 4M

4 . 2M

Q 6 :   A block of mass 8kg is kept on a rough horizontal surface. What will be the acceleration of the body if   **Marks :**   1
a horizontal force of magnitude 65 N is applied on the block ? (Coefficient of static friction=0.8,
coefficient of kinetic friction =0.7,g=10m/s²)

1 . 9m/s²

2 . 8m/s²

3 . 9/8 m/s²   ✅ (This Answer is Correct)

4 . zero

Q 7 :   When a horizontal force of 45N is applied on a body kept on a rough horizontal plane, it is seen that,   **Marks :**   1
the acceleration of the body is 3 m/s². If the mass of the body is 5kg, then what will be the coefficient
of kinetic friction of the system? (g=10m/s²)

1 . 0.5

2 . 0.6   ✅ (This Answer is Correct)

3 . 0.7

4 . 0.8

Q 8 :   A block of mass M is placed at rest on an inclined plane of inclination θ . If the coefficient of friction   **Marks :**   1
between the block and the rough plane is μ, then the total force the inclined plane exerts on the block
is –

1 . Mg   ✅ (This Answer is Correct)

2 . μMg cos θ

3 . Mg sin θ

4 . μMg tan θ

Q 9 :   A fan is switched on at rest (length of one blade is r). If the linear speed at the edge of a blade after   **Marks :**   1
rotating θ angle be v, then the angular acceleration is –

1 . v²/r

2 . (2v²)/(r² θ)

3 . (v²)/(r² θ)

4 . (v²)/(2r² θ)   ✅ (This Answer is Correct)

Q 10 :   A block of mass m moving with initial speed v compresses a spring by x amount before its speed is   **Marks :**   1
halved. What is the value of the spring constant of the spring?

1 . (3mv²)/(4x²)   ✅ (This Answer is Correct)

2 . (mv²)/(4x²)

3 . (mv²)/(2x²)

4 . (2mv²)/(x²)

Q 11 : A body crosses the top most point of vertical circular path with critical speed. What will be the its centripetal acceleration when the string is horizontal? **Marks :** 1

1 . g

2 . 2g

3 . 3g ☑ (This Answer is Correct)

4 . 6g

Q 12 : A spring of force constant 800N/m has an initial extension of 5cm. The work done in extending it from 5cm to 15cm is **Marks :** 1

1 . 8J ☑ (This Answer is Correct)

2 . 16J

3 . 24J

4 . 32J

Q 13 : Moment of inertia of a thin circular disc of mass M and radius R about any diameter is – **Marks :** 1

1 . (MR²)/4 ☑ (This Answer is Correct)

2 . (MR²)/2

3 . (MR²)

4 . 2(MR²)

Q 14 : A stone is dropped from the top of a tower and one second later, a second stone is thrown vertically downward with a velocity 20m/s from the same point. The 2nd stone will overtake the 1st stone after travelling a distance of (g = 10m/s^2) – **Marks :** 1

1 . 13m

2 . 15m

3 . 11.25m ☑ (This Answer is Correct)

4 . 19.5m

Q 15 : The displacement of a particle y is given by the equation $y = a\,Sin\,w\left(\frac{x}{v} - k\right)$, where x is measured in cm and v is the linear velocity. The dimension of k will be –
1. T 2. T^{-1} 3. MT^{-1} 4. L^2T^{-1} **Marks :** 1

1 . 1 ☑ (This Answer is Correct)

2 . 2

3 . 3

4 . 4

Q 16 :   The dimension of $\frac{a}{b}$ in the equation $P = \frac{a - t^2}{bx}$, where P is pressure, x is distance and t is time is –   **Marks :**   1

     1. MLT^{-1} 2. MT^{-2} 3. MT^{-1} 4. $ML^{-1}T^{-1}$

    1 .   1

    2 .   2   ☑ (This Answer is Correct)

    3 .   3

    4 .   4

Q 17 :   . The displacement of a particle in 1D motion is given as $x = 3t^3 - 9t$ m. The nature of acceleration – time   **Marks :**   1
graph of the particle will be –
1.   A straight line parallel to the time axis
2.   A straight line parallel to the acceleration axis
3.   A straight line making an acute angle with the time axis.
4.   A straight line making an obtuse angle with the time axis.

    1 .   1

    2 .   2

    3 .   3   ☑ (This Answer is Correct)

    4 .   4

Q 18 :   A particle moves in a circle of radius $R = \frac{21}{22}$ with constant speed 1 m/s. what is the magnitude its average   **Marks :**   1
velocity in 1.5sec?
     1.   Zero   2. 1m/s   3. $\frac{21}{22}\sqrt{2}$ m/s   4. $\frac{7}{11}\sqrt{2}$ m/s

    1 .   1

    2 .   2

    3 .   3

    4 .   4   ☑ (This Answer is Correct)

Q 19 :   A particle moves along a straight line. Its position at any instant is given by $x = 32t - \frac{8t^3}{3}$, where x is in m and t   **Marks :**   1
is in sec. find the acceleration of the particle at the instant when the particle is at rest.
     1. $-16m/s^2$ 2. $-32m/s^2$ 3. $32m/s^2$ 4. $16m/s^2$

    1 .   1

    2 .   2   ☑ (This Answer is Correct)

    3 .   3

    4 .   4

Q 20 :   . Three unit vectors $\hat{a}_1$, $\hat{a}_2$ and $\hat{a}_3$ are such that , $\hat{a}_1 + \hat{a}_2 + \hat{a}_3 = \vec{0}$. Then the angle between $\hat{a}_1$ and $\hat{a}_2$ can be –   **Marks :**   1
     1.   30°   2. 60°   3. 90°   4. 120°

    1 .   1

    2 .   2

    3 .   3

    4 .   4   ☑ (This Answer is Correct)

Q 21 :   1

If the $\vec{P} = a\hat{\imath} + a\hat{\jmath} + 3\hat{k}$ and $\vec{Q} = a\hat{\imath} - 2\hat{\jmath} - \hat{k}$ are perpendicular to each other, then the positive value of a is –
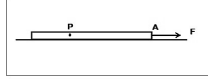1. 0   2. 1   3. 2   4. 3

Marks :

1 . 1

2 . 2

3 . 3

4 . 4   ✅ (This Answer is Correct)

Q 22 : A uniform rod of length l and mass m is kept on a smooth horizontal plane. If a horizontal force F is applied on the road along its length, then what will be the force on the rod at point P? (AP = x)

1. F   2. Zero   3. $F\left(1 - \frac{x}{l}\right)$ 4. $Fm\left(1 - \frac{l}{x}\right)$

Marks :   1

1 . 1

2 . 2

3 . 3   ✅ (This Answer is Correct)

4 . 4

Q 23 : In the figure ($g = 10m/s^2$), the tension on the string C is –

1. Zero
2. $\frac{200}{\sqrt{3}}$ N
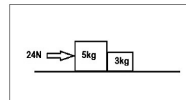3. $\frac{100}{\sqrt{3}}$ N
4. 100N

Marks :   1

1 . 1

2 . 2

3 . 3   ✅ (This Answer is Correct)

4 . 4
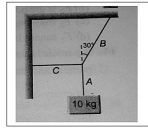
Q 24 : Two blocks of mass 5kg and 3kg are placed in contact on a smooth horizontal plane as shown in the figure The reaction force exerted by 3kg mass on 5kg mass will be –

1. 24N
2. 15N
3. 9N
4. Zero

Marks :   1

1 . 1

2 . 2

3 . 3   ✅ (This Answer is Correct)

4 . 4

Q 25 : A force F is applied on a square plate of side L. If the percentage error in the determination of L is 2% and that in F is 4%, what is the error in pressure?

Marks :   1

1 . 8%   ✅ (This Answer is Correct)

2 . 6%

3 . 4%

4 . 2%

Q 26 :   If the error introduced to measure the resistance, current and time are 1%, 2% and 1% respectively,   **Marks :**   1
then the maximum error in the calculation of heat produced due to the flow of current is –

1 .   8%

2 .   6%   ✅ (This Answer is Correct)

3 .   18%

4 .   12%

Q 27 :   When a man projects himself at an angle 30° with the perpendicular direction of the bank of a river, he   **Marks :**   1
can reach the exactly opposite point on the other bank. If his speed in still water is 12km/h, then what
is the speed of the river?

1 .   12km/h

2 .   12√3 km/h

3 .   6 √3 km/h

4 .   6 km/h   ✅ (This Answer is Correct)

Q 28 :   A body of mass 2kg is moving on a horizontal surface with initial velocity of 4m/s comes to rest after   **Marks :**   1
2s. if one wants to keep this body moving on the same surface with a velocity of 4m/s, the force
required is -

1 .   8N

2 .   4N   ✅ (This Answer is Correct)

3 .   Zero

4 .   2N

Q 29 :   A player catches a 200g ball moving with a speed of 20m/s. If the time taken to complete the catch is   **Marks :**   1
0.5 sec, the force exerted on the player's hand is –

1 .   8N   ✅ (This Answer is Correct)

2 .   4N

3 .   2N

4 .   0N

Q 30 :   At what maximum acceleration should a monkey slide up a vertical rope (mass less and inextensible)   **Marks :**   1
whose breaking strength is 4/3 rd of the weight of the monkey? (g = acceleration due to gravity).

1 .   ¾ g

2 .   g

3 .   g/3   ✅ (This Answer is Correct)

4 .   zero

Q 31 :   For two specific bodies, the constant factor is –   **Marks :**   1

1 . The static frictional force

2 . The kinetic frictional force ✅ (This Answer is Correct)

3 . Both

4 . None

Q 32 : A block of mass 5kg is kept on a rough horizontal surface. What will be the frictional force if a horizontal force of magnitude 36N is applied on the body ? (Coefficient of static friction=0.8, coefficient of kinetic friction =0.7,g=10m/s²) **Marks :** 1

1 . 40N

2 . 35N

3 . 36N ✅ (This Answer is Correct)

4 . 0N

Q 33 : Angular velocity of minute hand of clock is – **Marks :** 1

1 . $\pi/30$ rad/s

2 . 8π rad/s

3 . $2\pi/1800$ rad/s

4 . $\pi/1800$ rad/s ✅ (This Answer is Correct)

Q 34 : A fly wheel rotating at 600 rev/min is brought under uniform deceleration and stopped after 2 min. The angular deceleration in rad/s² is – **Marks :** 1

1 . $\pi/6$ ✅ (This Answer is Correct)

2 . 10π

3 . 1/12

4 . 300

Q 35 : If the angular speed of a wheel is 120rpm, then in rad/s unit it will be – **Marks :** 1

1 . π

2 . 2π

3 . 3π

4 . 4π ✅ (This Answer is Correct)

Q 36 : A massless string of length 0.1m can not bear a tension more than 100N. It is tied to a body of mass 100g and rotated in a horizontal circle. The maximum angular velocity can be – **Marks :** 1

1 . 100rad/s ✅ (This Answer is Correct)

2 . 1000rad/s

3 . 10000rad/s

4 . 0.1rad/s

Q 37 : A body has kinetic energy E when projected at angle of projection for maximum range. Its kinetic energy at the highest point will be –   **Marks :** 1

1 . E

2 . E/2   ✅ (This Answer is Correct)

3 . E/3

4 . zero

Q 38 : If the kinetic energy of a body is doubled, then its linear momentum will be –   **Marks :** 1

1 . 4times

2 . Doubled

3 . √2 times   ✅ (This Answer is Correct)

4 . Unchanged

Q 39 : The minimum stopping distance of a car moving with velocity v is x. If the car is moving with velocity 2v, then the minimum stopping distance under the same condition is –   **Marks :** 1

1 . x

2 . 2x

3 . 3x

4 . 4x   ✅ (This Answer is Correct)

Q 40 : The total work done on a particle is equal to the change in its kinetic energy –   **Marks :** 1

1 . Always   ✅ (This Answer is Correct)

2 . Only if the force is constant

3 . Only in the inertial frame

4 . Only for no external force acting on it.

Q 41 : A stone of mass 1kg is tied to the end of a string of 1m length. It is whirled in a vertical circle. If the velocity of the stone at the top be 4m/s, what is the tension in the string there? (g=10m/s²)   **Marks :** 1

1 . 5N

2 . 6N   ✅ (This Answer is Correct)

3 . 10N

4 . 16N

Q 42 : A body of mass 6kg is displaced under a force which causes displacement in it as s=t²/4 metres, where t is in sec. The work done by the force in 2sec is –   **Marks :** 1

1. 12J

2. 9J

3. 6J

4. 3J   ✅ (This Answer is Correct)

Q 43 :   The centre of mass of a system of particle does not depend on   **Marks :**   1

1. masses of the particle

2. internal forces of the particle   ✅ (This Answer is Correct)

3. position of the particle

4. relative distances between the particle

Q 44 :   A wheel of moment of inertia 0.005 kg m² was making 20 revolution per sec. Then it is stopped in 20 sec. The angular retardation is –   **Marks :**   1

1. 2 π rad/s²   ✅ (This Answer is Correct)

2. 8π rad/s²

3. 4π rad/s²

4. π rad/s²

Q 45 :   A disc is rotating with angular speed w. If a child sits on it, which of the following is conserved?   **Marks :**   1

1. Angular momentum   ✅ (This Answer is Correct)

2. Kinetic energy

3. Potential energy

4. Linear momentum

Q 46 :   A particle is moving in a vertical circle. The tension of the string at angles 30° and 60° w.r.t lowest position are x and y respectively. Then –   **Marks :**   1

1. x=y

2. x > y   ✅ (This Answer is Correct)

3. x < y

4. Can not be predicted

Q 47 :   When a ball is thrown vertically up with velocity v_0, it reaches a maximum height of h. if one wishes to triple the maximum height then the ball should be thrown with velocity –

1. $\sqrt{3}v_0$ 2. $3v_0$ 3. $9v_0$ 4. $\frac{3}{2}v_0$ **Marks :**   1

1. 1   ✅ (This Answer is Correct)

2. 2

3. 3

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4 . 4

Q 48 : Two trains are moving with velocities $v_1 = 10m/s$ and $v_2 = 20m/s$ on the same track in opposite directions. After the application of breaks if their retardations are $2m/s^2$ and $1m/s^2$ respectively, then the minimum distance of separation between the trains to avoid collision is –
1. 150 m   2. 225 m   3. 450 m   4. 300 m

Marks : 1

1 . 1

2 . 2   ✅ (This Answer is Correct)

3 . 3

4 . 4

Q 49 : If $\vec{A}$ and $\vec{B}$ are two vectors such that $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$, then the angle between $\vec{A}$ and $\vec{B}$ is –
1. 0^0 2. 60^0 3. 90^0 4. 120^0

Marks : 1
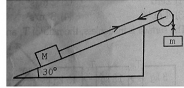
1 . 1

2 . 2

3 . 3   ✅ (This Answer is Correct)

4 . 4

Q 50 : . As, shown in the figure the mass M = 10 Kg. Then mass m needed in order to keep M at rest is –
1. 5 Kg
2. $10\sqrt{3}$ Kg
3. 0.10 Kg
4. $\sqrt{3}$ Kg

Marks : 1

1 . 1   ✅ (This Answer is Correct)

2 . 2

3 . 3

4 . 4

Q 51 : . The velocity of a particle at time t is given as $v = at + \frac{b}{t+c}$. Where a, b and c are constants. The dimension of a, b and c are respectively –
1. LT^{-2}, L and T 2. LT^2, LT^{-2}, T 3. LT^{-2}, L^2 and T 4. LT^{-2}, L and $L^{-1}T$

Marks : 1

1 . 1   ✅ (This Answer is Correct)

2 . 2

3 . 3

4 . 4

Q 52 : Starting from rest a lift performs the first part of its ascent with uniform acceleration a and the remaining with uniform retardation $2a$ and comes to rest. If t is the total time of ascent, then the depth of the shaft is –
1. $\frac{at^2}{4}$ 2. $\frac{at^2}{3}$ 3. $\frac{at^2}{2}$ 4. $\frac{at^2}{8}$

Marks : 1

1 . 1

2 . 2   ✅ (This Answer is Correct)

3 . 3

4 . 4

Q 53 :   A cart is moving along a straight line with constant speed of 30m/s. A particle is to be fired vertically upwards from the moving cart in such a way that it returns to the cart at the same point from where it was projected after the cart has moved 80m. At what speed (relative to the cart) must the particle be fired?

   1. 10m/s   2. $10\sqrt{8}$ m/s   3. $\frac{40}{3}$ m/s   4. *none of these*

Marks :   1

1 . 1

2 . 2

3 . 3   ✅ (This Answer is Correct)

4 . 4

Q 54 :   The speed of a projectile at its maximum height is $\frac{\sqrt{3}}{2}$ times the initial speed u. The range of the projectile is –

   1. $\frac{\sqrt{3}u^2}{2g}$ 2. $\frac{u^2}{2g}$ 3. $\frac{3u^2}{2g}$ 4. $\frac{3u^2}{g}$
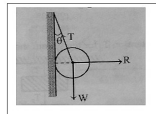
Marks :   1

1 . 1   ✅ (This Answer is Correct)

2 . 2

3 . 3

4 . 4

Q 55 :   . A solid sphere of weight W is hung as shown in the figure. What is the reaction force by the wall on the sphere?

   1. W cos θ
   2. T cos θ
   3. W tan θ
   4. T tan θ

Marks :   1

1 . 1

2 . 2

3 . 3   ✅ (This Answer is Correct)

4 . 4

Q 56 :   To a moving car, the rain drops (which are actually vertical) appear to fall inclined making an angle 30º with the horizontal road. If the speed of the car is 60km/h, what is the speed of the rain drops?

Marks :   1

1 . 60√3 km/h

2 . 60 km/h

3 . 20√3 km/h   ✅ (This Answer is Correct)

4 . 20km/h

Q 57 :   A water jet, whose cross sectional area is a strikes a wall making an angle θ with the normal and rebounds elastically. The velocity of water of density d is v. force exerted on the wall is –

Marks :   1

1 . 2 a v² d Cosθ   ✅ (This Answer is Correct)

2 . 2 a v² d Sinθ

3 . 2 a v d cosθ

4 . a v d cosθ

Q 58 : The force required to just move a body up the inclined plane is double the force required to just prevent the body from sliding down the plane. The coefficient of friction is μ. If θ is angle of inclination of the plane, then tan θ =

Marks : 1

1 . 0.5 μ

2 . μ

3 . 2 μ

4 . 3 μ ✓ (This Answer is Correct)

Q 59 : A particle is placed at rest inside a hollow hemisphere of radius R. The coefficient of friction between them is 1/√3. The maximum height up to which the particle can remain stationary is –

Marks : 1

1 . R/2

2 . (1-√3/2)R ✓ (This Answer is Correct)

3 . (√3/2)R

4 . 3/8 R

Q 60 : A person of mass m is standing on one end of a plank of mass M and length L which is floating on water. The person moves from one end to another and stops. The displacement of the plank is –

Marks : 1

1 . Lm/(m+M) ✓ (This Answer is Correct)

2 . Lm(m+M)

3 . (m+M)/Lm

4 . LM/(m+M)