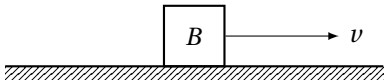
Module-Test-8
(Physics-NEET)

December 31, 2022

1. A heavy uniform chain lies on horizontal table top. If the coefficient of friction between the chain and the table surface is 0.25, then the maximum friction of the length of the chain that can hang over the edge of the table is

   a) 20% *Ans.*
   b) 25%
   c) 35%
   d) 15%

2. A block B is pushed momentarily along a horizontal surface with an initial velocity v. If μ is the coefficient of sliding friction between B and the surface, block B will come to rest after a time

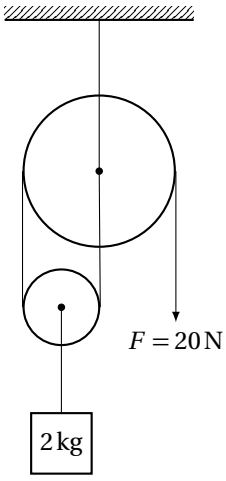


   a) $\frac{v}{\mu g}$ *Ans.*
   b) $\frac{\mu g}{v}$
   c) $\frac{g}{v}$
   d) $\frac{v}{g}$

3. The upper half of an inclined plane of inclination θ is perfectly smooth while lower half is rough. A block starting from rest at the top of the bottom, if the coefficient of friction between the block and the lower half of the plane is given by

   a) $\mu = \frac{1}{\tan\theta}$
   b) $\mu = \frac{2}{\tan\theta}$
   c) $\mu = 2\tan\theta$ *Ans.*
   d) $\mu = \tan\theta$

4. The acceleration of the 2 kg block, if the free end of string is pulled with a force of 20 N as shown, is



   a) zero
   b) $10\,\mathrm{m\,s^{-2}}$ upward *Ans.*
   c) $5\,\mathrm{m\,s^{-2}}$ upward
   d) $5\,\mathrm{m\,s^{-2}}$ downward

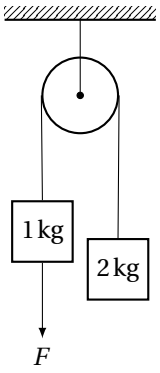
5. A block of mass 10 kg is placed on a rough horizontal surface having coefficient of friction $\mu = 0.5$. If a horizontal force of 100 N is applied on it, then the acceleration of the block will be

a) $15\,\mathrm{m\,s^{-2}}$
b) $10\,\mathrm{m\,s^{-2}}$
c) $5\,\mathrm{m\,s^{-2}}$ *Ans.*
d) $0.5\,\mathrm{m\,s^{-2}}$

6. Consider, a car moving along a straight horizontal road with a speed of $72\,\mathrm{km\,h^{-1}}$. If the coefficient of static friction between the tyres and the road is 0.5, the shortest distance in which the car can be stopped is

a) 30 m
b) 40 m *Ans.*
c) 72 m
d) 20 m

7. Two unequal masses of 1 kg and 2 kg are connected by an inextensible light string passing over a smooth pulley as shown in figure. A force $F = 20\,\mathrm{N}$ is applied on 1 kg block. The acceleration of the either block is

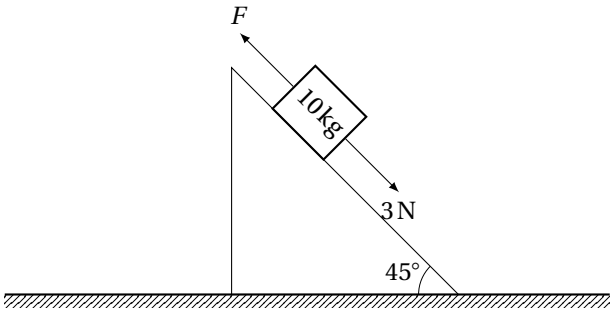


a) $\frac{10}{3}\,\mathrm{m\,s^{-2}}$ *Ans.*
b) $\frac{20}{3}\,\mathrm{m\,s^{-2}}$
c) $\frac{30}{3}\,\mathrm{m\,s^{-2}}$
d) $\frac{40}{3}\,\mathrm{m\,s^{-2}}$

8. A body of mass m is kept on a rough horizontal surface(coefficient of friction is μ). Horizontal force is applied on the body, but it does not move. The resultant of normal reaction and the frictional force acting on the object is given F, where F is

a) $|F| = mg + \mu mg$
b) $|F| = \mu mg$
c) $|F| \leq mg\sqrt{1+\mu^2}$ *Ans.*
d) $|F| = mg$

9. A block of mass 10 kg is kept on a rough inclined plane as shown in the figure. A force of 3 N is applied on the block. The coefficient of static friction between the plane and the block is 0.6. What should be the minimum value of force F , such that the block does not move downward ?

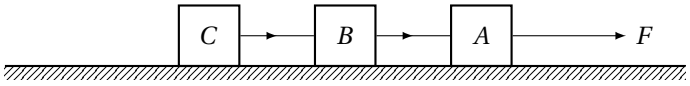


a) 32 N *Ans.*
b) 25 N
c) 23 N
d) 18 N

10. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is $g/8$,then the ratio of the masses is

a) 8 : 1
b) 9 : 7 *Ans.*
c) 4 : 3
d) 5 : 3

11. Three identical blocks of masses $m = 2\,\mathrm{kg}$ are drawn by a force $F = 10.2\,\mathrm{N}$ with an acceleration of $0.6\,\mathrm{m\,s^{-2}}$ on a frictionless surface, then what is the tension (in N) in the string between the blocks B and C ?



a) 9.2
b) 7.8 *Ans.*
c) 4
d) 9.8

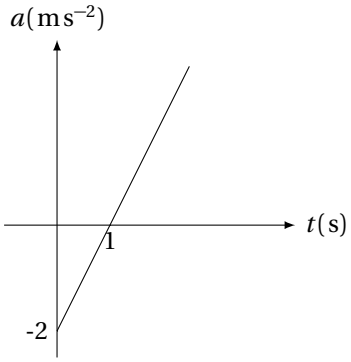
12. When forces F_1 , F_2 , F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed, then the acceleration of the particle is

a) $\frac{F_1}{m}$ *Ans.*
b) $\frac{F_2 F_3}{m F_1}$
c) $\frac{F_2 - F_3}{m}$
d) $\frac{F_2}{m}$

13. A marble block of mass 2 kg lying on ice when given a velocity of $6\,\mathrm{m\,s^{-1}}$ is stopped by friction in 10 s. Then, the coefficient of friction is

a) 0.02
b) 0.03
c) 0.06 *Ans.*
d) 0.01

14. The acceleration of particle varies with time as shown. Then the expression of v as a function of time t is



a) $v = t^2 - 2t$ *Ans.*
b) $v = t^2 + 2t$
c) $v = -t^2 + 2t$
d) $v = -t^2 - 2t$

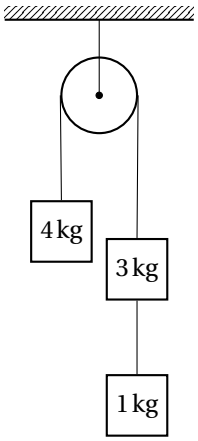
15. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass m. If a force P is applied at the free end of the rope, the force exerted by the rope on the block is

a) $\frac{Pm}{M+m}$
b) $\frac{Pm}{M-m}$
c) P
d) $\frac{PM}{M+m}$ *Ans.*

16. Consider a car moving on a straight road with a speed of $100\,\mathrm{m\,s^{-1}}$. The distance at which car can be stopped, is $[\mu_k = 0.5]$

a) 800 m
b) 1000 m *Ans.*
c) 100 m
d) 400 m

17. In the arrangement shown in figure, the ratio of tensions in the strings attached with 4 kg block and that with 1 kg block is



a) 2 : 1
b) 4 : 1 *Ans.*
c) 1 : 2
d) 1 : 4

18. A smooth block is released at rest on a 45° incline and then slides a distance d.The time taken to slide is n times as much to slide on rough incline than on a smooth incline. The coefficient of friction is

a) $\mu_k = 1 - \frac{1}{n^2}$ *Ans.*
b) $\mu_k = \sqrt{1 - \frac{1}{n^2}}$
c) $\mu_s = 1 - \frac{1}{n^2}$
d) $\mu_s = \sqrt{1 - \frac{1}{n^2}}$

19. A mass of 10 kg is suspended vertically by a rope from the roof. When a horizontal force is applied on the mass, the rope deviated at an angle of 45° at the roof point. If the suspended mass is at equilibrium, the magnitude of the force applied is

a) 70 N
b) 200 N
c) 100 N *Ans.*
d) 140 N

20. Two blocks of equal mass are stacked on top of each other on a horizontal plane, then the frictional force between them is

a) 0 *Ans.*
b) ∞
c) can't say
d) none of these

21. A block of mass m is placed on a frictionless inclined plane, then the angle of repose is

a) 45°
b) 30°
c) 0° *Ans.*
d) None of these

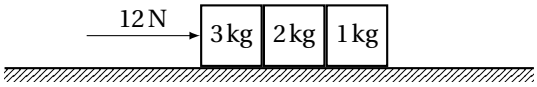
22. A block of mass m is placed on a frictionless horizontal plane, then the angle of friction is

a) 45°
b) 60°
c) 30°
d) 0° *Ans.*

23. A uniform cube of mass m and side a is resting in equilibrium on a rough 45° inclined surface. The distance of the point of application of normal reaction measured from the lower edge of the cube is

a) $\frac{a}{2}$
b) $\frac{a}{4}$
c) $\frac{a}{5}$
d) 0 *Ans.*

24. Three blocks of masses 3 kg, 2 kg and 1 kg are placed side by side on a smooth surface as shown in figure. A horizontal force of 12 N is applied on 3 kg block. The net force on 2 kg block is

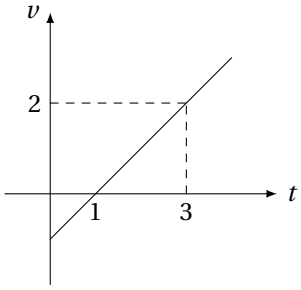


a) 2 N
b) 3 N
c) 4 N *Ans.*
d) 5 N

25. A thin rod of length 1 m is fixed in a vertical position inside a train, which is moving horizontally with constant acceleration $4\,\mathrm{m\,s^{-2}}$. A bead can slide on the rod and friction coefficient between them is 0.5. If the bead is released from rest at the top of the rod, it will reach the bottom in time t then the value of $2t$ is

a) 1 *Ans.*
b) 2
c) 4
d) 0

26. The velocity of a particle depends on time t as $v = t-1$, finds the displacement covered by the particle during $t = 1$ to $t = 3$ seconds.

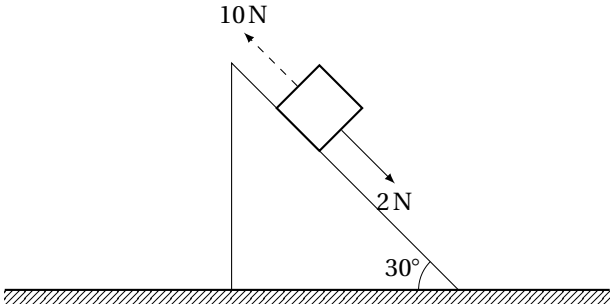


a) 0
b) $2m$ *Ans.*
c) $-2m$
d) None of these

27. The minimum force required to start pushing a body up a rough (frictional coefficient μ) inclined plane is F_1 while the minimum force needed to prevent it from sliding down is F_2. If the inclined plane makes an angle θ from the horizontal such that $\tan\theta = 2\mu$, then the ratio $\dfrac{F_1}{F_2}$ is

a) 4
b) 1
c) 2
d) 3 *Ans.*

28. A block kept on a rough inclined plane, as shown in the figure, remains at rest upto a maximum force 2 N down the inclined plane. The maximum external force up the inclined plane that does not move the block is 10 N. The coefficient of static friction between the block and the plane is (Take, $g = 10\,\mathrm{m\,s^{-2}}$)



a) $\dfrac{2}{3}$
b) $\dfrac{\sqrt{3}}{2}$ *Ans.*
c) $\dfrac{\sqrt{3}}{4}$
d) $\dfrac{1}{2}$

29. A block has been placed on an inclined plane with the slope angle θ, block slides down the plane at constant speed. The coefficient of kinetic friction is equal to

a) $\sin\theta$
b) $\cos\theta$
c) g
d) $\tan\theta$ *Ans.*

30. Three blocks of masses 3 kg, 2 kg and 1 kg are placed side by side on a smooth surface as shown in figure. A horizontal force of 12 N is applied on 3 kg block. The net force on 2 kg block is

a) 2 N
b) 3 N
c) 4 N *Ans.*
d) 5 N

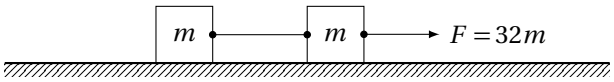
31. A monkey of mass 20 kg is holding a vertical rope. The rope will not break, when a mass of 25 kg is suspended from it but will break, if the mass exceeds 25 kg. What is the maximum acceleration with which the monkey can climb up along the rope ?

a) $25\,\mathrm{m\,s^{-2}}$
b) $2.5\,\mathrm{m\,s^{-2}}$ *Ans.*
c) $5\,\mathrm{m\,s^{-2}}$
d) $10\,\mathrm{m\,s^{-2}}$

32. A man weighs 80 kg. He stands on a weighing scale in a lift which is moving upwards with a uniform acceleration of $5\,\mathrm{m\,s^{-2}}$. What would be the reading on the scale?

a) 800 N
b) 1200 N *Ans.*
c) zero
d) 400 N

33. For the given figure, acceleration of the block of mass m is

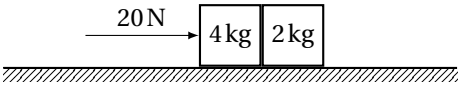


a) 4
b) 8
c) 16 *Ans.*
d) 32

34. A lift of mass 1000 kg is moving upwards with an acceleration of $1\,\mathrm{m\,s^{-2}}$. The tension developed in the string, which is connected to lift is ($g = 9.8\,\mathrm{m\,s^{-2}}$)

a) 9800 N
b) 10800 N *Ans.*
c) 11000 N
d) 10000 N

35. Two blocks of masses 4 kg and 2 kg are placed side by side on a smooth horizontal surface as shown in the figure. A horizontal force of 20 N is applied on 4 kg block. Then, the normal reaction between them is



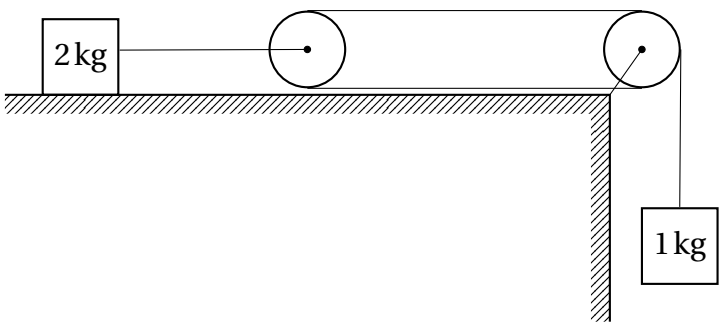
a) $\frac{20}{3}$ N *Ans.*
b) $\frac{30}{3}$ N
c) $\frac{10}{3}$ N
d) $\frac{40}{3}$ N

Section-B

1. Two bodies of masses m_1 and m_2 are connected by a light string which passes over a frictionless massless pulley. If the pulley is moving upward with uniform acceleration $g/2$ then tension in the string will be

a) $\frac{3m_1m_2}{m_1+m_2}g$ *Ans.*
b) $\frac{m_1+m_2}{4m_1m_2}g$
c) $\frac{2m_1m_2}{m_1+m_2}g$
d) $\frac{m_1m_2}{m_1+m_2}g$

2. Consider the situation shown in figure. Both the pulleys 2 kg and the string are light and all the surfaces are smooth. The acceleration of 1 kg block is



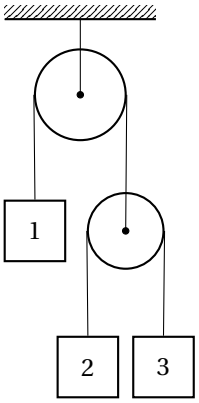
a) $\frac{g}{3}\,\mathrm{m\,s^{-2}}$

b) $\frac{2g}{3}\,\mathrm{m\,s^{-2}}$ *Ans.*

c) $\frac{4g}{3}\,\mathrm{m\,s^{-2}}$

d) $\frac{6g}{3}\,\mathrm{m\,s^{-2}}$

3. Find the relation between a_1, a_2 and a_3 where a_1, a_2 and a_3 are accelerations of the blocks 1, 2 and 3.



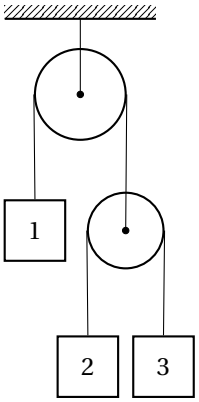
a) $2a_1 + a_2 + a_3 = 0$ *Ans.*

b) $a_1 + 2a_2 + a_3 = 0$

c) $a_1 + a_2 + 2a_3 = 0$

d) $a_1 + a_2 + a_3 = 0$

4. In the figure shown, $a_3 = 6\,\mathrm{m\,s^{-2}}$ (downwards) and $a_2 = 4\,\mathrm{m\,s^{-2}}$ (upwards). The acceleration of 1 is



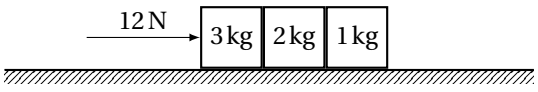
a) $1\,\mathrm{m\,s^{-2}}$ downward

b) $2\,\mathrm{m\,s^{-2}}$ upward

c) $1\,\mathrm{m\,s^{-2}}$ upward *Ans.*

d) $2\,\mathrm{m\,s^{-2}}$ downward

5. Three blocks of masses 3 kg, 2 kg and 1 kg are placed side by side on a smooth surface as shown in figure. A horizontal force of 12 N is applied on 3 kg block. The net force on 2 kg block is



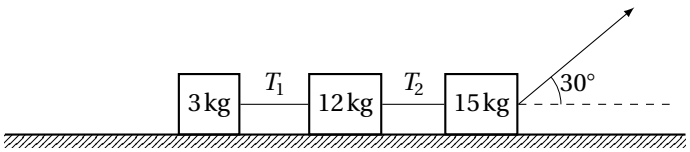
a) 2 N

b) 3 N

c) 4 N *Ans.*

d) 5 N

6. The surface is frictionless, the ratio between T_1 and T_2 is



a) $\sqrt{3}:1$

b) $1:\sqrt{3}$

c) $1:5$ *Ans.*

d) $5:1$

7. A projectile is projected with speed u at an angle of 60° with horizontal from the foot of an inclined plane. If the projectile hits the inclined plane horizontally, the range on inclined plane will be

a) $\frac{u^2\sqrt{21}}{2g}$ b) $\frac{3u^2}{4g}$

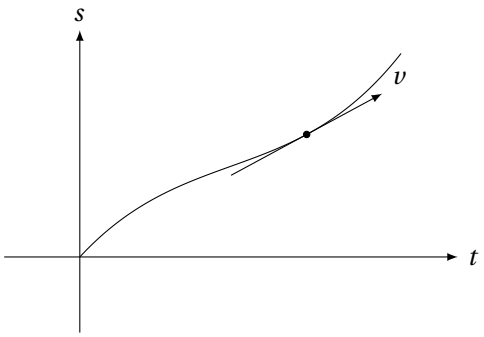
c) $\frac{u^2}{2g}$ d) $\frac{u^2\sqrt{21}}{8g}$ *Ans.*

8. A particle starts from the origin of coordinates at time $t = 0$ and moves in the xy plane with a constant acceleration α in the y-direction. Its equation of motion is $y = \beta x^2$. Its velocity component in the x-direction is

a) variable b) $\sqrt{\frac{2\alpha}{\beta}}$

c) $\frac{\alpha}{2\beta}$ d) $\sqrt{\frac{\alpha}{2\beta}}$ *Ans.*

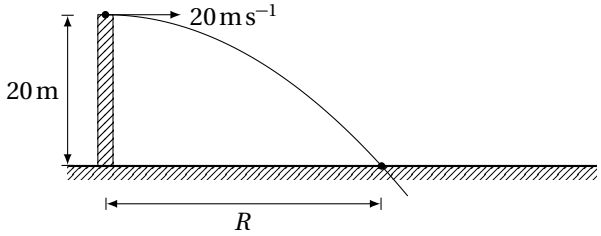
9. A particle is moving such that $s = t^3 - 6t^2 + 18t$, where s is in metre and t is in second. The minimum velocity attained by the particle is



a) $29 m/s$ b) $5 m/s$

c) $6 m/s$ *Ans.* d) $12 m/s$

10. In the figure shown, time of flight and range is



a) 2 s and 40 m *Ans.* b) 1 s and 20 m

c) 3 s and 60 m d) None of these

11. At a height of 15 m from ground velocity of a projectile is $\vec{v} = (10\hat{i} + 10\hat{j})$. Here, $\hat{j}$ is vertically upwards and $\hat{i}$ is along horizontal direction then ($g = 10\,\mathrm{m\,s^{-2}}$)

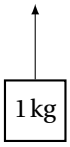
a) particle was projected at an angle of 45° with horizontal

b) time of flight of projectile is 4 s *Ans.*

c) horizontal range of projectile is 100 m

d) maximum height of projectile from ground is 40 m

12. A mass of 1 kg is suspended by a thread. It is lifted up with an acceleration of $5\,\mathrm{m\,s^{-2}}$ and then it is lowered down with an acceleration of $5\,\mathrm{m\,s^{-2}}$. Then the ratio of tensions in the string for the both cases is

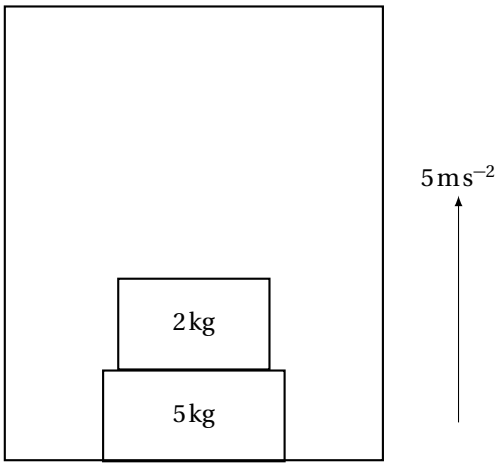


a) 3 : 1 *Ans.*
b) 1 : 3
c) 1 : 2
d) 2 : 1

13. A body starting from rest has an acceleration of $4m/s^2$. Calculate distance travelled by it in 5^{th} second.

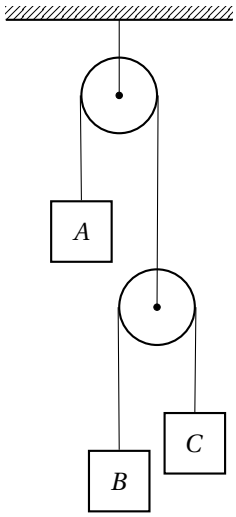
a) $18m$ *Ans.*
b) $16m$
c) $14m$
d) $12m$

14. Find the force exerted by 5 kg block on floor of lift, as shown in figure. (Take, $g = 10\,\mathrm{m\,s^{-2}}$)



a) 100 N
b) 115 N
c) 105 N *Ans.*
d) 135 N

15. In the pulley-block arrangement shown in figure, find relation between a_A , a_B and a_C .



a) $2a_A + a_B + a_C = 0$ *Ans.*
b) $a_A + a_B + a_C = 0$
c) $a_A + 2a_B + a_C = 0$
d) $a_A + a_B + 2a_C = 0$