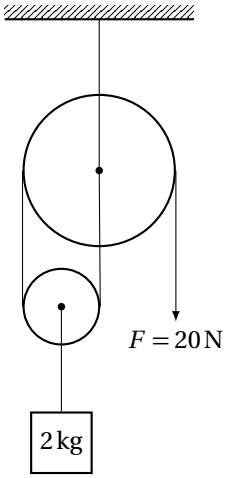
Module-Test-6
(Physics-JEE)

December 31, 2022

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

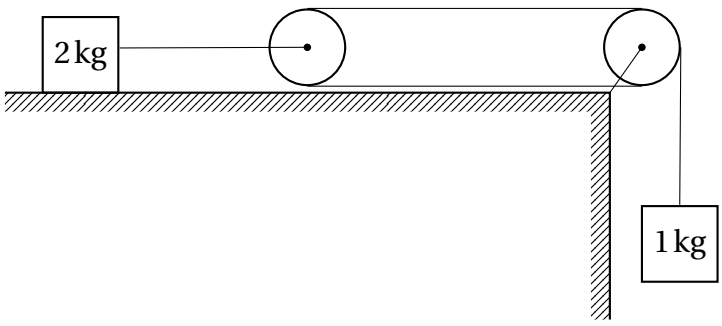


a) zero
b) $10\,\mathrm{m\,s^{-2}}$ upward *Ans.*
c) $5\,\mathrm{m\,s^{-2}}$ upward
d) $5\,\mathrm{m\,s^{-2}}$ downward

2. 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

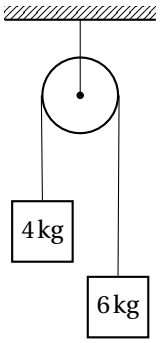
a) $\dfrac{3m_1m_2}{m_1+m_2}g$ *Ans.*
b) $\dfrac{m_1+m_2}{4m_1m_2}g$
c) $\dfrac{2m_1m_2}{m_1+m_2}g$
d) $\dfrac{m_1m_2}{m_1+m_2}g$

3. 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) $\dfrac{g}{3}\,\mathrm{m\,s^{-2}}$
b) $\dfrac{2g}{3}\,\mathrm{m\,s^{-2}}$ *Ans.*
c) $\dfrac{4g}{3}\,\mathrm{m\,s^{-2}}$
d) $\dfrac{6g}{3}\,\mathrm{m\,s^{-2}}$

4. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless(see figure). The acceleration of the system in terms of acceleration due to gravity g is



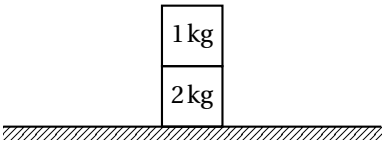
a) $\frac{g}{2}$

b) $\frac{g}{5}$ *Ans.*

c) $\frac{g}{10}$

d) g

5. This whole system of blocks is under gravity free space, then the normal reaction between the blocks is



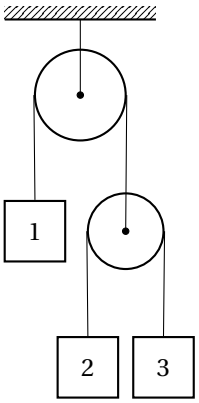
a) zero *Ans.*

b) 10 N

c) 20 N

d) 30 N

6. 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.



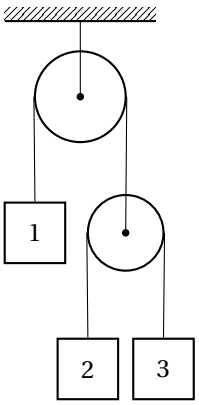
a) $2a_1 + a_2 + a_3 = 0$ *Ans.*

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

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

d) $a_1 + a_2 + a_3 = 0$

7. 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



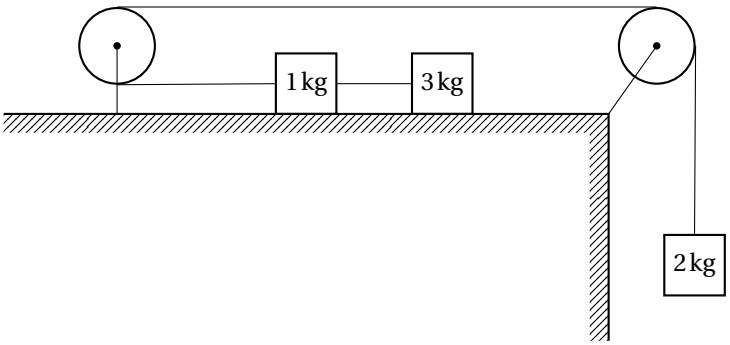
a) $1\,\mathrm{m\,s^{-2}}$ downward

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

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

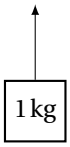
d) $2\,\mathrm{m\,s^{-2}}$ downward

8. In the following system of blocks and pulley, the acceleration of the block of mass 2 kg is



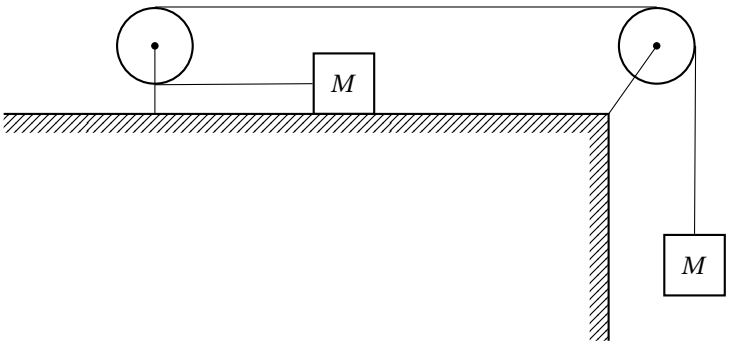
a) $\frac{10}{6}\,\mathrm{m\,s^{-2}}$
b) $\frac{20}{6}\,\mathrm{m\,s^{-2}}$ *Ans.*
c) $\frac{30}{6}\,\mathrm{m\,s^{-2}}$
d) $\frac{40}{6}\,\mathrm{m\,s^{-2}}$

9. 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



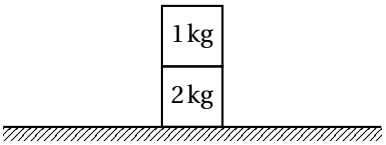
a) 3 : 1 *Ans.*
b) 1 : 3
c) 1 : 2
d) 2 : 1

10. Which of the following is the correct pair for the acceleration of either blocks and the tension in the string shown in figure. The pulley and the string are light and all surfaces are smooth.



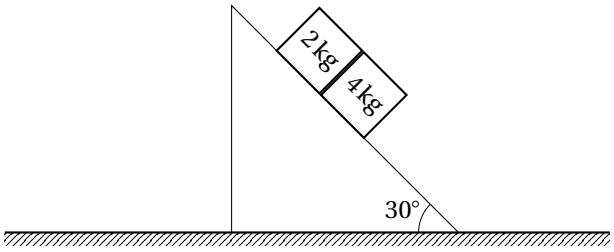
a) $\frac{g}{2}, \frac{Mg}{2}$ *Ans.*
b) $\frac{g}{3}, \frac{Mg}{3}$
c) $\frac{g}{2}, \frac{Mg}{3}$
d) $\frac{g}{3}, \frac{Mg}{2}$

11. What would be the normal reaction between the block of mass 2 kg and 1 kg in the given figure?



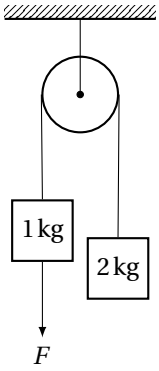
a) 20 N
b) 30 N
c) 10 N *Ans.*
d) None of these

12. Two blocks of masses 2 kg and 4 kg are released from rest over a smooth inclined plane of inclination 30° as shown in figure. What is the normal force between the two blocks?



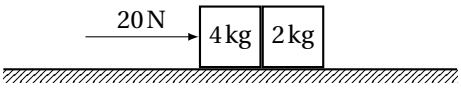
a) 10 N
b) 20 N
c) 5 N
d) Zero *Ans.*

13. 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 $F = 20$ 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) $\frac{40}{3}\,\mathrm{m\,s^{-2}}$

14. 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

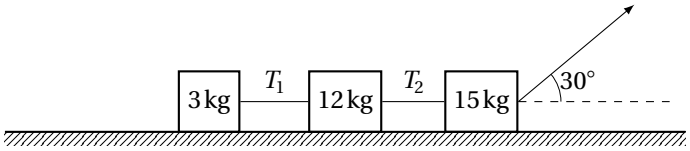


a) $\frac{20}{3}$ N *Ans.*
b) $\frac{30}{3}$ N
c) $\frac{10}{3}$ N
d) $\frac{40}{3}$ N

15. 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

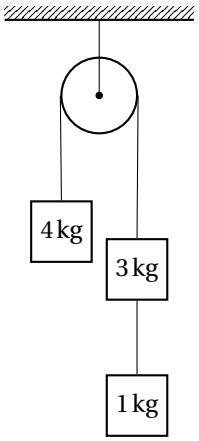
a) 2 N
b) 3 N
c) 4 N *Ans.*
d) 5 N

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



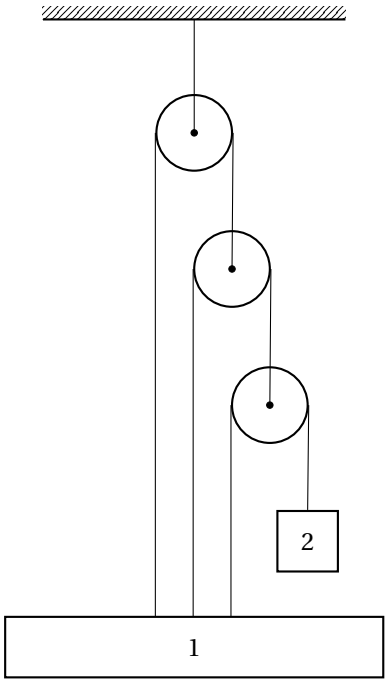
a) $\sqrt{3}:1$
b) $1:\sqrt{3}$
c) $1:5$ *Ans.*
d) $5:1$

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



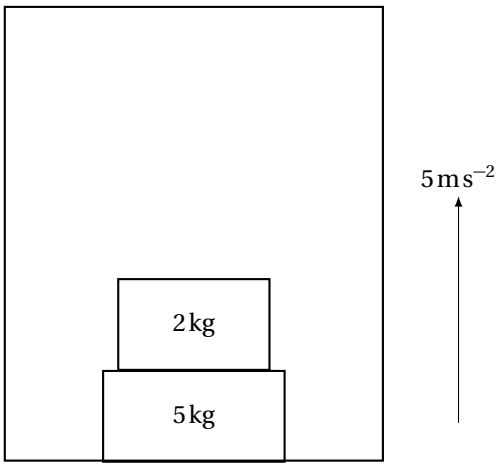
a) 2 : 1
b) 4 : 1 *Ans.*
c) 1 : 2
d) 1 : 4

18. Find the relation between a_1 and a_2 .



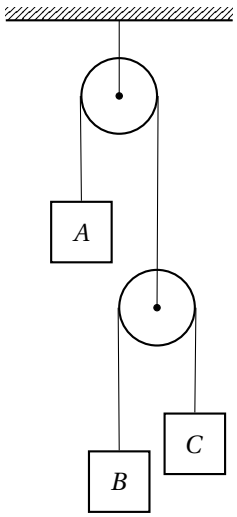
a) $a_1 + 7a_2 = 0$
b) $7a_1 + a_2 = 0$ *Ans.*
c) $3a_1 + a_2 = 0$
d) $a_1 + 3a_2 = 0$

19. 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

20. 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) $a_A + a_B + 2a_C = 0$

21. Problems of non-intertial frames can be solved only with the concept of pseudo force.

a) Above statement is wrong *Ans.*
b) Above statement is right
c) Can't say anything
d) Above statement is right for some cases and wrong for some cases

22. 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) $12 m/s$

23. 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.*

24. 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.*

25. A particle is dropped from a height h. Another particle which is initially at a horizontal distance d from the first is simultaneously projected with a horizontal velocity u and the two particles just collide on the ground. Then

a) $d^2 = \frac{u^2 h}{2h}$
b) $d^2 = \frac{2u^2 h}{g}$ *Ans.*
c) $d = h$
d) $gd^2 = u^2 h$

26. 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 ($g = 10\,\text{m s}^{-2}$)

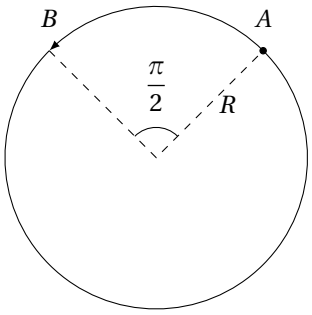
    a) particle was projected at an angle of 45° with horizontal

    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 20 m *Ans.*

27. A particle moves in a circle of radius R from A to B as shown in figure in 1 s. The average speed of the particle is



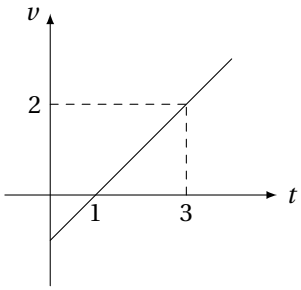
    a) $\frac{\pi R}{2}$ *Ans.*

    b) $\frac{\pi}{2R}$

    c) $\sqrt{2}R$

    d) none of these

28. 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

29. The motion of a particle is described by the equation $v = \alpha t$. α is a $+ve$ constant. The distance travelled by the particle in the first $4s$ is

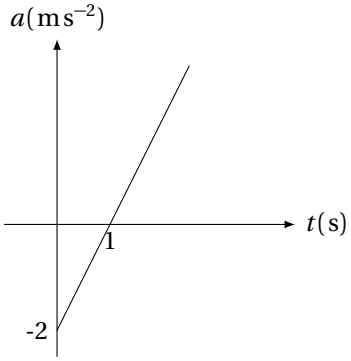
    a) 4α

    b) 12α

    c) 6α

    d) 8α *Ans.*

30. 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) $v = -t^2 - 2t$