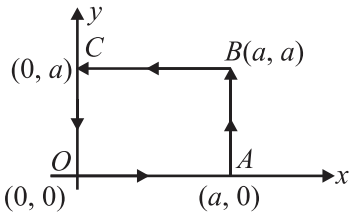
NEET UG (2024)
Physics
Quiz-4

SECTION - A

1. A force of constant magnitude acts on a particle such that its always perpendicular to the velocity of particle moving in a plane then
(1) Its velocity is constant
(2) Its acceleration is constant
(3) Its kinetic energy is constant
(4) Its linear momentum is constant

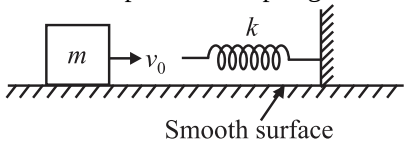
2. The force acting on a particle varies with displacement x as $F = kx$ then work done by the force in displacing particle from (0, 0) to (x, 0) will be proportional to
(1) $x^{2/3}$ (2) x^2
(3) x^3 (4) x

3. The work done by a force $\vec{F} = 2\hat{i} + 2\hat{j}$ to displace a particle around the path $OABCO$ as shown in figure is



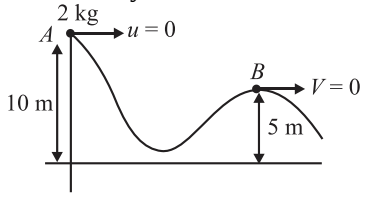
(1) $\frac{2a^3}{3}$ (2) a^3
(3) Zero (4) $\frac{4a^3}{3}$

4. A body of mass m is moving with speed v_0, towards a wall attached with a massless spring of spring constant k as shown in the figure. The maximum compression in spring will be



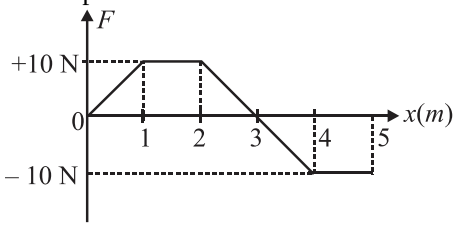
(1) $v_0\sqrt{\frac{3m}{k}}$ (2) $v_0\sqrt{\frac{2m}{3k}}$
(3) $v_0\sqrt{\frac{m}{3k}}$ (4) $v_0\sqrt{\frac{m}{k}}$

5. In the given figure, a body of mass 2 kg slides from point A from rest, then it stops at point B, then work done by the friction will be



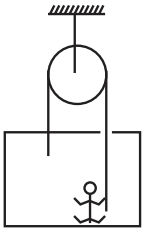
(1) –200 J (2) –100 J
(3) 50 J (4) –50 J

6. A position dependent force F is acting on a particle of mass 1 kg and its force-position curve is as shown in the figure. If speed at $x = 0$ is zero then speed of particle at $x = 5$ m is



(1) 10 m/s (2) 5 m/s
(3) $\sqrt{10}$ m/s (4) $\sqrt{15}$ m/s

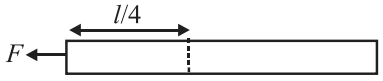
7. A man of mass 50 kg stands on a box of mass 30 kg. For the system to be in equilibrium, what force man must exert on the rope?



(1) 400 N (2) 600 N
(3) 300 N (4) 1000 N

8. A string is used to pull a block of mass m vertically up by a distance h at a constant acceleration $\frac{g}{3}$. The work done by the tension in the string is
(1) $\frac{2}{3}mgh$ (2) $\frac{-mgh}{3}$
(3) mgh (4) $\frac{4}{3}mgh$

9. A force F is applied at the left end of a uniform rod of mass m and length l placed on smooth horizontal surface as shown in figure. The tension in the rod at a distance $l/4$ from left end is

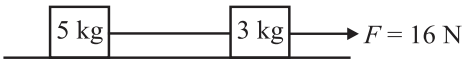


(1) $F/2$ (2) $2F/5$
(3) $3F/2$ (4) $3F/4$

10. A particle of mass 1 kg is tied to a string and a horizontal force 20 N in applied on the particle as shown in figure. The tension in the string is ($g = 10$ m/s^2)

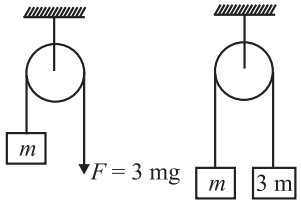
(1) $5\sqrt{30}$ N (2) $5\sqrt{10}$ N
(3) $10\sqrt{5}$ N (4) $3\sqrt{20}$ N

11. The acceleration of 5 kg mass in the below given arrangement is



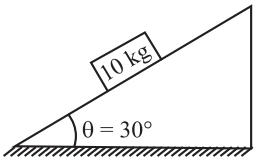
(1) 2 m/s^2 (2) 4 m/s^2
(3) 1 m/s^2 (4) 3 m/s^2

12. In the arrangement shown in two figures, the mass m will ascend with an acceleration



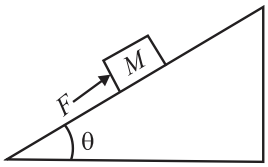
(1) $\frac{g}{2}, \frac{g}{2}$ (2) $g, \frac{g}{2}$
(3) $3g, \frac{g}{2}$ (4) $2g, \frac{g}{2}$

13. A block of mass 10 kg is kept on a fixed inclined plane of $\mu = 0.8$. The frictional force acting on the block is ($g = 10$ ms^{-2})



(1) 50 N (2) 60 N
(3) $40\sqrt{3}$ N (4) $50\sqrt{3}$ N

14. A block of mass m is placed on rough inclined plane. A force F is applied parallel to the inclined such that it just starts moving upwards. The value of F is



(1) $Mg \sin\theta - \mu Mg \cos\theta$
(2) $Mg \sin\theta + \mu Mg \cos\theta$
(3) $Mg \sin\theta$
(4) $\mu Mg \cos\theta$

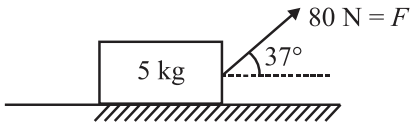
15. The coefficient of static friction between a block and an inclined plane is $\sqrt{3}$. The angle of repose is
(1) 30°
(2) 60°
(3) 45°
(4) 53°

16. A block of mass 6 kg lying on the rough surface with coefficient of static friction ($\mu_s = 0.2$) is being acted upon by a horizontal force of 5 N as shown. The frictional force acting the body is (Take g = 10 m s^{-2})

(1) 5 N (2) 7 N
(3) 9 N (4) 12 N

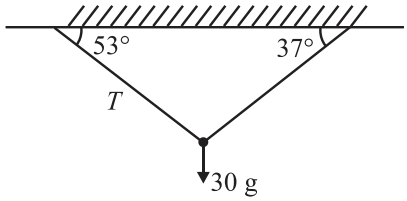
17. Mark the incorrect statements about the friction between two bodies.
(1) Limiting friction is never less than static friction
(2) Limiting friction is greater than the kinetic friction
(3) Static friction is always greater than the kinetic friction
(4) Coefficient of static friction is greater than the coefficient of kinetic friction

18. A pull of 80 N is applied in the direction as shown in the figure. A constant frictional force 30 N is opposing motion. The mass of block is 5 kg. The acceleration of block is



(1) 4.3 m/s^2
(2) 5.6 m/s^2
(3) 6.8 m/s^2
(4) 2.3 m/s^2

19. The mass of hanging man is 30 kg. What is value of tension T in shown string? (g = 10 m/s^2)

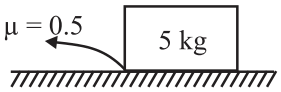


(1) 160 N
(2) 240 N
(3) 180 N
(4) 300 N

20. If 250 J of work is done in sliding a 5 kg block slowly up an inclined plane of height 4 m. Work done against friction is (g = 10 ms^{-2})
(1) 50 J
(2) 100 J
(3) 200 J
(4) zero

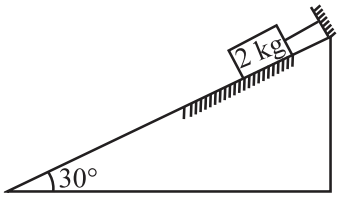
21. When a horse pulls a wagon, the force that causes the horse to move forward is the force
(1) Horse exerts on ground
(2) Horse exerts on wagon
(3) Wagon exerts on horse
(4) Ground exerts on horse

22. A block is placed on a rough horizontal surface as shown in the figure. The frictional force acting on the block is



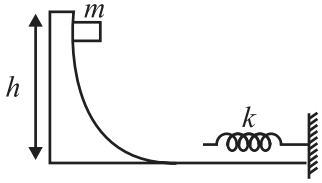
(1) 25 N (2) Zero
(3) 5 N (4) 50 N

23. The coefficient of friction of rough inclined plane is 0.7. What is the tension in the connecting wire shown?



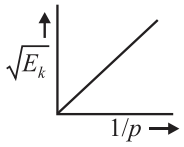
(1) 10 N (2) 11.4 N
(3) 1.4 N (4) Zero

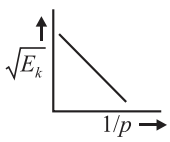
24. A block of mass m is released from a height h from the top of a smooth surface. There is an ideal spring of spring constant k at the bottom of the track. Find the maximum compression in the spring. (Wedge is fixed)

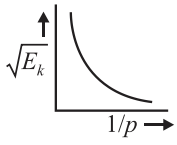


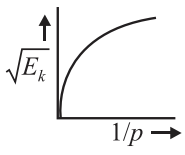
(1) $\sqrt{\frac{2mgh}{k}}$ (2) $\sqrt{\frac{mgh}{k}}$
(3) $\sqrt{\frac{mgh}{2k}}$ (4) Cannot be determined

25. The graph between $\sqrt{E_k}$ and $\frac{1}{p}$ is
(E_K = kinetic energy and p = momentum)

(1) 

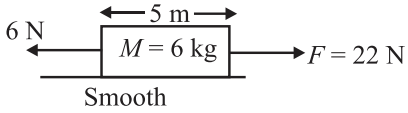
(2) 

(3) 

(4) 

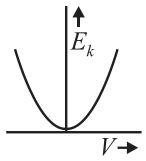
26. A rocket from launching pad is set for vertical lift off. The exhaust speed is 1500 m/s. How much gas must be ejected per second to just lift off the rocket. Mass of rocket is 6000 kg (g = 10 m/s^2)
(1) 112 kg/s (2) 92 kg/s
(3) 49.5 kg/s (4) 40 kg/s

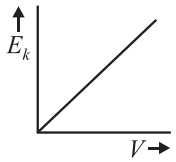
27. The block has uniform mass density. The tension at mid-point of the block is (M = 6 kg)

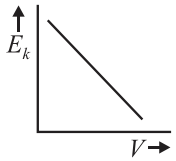


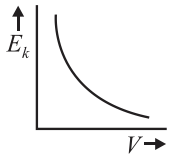
(1) 8 N
(2) 14 N
(3) 12 N
(4) 20 N

28. The graph between kinetic energy E_K and velocity V is

(1) 

(2) 

(3) 

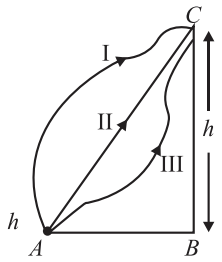
(4) 

29. In the following question, Column-I is matched with Column-II. The incorrect match of columns is

	Column-I		**Column-II**
A.	Dynamic friction	P.	Independent of contact area
B.	Limiting friction	Q.	Maximum value of kinetic friction
C.	Static friction	R.	Less than limiting Friction
D.	Coefficient of kinetic friction	S.	Less than coefficient of static friction

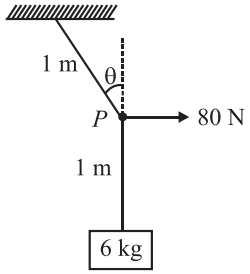
(1) A – P (2) B - Q
(3) C – R (4) D - S

30. As shown in the diagram a particle is to be carried from point *A* to *C* via paths (I), (II) and (III) in gravitational field, then which of the following statements is correct:-



(1) Work done is same for all the paths
(2) Word done is minimum for path (II)
(3) Work done is maximum for path (I)
(4) None of the above

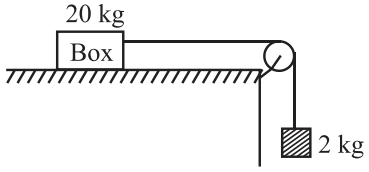
31. A mass of 6 kg is suspended by a rope of length 2 m as shown in figure. A force of 80 N is applied at mid-point *P* as shown. What angle the rope makes with vertical under equilibrium?
(Take $g = 10\ m/s^2$)



(1) 37º (2) 45º
(3) 53º (4) 60º

32. A mass of 3 kg rests on horizontal plane. The plane is gradually inclined until at an angle of 37º to horizontal, the mass just begins to slide down. The coefficient of static friction between block and surface is
(1) 0.2 (2) 0.5
(3) 0.75 (4) 0.90

33. A box of mass 20 kg is connected to mass of 2 kg (hanging) through a light string and an ideal pulley as shown in figure. Coefficient of kinetic friction between trolley and surface is 0.05. What is acceleration of the box? ($g = 10\ m/s^2$)



(1) $(4/11)\ ms^{-2}$
(2) $(5/11)\ ms^{-2}$
(3) $(6/11)\ ms^{-2}$
(4) $(7/11)\ ms^{-2}$

34. A cyclist is speeding at 20 m/s on a level road taking a level circular turn of radius 200 m without reducing speed. What is minimum coefficient of static friction required between tyres and road so that cyclist take turn without slipping?
(1) 0.1 (2) 0.2
(3) 0.25 (4) 0.35

35. A bullet of mass 5 *g* is shot from a gun of mass 5 kg. The muzzle velocity of the bullet is 500 m/s. The recoil velocity of the gun is:
(1) 0.5 m/s
(2) 0.25 m/s
(3) 1 m/s
(4) Data is insufficient

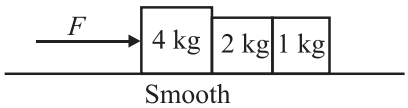
SECTION – B

36. A man of mass 60 kg stands on weighing machine in a lift which is moving down and speeding up with an acceleration of $2.3\ m/s^2$. What will be reading on the weighing machine scale?
($g = 9.8\ m/s^2$)
(1) 450 N (2) 720 N
(3) 680 N (4) 380 N

37. A particle is moving on a circular path of 10 m radius. At any instant of time, its speed is 5 m/s and speed is decreasing at a rate of $1.5\ m/s^2$. The magnitude of net acceleration at this instant is nearly
(1) $4\ m/s^2$
(2) $1\ m/s^2$
(3) $2.9\ m/s^2$
(4) $3.2\ m/s^2$

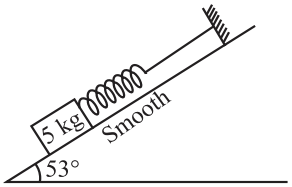
38. A cricket ball of mass 250 g with a speed of 10 m/s is hit back by a bat and returns with same speed within 0.01 s. The force exerted by the bat is
(1) 200 N
(2) 400 N
(3) 500 N
(4) 250 N

39. The force by 2 kg block exerted on 1 kg block is 4 N. What is force *F* applied on 4 kg block shown?



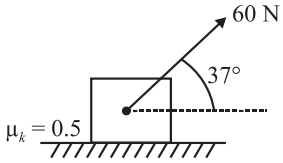
(1) 18 N
(2) 28 N
(3) 32 N
(4) 9 N

40. A body of mass 5 kg is suspended by a spring balance on an inclined plane as shown in figure. The spring balance reading is (g = 10 m/s^2)



(1) 50 N (2) 30 N
(3) 40 N (4) Zero

41. A block of mass 5 kg is resting on rough surface for which coefficient of kinetic friction is 0.5. When a force of F = 60 N is applied, the acceleration of block will be (g = 10 m/s^2)



(1) 4.6 m s^{-2} (2) 3.9 m s^{-2}
(3) 8.2 m s^{-2} (4) 2.6 m s^{-2}

42. A cricket ball of mass 100 g has an initial velocity $\vec{u} = (2\hat{i} + 3\hat{j})$ m/s and a final velocity $\vec{v} = -(2\hat{i} + 3\hat{j})$ m/s after being hit by bat. The change in momentum (in kgm/s) of the ball is

(1) $-\left(0.9\hat{i} + 1.2\hat{j}\right)$

(2) $-\left(0.4\hat{i} + 0.6\hat{j}\right)$

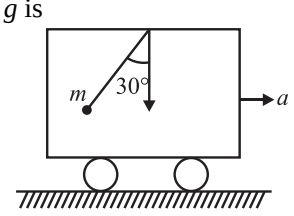
(3) $-\left(4\hat{i} + 6\hat{j}\right)$

(4) Zero

43. Sand is being dropped gently on a conveyor belt at the rate of 2 kg/s. The force necessary to keep the belt moving with a constant velocity of 10 m/s will be

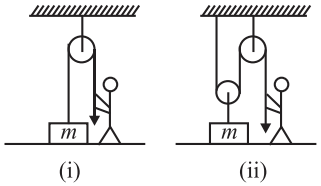
(1) 10 N (2) 40 N
(3) 20 N (4) Zero

44. If trolley accelerates horizontally with acceleration a, then bob is displaced backward from its initial vertical position by an angle 30° in equilibrium w.r.t. trolley as shown in figure. The value of a in terms of g is



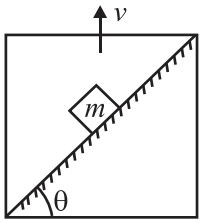
(1) g (2) $\sqrt{3}g$
(3) $\frac{g}{\sqrt{3}}$ (4) $g/2$

45. A person wants to raise a block lying on the ground to a height h by two ways as shown in the figure. In both cases, if the time required is same, then force exerted by man is (Pulley and strings are ideal)



(1) More in case-(i)
(2) More in case-(ii)
(3) Same in both cases
(4) Data is insufficient

46. A block of mass 'm' is placed over a smooth inclined plane fixed inside a lift moving upward with constant speed 'v'. Power developed by the normal reaction on block by inclined plane from the frame of lift is

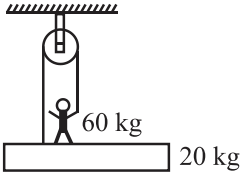


(1) $mgv \sin\theta$ (2) $mg \cos\theta \cdot v$
(3) mgv (4) Zero

47. A mass of 2 kg is moving with a speed of 2 m/s on a horizontal smooth surface, collides with a massless of spring constant K = 200 N/m. The maximum compression of the spring will be

(1) 10 cm (2) $10\sqrt{3}$ cm
(3) 20 cm (4) $100\sqrt{3}$ cm

48. The force F with which a man must pulls the rope in order to keep the platform at rest on which he stands as shown in the figure is (mass of man is 60 kg and that of platform is 20 kg)



(1) 40 kg-wt
(2) 60 kg-wt
(3) 80 kg-wt
(4) 100 kg-wt

49. A body of mass m rests on a horizontal floor. The coefficient of static friction between floor and body is μ. The minimum possible force that has to be applied to make the body move is

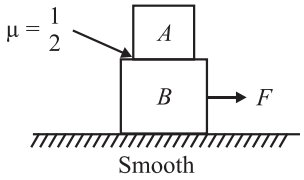
(1) μmg

(2) $\left(\sqrt{\mu^2+1}\right)mg$

(3) $\dfrac{\mu mg}{\sqrt{\mu^2+1}}$

(4) $\dfrac{mg}{\sqrt{\mu^2+1}}$

50. A 4 kg block A is placed at the top of 8 kg block B which rests on a smooth table. The minimum horizontal force F required to make block A and B move separately is (g = 10 ms^{-2})



(1) 36 N

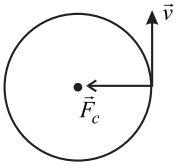
(2) 5 N

(3) 40 N

(4) 60 N

Solution

1. **(3)** **[Pg No. 74, NCERT Topic No. 5.4]**



In uniform circular motion.

$\vec{F}_c \cdot \vec{v} = 0$

Because of $\vec{F}_c \perp \vec{v}$

$\vec{F}_c$ has constant magnitude and kinetic energy remains constant.

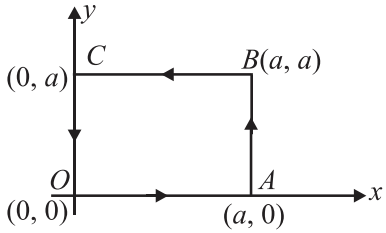
2. **(2)** **[Pg No. 75, NCERT Topic No. 5.5]**

$F = kx$

$W = \int F \cdot dx = \int_0^x kx dx$

$W = \dfrac{kx^2}{2}$

3. **(3)** **[Pg No. 80, NCERT Topic No. 5.9]**



$W = \int \vec{F} \cdot d\vec{r}$

$\int_{(0,0)}^{(0,0)} (2\hat{i} + 2\hat{j}) \cdot (dx\hat{i} + dy\hat{j}) = 0$

4. **(4)** **[Pg No. 78, NCERT Topic No. 5.8]**

$\dfrac{1}{2}Kx^2 = \dfrac{1}{2}mv_0^2$

5. **(2)** **[Pg No. 76, NCERT Topic No. 5.6]**

$W_{A11} = \Delta K.E$

$W_{A11} = KF_f - KE_i$

$W_{mg} + W_{fr} = KE_f - KE_i$

$W_{fr} = -100 \text{ J}$

6. **(3)** **[Pg No. 75, NCERT Topic No. 5.5]**

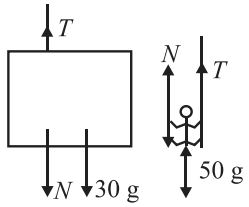
Work done = Area under F-x curve

= change in K.E.

Area $= 20 - 15 = 5 \text{ J} = \dfrac{1}{2}mv^2$

$\Rightarrow V = \sqrt{10}$ m/s

7. **(1)** **[Pg No. 53, NCERT Topic No. 4.5]**



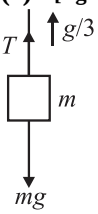
$T = N + 30\ g$

$N + T = 50\ g$

$\Rightarrow 2T = 80\ g$

$\Rightarrow T = 400$ N

8. **(4)** **[Pg No. 73, NCERT Topic No. 5.3]**

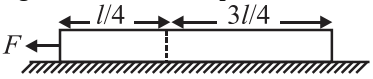


Let tension be T

$T - mg = \dfrac{mg}{3}$ $T = \dfrac{4}{3}mg$

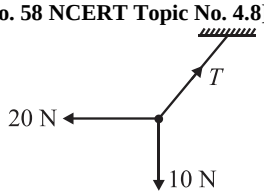
$W =$ force $\times$ distance $= \dfrac{4}{3}mgh$

9. **(4)** **[Pg No. 53, NCERT Topic No. 4.5]**



$T = F\left(1 - \dfrac{l}{4 \times I}\right) = \dfrac{3F}{4}$

10. **(3)** **[Pg No. 58 NCERT Topic No. 4.8]**



$T = \sqrt{(20)^2 + (10)^2}$ s

$T = \sqrt{500}$ N

11. **(1)** **[Pg No. 53, NCERT Topic No. 4.5]**

$a = \dfrac{F}{m_1 + m_2} = \dfrac{16}{8} = 2 \text{ m/s}^2$

12. **(4)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

$a_1 = \dfrac{3mg - mg}{m} = 2g$

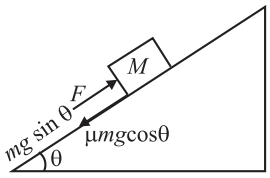
$a_2 = \dfrac{(3m - m)}{(3m + m)}g = \dfrac{g}{2}$

13. **(1)** **[Pg No. 61, NCERT Topic No. 4.7]**

$\mu mg \cos\theta > mg \sin\theta$

Friction $= mg \sin\theta$

14. **(2)** **[Pg No. 61, NCERT Topic No. 4.7]**



$F = mg\sin\theta + \mu mg\cos\theta$

15. **(2)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

$\tan\alpha = \mu$

$\Rightarrow \alpha = 60°$

16. **(1)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

$\mu mg > F$

$\Rightarrow$ Friction = F = 5 N

17. **(3)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

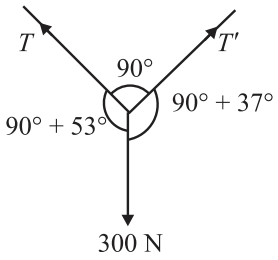
Static friction varies from zero to μN.

18. **(3)** **[Pg No. 58, NCERT Topic No. 4.8]**

$$\text{Acceleration} = \frac{F\cos 37^\circ - 30}{5} = \frac{80\times\frac{4}{5} - 30}{5}$$

$$a = \frac{34}{5} = 6.8 \text{ m/s}^2$$

19. **(2)** **[Pg No. 73, NCERT Topic No. 5.3]**



By lami's Theorem

$$\frac{T}{\sin(90^\circ + 37^\circ)} = \frac{T'}{\sin(90^\circ + 53^\circ)} = \frac{300}{\sin 90^\circ}$$

$$T = \frac{300}{1}\times\sin(90^\circ + 37^\circ) = 300\cos 37^\circ = 300\times\frac{4}{5}$$

$= 240$ N

20. **(1)** **[Pg No. 51, NCERT Topic No. 4.4]**

PE of block at top of inclined plane = mgh

$= 5\times 10\times 4 = 200$ J

Total work done = 250 J

$\therefore$ Work done against friction

$= W - \Delta PE = 250 - 200 = 50$ J

21. **(4)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

Horse moves forward due to force exerted by

22. **(2)** **[Pg No. 51, NCERT Topic No. 4.4]**

If applied force on the block is zero, then frictional force will be zero.

23. **(4)** **[Pg No. 79, NCERT Topic No. 5.8]**

Downward force on block

$= mg\sin 30^\circ = 2\times 10\times 1/2 = 10$ N

Max static friction which can act

$$= \mu mg\cos\theta = 0.7\times 2\times 10\times\frac{\sqrt{3}}{2} = 7\sqrt{3} = 12 \text{ N}.$$

As friction is adjusting in nature.

$f_s = 10$ N

$\therefore$ No tension in string

24. **(1)** **[Pg No. 75, NCERT Topic No. 5.4]**

$mgh = \frac{1}{2}kx^2$ (by energy conservation)

$$x = \sqrt{\frac{2mgh}{k}}$$

25. **(3)** **[Pg No. 53, NCERT Topic No. 4.5]**

26. **(4)** **[Pg No. 53, NCERT Topic No. 4.5]**

$$F_u = v_e\frac{dM}{dt} = M_0 g$$

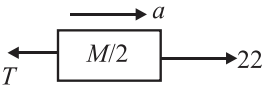
$$\therefore \frac{dM}{dt} = \frac{M_0 g}{v_e}$$

$$\left(\frac{dM}{dt}\right) = \frac{6000\times 10}{1500} = 4\times 10 = 40 \text{ kg/s}$$

27. **(2)** **[Pg No. 75, NCERT Topic No. 5.4]**

Unbalance force $= \frac{22-6}{M} = \frac{16}{M}$

FBD of half block



$22 - T = M/2\times a$

$$22 - T = \frac{M}{2}\times\frac{16}{M}$$

$22 - 8 = T \ \therefore \ T = 14$ N

28. **(1)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

$KE = \frac{1}{2}mV^2$

$\boxed{KE \propto V^2}$

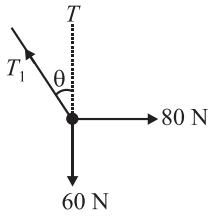
29. **(2)** **[Pg No. 60, NCERT Topic No. 4.9.1]**

Limiting value of friction is defined for static friction.

30. **(1)** **[Pg No. 78, NCERT Topic No. 5.7]**

Work done by conservative for does not depend on path it is depend on final and initial point.

31. **(3)** **[Pg No. 58, NCERT Topic No. 4.8]**



Under equilibrium $T_1\cos\theta = 60$

$T_1\sin\theta = 80$

$$\frac{T_1\sin\theta}{T_1\cos\theta} = \frac{80}{60} \rightarrow \tan\theta = \frac{4}{3}$$

$\theta = 53^\circ$

32. **(3)** **[Pg No. 61, NCERT Topic No. 4.9]**

Angle of repose θ is related to μ

$$\mu = \tan\theta = \tan 37^\circ = \frac{3}{4} = 0.75$$

33. **(2)** **[Pg No. 61, NCERT Topic No. 4.9]**

For box $T - f_k = ma$

$T - 0.05\times 20\times 10 = 20a$ … (1)

For hanging block

$20 - T = 2\times a$ …. (2)

Adding equation

$T - 10 + 20 - T = (20+2)a$

$$10 = 22a \ \therefore\ a = \frac{10}{22} = \frac{5}{11}\ \text{ms}^{-2}$$

34. **(2)** **[Pg No. 63, NCERT Topic No. 4.10]**

$$\mu_{\min} = \frac{v^2}{rg} = \frac{20\times 20}{200\times 10} = 0.2$$

35. **(1)** **[Pg No. 55, NCERT Topic No. 4.5]**

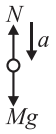
By the conservation of linear momentum

$m_Bv_B = m_Gv_G$

$$\Rightarrow v_G = \frac{m_B\times v_B}{m_G} = \frac{5\times 10^{-3}\times 500}{5} = 0.5\ \text{m/s}$$

36. **(1)** **[Pg No. 54, NCERT Topic No. 4.4]**

As lift is moving down normal reaction on man is equal to weighing machine reading.



$Mg - N = Ma \rightarrow N = Mg - Ma = 60(9.8 - 2.3)$

60 7.5

37. **(3)** **[Pg No. 63, NCERT Topic No. 4.10]**

$$a_c = \frac{v^2}{R} = \frac{(5)^2}{10} = 2.5\ \text{m/s}^2$$

$a_t = 1.5\ \text{m/s}^2$

$$a = \sqrt{a_c^2 + a_t^2} = \sqrt{(2.5)^2 + (1.5)^2}$$

$= \sqrt{8.5} \approx 2.9\ \text{m/s}^2$

38. **(3)** **[Pg No. 55, NCERT Topic No. 4.4]**

$|\Delta p| = 2mu$

$$F_{av} = \frac{|\Delta p|}{\Delta t} = \frac{2mu}{t} = \frac{2\times 0.25\times 10}{0.01}$$

$= 500\ \text{N}$

39. **(2)** **[Pg No. 56, NCERT Topic No. 4.6]**

From free body diagram $\xrightarrow[f_1]{} \boxed{1\ \text{kg}} \xrightarrow{a}$

$f_1 = 4\ \text{N}$

$4 = 1\times a \ \therefore a = 4\ \text{m/s}^2$

By FBD for system $\rightarrow a = 4\ \text{ms}^{-2}$

$\xrightarrow[F]{} \boxed{4+2+1}$

$F = (4+2+1)\times 4$

$F = 28\ \text{N}$

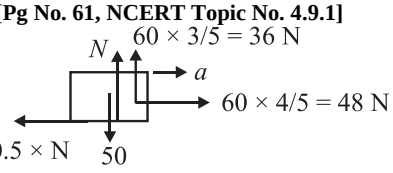
40. **(3)** **[Pg No. 56, NCERT Topic No. 4.6]**

The mass is under equilibrium with spring

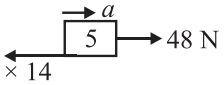
T = Spring balance reading $= 5\times g\times\sin 53^\circ$

$$= 50\times\frac{4}{5} = 40\ \text{N}$$

41. **(2)** **[Pg No. 61, NCERT Topic No. 4.9.1]**



$N + 36 = 50 \ \therefore\ N = 14$ newton



$\therefore\ 48 - 7 = 5\times a$

$$a = \frac{41}{5} = 8.2\ \text{ms}^{-2}$$

42. **(2)** **[Pg No. 53, NCERT Topic No. 4.5]**

$(\Delta\vec{p}) = \vec{p}_f - \vec{p}_i = m(\vec{v} - \vec{u})$

$= 0.1\left(-4\hat{i} - 6\hat{j}\right)$

$= -\left(0.4\hat{i} + 0.6\hat{j}\right)\text{kgm/s}$

43. **(3)** **[Pg No. 53, NCERT Topic No. 4.5]**

$$F = v\frac{dm}{dt} = 10\times 2 = 20\ \text{N}$$

44. **(3)** **[Pg No. 53, NCERT Topic No. 4.5]**

$$\tan 30^\circ = \frac{a}{g} \Rightarrow a = \frac{g}{\sqrt{3}}$$

45. **(1)** **[Pg No. 53, NCERT Topic No. 4.5]**
In both cases acceleration is same. In case (ii), force required is less.

46. **(4)** **[Pg No. 83, NCERT Topic No. 5.10]**
Normal is always perpendicular to velocity of block in frame of lift.
So, P = zero

47. **(3)** **[Pg No. 78, NCERT Topic No. 5.8]**

$$\frac{1}{2}mv^2 = \frac{1}{2}kx^2$$

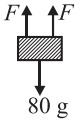
$$2 \times 4 = 200 \times x^2$$

$$\therefore\ x^2 = \frac{4}{100}$$

$$\Rightarrow\ x = \frac{2}{10}$$

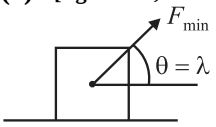
$$\therefore\ x = 20 \text{ cm}$$

48. **(1)** **[Pg No. 53, NCERT Topic No. 4.5]**
Consider platform + man as a system



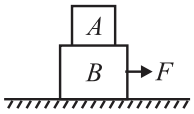
$F + F = (60 + 20)g$
$F = 40$ kg-wt

49. **(3)** **[Pg No. 60, NCERT Topic No. 4.9.1]**



$$F_{\min} = \frac{\mu mg}{\sqrt{1+\mu^2}}$$

50. **(4)** **[Pg No. 60, NCERT Topic No. 4.9.1]**



When A & B just move separately
For $A \Rightarrow \mu mg = ma$

$$\Rightarrow \frac{1}{2} \times 40 = 4.a$$

$$\Rightarrow a = 5 \text{ m/s}^2$$

So, $F_{\min} = (8 + 4) \times 5$

$= 60$ N