Chapter : LAWS OF MOTION

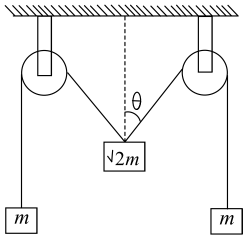
Assignment 1

Class 11

CLASS : XIth	DPP DAILY PRACTICE PROBLEMS	SUBJECT : PHYSICS
Date :		DPP No. : 1

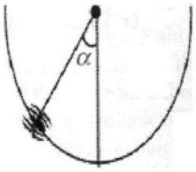
Topic :- LAWS OF MOTION

1. The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ shopuld be



a) 0° b) 30° c) 45° d) 60°

2. An insect crawls up a hemispherical surface very slowly. The coefficient of friction between the insect and the surface is 1/3. If the line joining the centre of the hemispherical surface to the insect makes an angle α with the vertical, the maximum possible value of α is given by



a) $\cot \alpha = 3$ b) $\tan \alpha = 3$ c) $\sec \alpha = 3$ d) $\operatorname{cosec} \alpha = 3$

3. Which of the following are correct?

a) A parachutist of weight W strikes the ground with his legs and comes to rest with an upward acceleration of magnitude 3 g. force exerted on him by ground during landing is 4 W

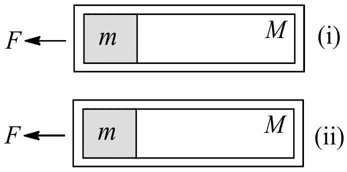
b) Two massless spring balances are hung vertically in series from a fixed point and a mass M kg is attached to the lower end of the lower spring balance. Each spring balance reads M kgf

c) A rough vertical broad has an acceleration a along the horizontal direction so that a block of mass m pressing against its vertical side does not fall. The coefficient of friction between the block and the broad is greater than g/a

d) A man is standing at a spring platform. If man jumps away from the platform the reading of the spring balance first increases and then decreases to zero

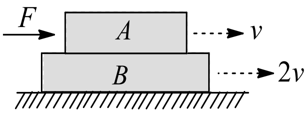
4. A block of mass m is placed in contact with one end of a smooth tube of mass$M$. A horizontal

force F acts in the tube in each case (i) and (ii). Then,



a) $a_m = 0$ and $a_M = \frac{F}{M}$ in (i)
b) $a_m = a_M = \frac{F}{M+m}$ in (i)
c) $a_m = a_M = \frac{F}{M+m}$ in (ii)
d) Force on m is $\frac{mF}{M+m}$ in (ii)

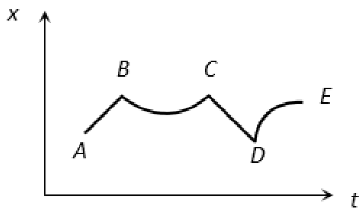
5. Two blocks A and B of masses m_A and m_B have velocity v and d$2v$, respectively, at a given instant. 000000A horizontal force F acts on the block$A$. There is no friction between ground and block B and coefficient of friction between A and B isμ. The friction



a) On A supports its motion
b) On B opposes its motion relative to A
c) On B opposes its motion
d) Opposes the motion of both

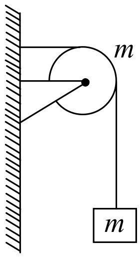
6. Mark the correct statement (s) regarding friction
a) Friction force can be zero, even through the contact surface is rough
b) Even though there is no relative motion between surfaces, frictional force may exist between them
c) The expression $f_L = \mu_s N$ or $f_k = \mu_k N$ are approximate expression
d) The expression $f_L = \mu_s N$ tells that the directions of f_L and N are the same

7. Figure shows the displacement of particle going along the X-axis as a function of time. The force acting on the particle is zero in the region



a) AB
b) BC
c) CD
d) DE

8. A string of negligible mass going over a clamped pulley of mass m supports a block of M as shown in figure. The force on the pulley by the clamp is given by



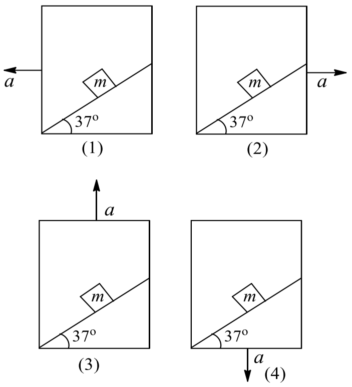
a) $\sqrt{2}\,Mg$
b) $\sqrt{2}\,Mg$
c) $\left(\sqrt{(M+m)^2+m}\right)g$
d) $\left(\sqrt{(M+m)^2+M^2}\right)g$

9. A car is moving in a circular horizontal track of radius 10 m with a constant speed of

10 ms^{-1}. A plumb bob is suspended from the roof of the car by a light rigid rod. The angle made by the rod with the vertical is

a) Zero b) 30° c) 45° d) 60°

10. A block of mass m is placed on a wedge. The wedge can be accelerated in four manners marked as (1), (2), (3) and (4) as shown. If the normal reactions in situations (1), (2), (3) and (4) are N_1, N_2, N_3 and N_4, respectively, and acceleration with which the block slides on the wedge in the situations are b_1, b_2, b_3 and b_4, respectively, then



a) $N_3 > N_1 > N_2 > N_4$ b) $N_4 > N_3 > N_1 > N_2$ c) $b_2 > b_3 > b_4 > b_1$ d) $b_2 > b_3 > b_1 > b_4$

11. A 3 kg block of wood is on a level surface where $\mu_s = 0.25$ and $\mu_k = 0.2$. A force of 7 N is being applied horizontally to the block. Mark the correct statement (s) regarding this situation

a) If the block is initially at rest, it will remain at rest and friction force will be about 7 N

b) If the block is initially moving, then it will continue its motion forever if force applied is in the direction of motion of the block

c) If the block is initially moving and the direction of applied force is same as that of motion of block, then block moves with an acceleration of $1/3\ ms^{-2}$ along its initial direction of motion

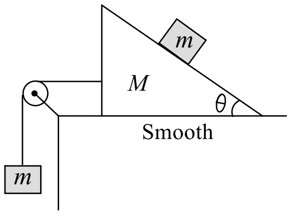
d) If the block is initially moving and direction of applied force is opposite to that of initial motion of block, then block decelerates, comes to a stop, and starts moving in the opposite direction

12. 80 railway wagons all of same mass 5×10^3 kg are pulled by an engine with a force of 4×10^5N. The tension in the coupling between 30th and 31st wagon from the engine is

a) 25×10^4 N b) 40×10^4 N c) 20×10^4 N d) 32×10^4 N

13. The figure shows a block of mass m placed on a smooth wedge of mass M. Calculate the

minimum value of M' and tension in the string, so that the block of mass m will move vertically downward with acceleration 10 ms^{-2}



a) The value of M' is $\frac{M \cot\theta}{1-\cot\theta}$

b) The value of M' is $\frac{M \tan\theta}{1-\tan\theta}$

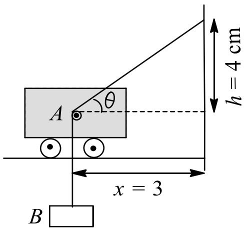
c) The value of tension in the string is $\frac{mg}{\tan\theta}$

d) The value of tension is , $\frac{Mg}{\cot\theta}$

14. A block of mass 0.1 kg is held against a wall applying a horizontal force of 5 N on the block. If the coefficient of friction between the block and the wall is 0.5, the magnitude of the friction force acting on the block is

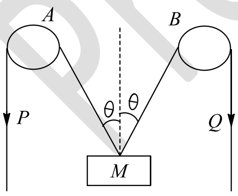
a) 2.5 N b) 0.98 N c) 4.9 N d) 0.49 N

15. The string shown in the figure is passing over small smooth pulley rigidly attached to trolley$A$. If the speed of trolley is constant and equal to v_A towards right, speed and magnitude of acceleration of block B at the instant shown in figure are



a) $v_B = v_A, a_B = 0$ b) $a_B = 0$ c) $v_B = \frac{3}{5} v_A$ d) $a_B = \frac{16 v_A^2}{125}$

16. In the arrangement shown in the figure, the ends P and Q of an unstretchable string move downwards with uniform speed$U$. Pulleys A and B are fixed



Mass M moves upwards with speed

a) $2\ U \cos\theta$ b) $U/\cos\theta$ c) $2\ U/\cos\theta$ d) $U \cos\theta$

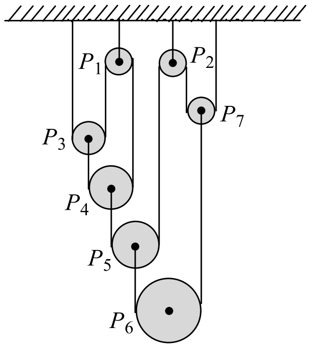
17. Suppose a body, which is acted on by exactly two forces, is accelerated. For this situation, mark the **incorrect** statement (s)

a) The body can't move with constant speed b) The velocity can never be zero

c) The vector sum of two forces can't be zero d) The two forces must act in the same line

18. Seven pulleys are connected with the help of three light strings as shown in the figure

below. Consider P_3, P_4, P_5 as light pulleys and pulleys P_6 and P_7 have masses m each. For this arrangement, mark the correct statement (s)

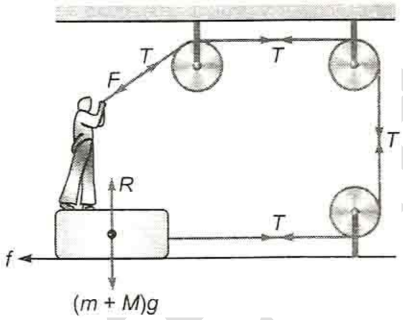


a) Tension in the string connecting P_1, P_3, and P_4 is zero
b) Tension in the string connecting P_1, P_3 and P_4 is $mg/3$
c) Tensions in all the three strings are same and equal to zero
d) Acceleration of P_6 is g downwards and that of P_7 is g upwards

19. If a dipole is situated in a non uniform field,

a) $\sum \vec{\mathbf{F}} = 0, \sum \vec{\tau} = 0$ b) $\sum \vec{\mathbf{F}} \neq 0$, but $\sum \vec{\tau} = 0$
c) $\sum \vec{\mathbf{F}} = 0$, but $\sum \vec{\tau} \neq 0$ d) $\sum \vec{\mathbf{F}} \neq 0, \sum \vec{\tau} \neq 0$

20. A man of mass M is standing on a board of mass m. The friction coefficient between the board and the floor is μ, figure. The maximum force that the man can exert on the rope so that the board does not move is



a) $\mu(m+M)g$ b) $\dfrac{\mu(m+M)g}{\mu+1}$ c) $\dfrac{\mu(m+M)g}{\mu-1}$ d) None of these