DPP

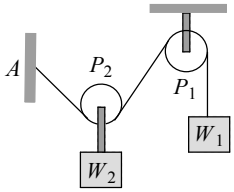
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**

DATE : **DPP No. : 9**

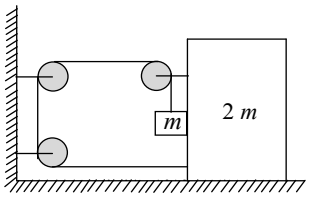
Topic :- LAWS OF MOTION

1. In the following figure, the pulley P_1 is fixed and the pulley P_2 is movable. If $W_1 = W_2 = 100$ N, what is the angleAP_2P_1? The pulleys are frictionless and assume equilibrium



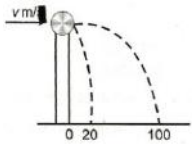
a) 30° b) 60° c) 90° d) 120°

2. In the system shown in the figure, the friction coefficient between ground and bigger block isμ. There is no friction between both the blocks. The string connecting both the block is light; all three pulleys are light and frictionless. Then the minimum limiting value of μ, so that the system remains in equilibrium, is



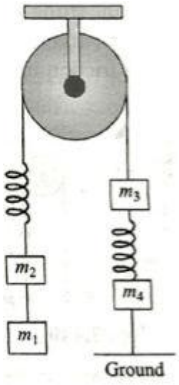
a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{2}{3}$ d) $\frac{3}{2}$

3. A ball of mass 0.2 kg rests on a vertical post of height 5 m. A bullet of mass 0.01 kg, travelling with a velocity v m/s in a horizontal direction, hits the centre of the ball. After the collision, the ball and bullet travel independently. The ball hits the ground at a distance of 20 m and the bullet at ball hits the ground at a distance of 100 m from the foot of the post. The initial velocity v of the bullet is



a) 250 m/s b) $250\sqrt{2}$ m/s c) 400 m/s d) 500 m/s

4. For the system shown in the figure, $m_1 > m_2 > m_3 > m_4$. Initially, the system is at rest in equilibrium condition. If the string joining m_4 and ground is cut, then just after the string is cut



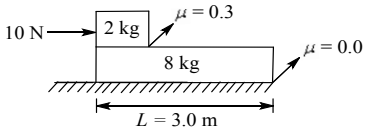
Statement I: m_1,m_{23}, m_3 remain stationary
Statement II: the value of acceleration of all the four blocks can be determined
Statement III: Only m_4 remains stationary
Statement IV: Only m_4 accelerates
Now, choose the correct options

a) All the statements are correct
b) Only I, II and IV are correct
c) Only I and II are correct
d) Only II and IV are correct

5. A block of base 10 cm × 10 cm and height 15 cm is kept on an inclined plane. The coefficient of friction between them is $\sqrt{3}$. The inclination θ of this inclined plane from the horizontal plane is gradually increased from 0°. Then,

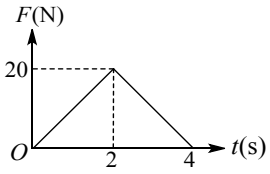
a) at $0 = 30°$, the block will start sliding down the plane
b) The block will remain at the rest on the plane up to certain θ and then it will topple
c) At $\theta = 60°$, the block will start sliding down the plane and continue to do so at higher angles
d) At $\theta = 60°$, the block will start sliding down the plane and on further increasing θ, it will topple at certain θ

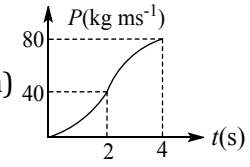
6. Determine the time in which the smaller block reaches other end of bigger block in the figure

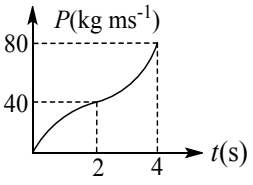


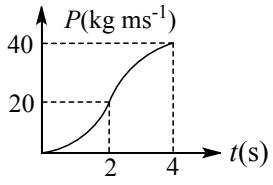
a) 4 s
b) 8 s
c) 2.19 s
d) 2.13 s

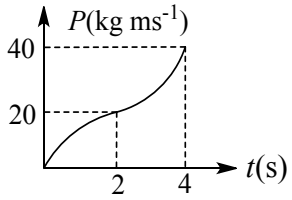
7. Figure shows the variation of force acting on a body with time. Assuming the body to start from rest, the variation of its momentum with time is best represented by which plot?



a) 

b) 

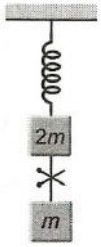
c) 

d) 

8. A circular road of radius 1000 m has banking angle45°. The maximum safe speed (in ms^{-1}) of a car having a mass 2000 kg will be, if the coefficient of friction between type and road is 0.5

a) 172 b) 124 c) 99 d) 86

9. System shown in figure is in equilibrium and at rest. The spring and string are massless, now

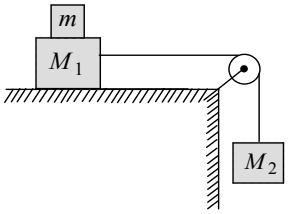


the string is cut. The acceleration of mass 2 m and m just after the string is cut will be

a) $g/2$ upward, g downward b) g upward, $g/2$ downward

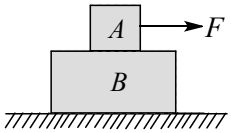
c) g upward, $2g$ downward d) $2g$ upward, g downward

10. Two blocks of masses M_1 and M_2 are connected with a string passing over a pulley as shown in figure. The block M_1 lies on a horizontal surface. The coefficient of friction between the block M_1 and the horizontal surface isμ. The system accelerates. What additional mass m should be placed on the block M_1 so that the system does not accelerate?



a) $\frac{M_2 - M_1}{\mu}$ b) $\frac{M_2}{\mu} - M_1$ c) $M_2 - \frac{M_1}{\mu}$ d) $(M_2 - M_1)\mu$

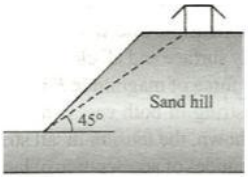
11. A block A of mass 2 kg is placed over another block B of mass 4 kg, which is placed over a smooth horizontal floor. The coefficient of friction between A and B is 0.4. when a horizontal force of magnitude 10 N is applied on A, the acceleration of blocks A and B are



a) 1 ms^{-2} and 2 ms^{-2}, respectively b) 5 ms^{-2} and 2.5 ms^{-2}, respectively

c) Both the blocks will moves together with acceleration 1/3 ms^{-2} d) Both the blocks will move together with acceleration, 5/3 ms^{-2}

12. A house is built on the top of a hill with 45° slope. Due to sliding of material and sand from top to bottom of hill, the slope angle has been reduced



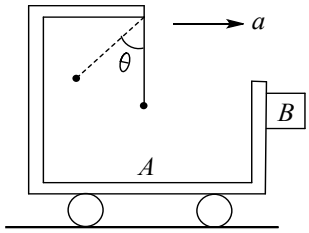
If coefficient of static friction between sand particles is 0.75, what is the final angle attained by hill? ($\tan^{-1} 0.75 \simeq 37°$)

a) 8° b) 45° c) 37° d) 30°

13. A balloon of mass M is descending at a constant accelerationα. When a mass m is released from the balloon, it starts rising with the same accelerationα. Assuming that its volume does not change, what is the value of m?

a) $\frac{\alpha}{\alpha + g} M$ b) $\frac{2\alpha}{\alpha + g} M$ c) $\frac{\alpha + g}{\alpha} M$ d) $\frac{\alpha + g}{2\alpha} M$

14. A trolley A has a simple pendulum suspended from a frame fixed to its desk. A block B is in contact on its vertical slide. The trolley is on horizontal rails and accelerates towards the right such that the block is just prevented from falling. The value of coefficient of friction between A and B is 0.5. The inclination of the pendulum to the vertical is

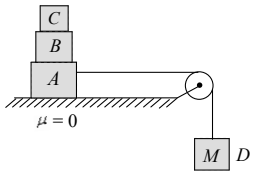


a) $\tan^{-1}\left(\frac{1}{2}\right)$ b) $\tan^{-1}(3)$ c) $\tan^{-1}(\sqrt{2})$ d) $\tan^{-1}(2)$

15. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass$m$. Force P is applied at one end of rope. The force which the rope exerts on the block is

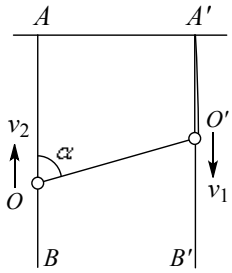
a) $\frac{P}{(M - m)}$ b) $\frac{P}{M(m + M)}$ c) $\frac{PM}{(m + M)}$ d) $\frac{PM}{(M - m)}$

16. Three blocks A,B and C of equal mass m are placed one over the other on a frictionless surface (table) as shown in the figure. Coefficient of friction between any blocks A, B and C isμ. The maximum value of mass of block D so that the blocks A, B and C move without slipping over each other is



a) $\frac{3m\mu}{\mu+1}$ b) $\frac{3m(1-\mu)}{\mu}$ c) $\frac{3m(1+\mu)}{\mu}$ d) $\frac{3m\mu}{(1-\mu)}$

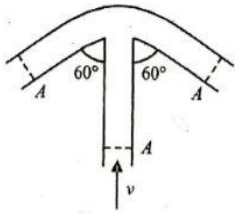
17. Two small rings O and O' are put two vertical stationary rods AB and$A'B'$, respectively. One end of an inextensible thread is tied at pointA'. The thread passes through ring O' and its other end is tied to ring$O$. Assuming that ring O' moves downwards at a constant at a constant velocity v_1, then velocity v_2 of the ring O, when $\angle AOO' = \alpha$, is



a) $v_1\left[\frac{2\sin^2\alpha/2}{\cos\alpha}\right]$ b) $v_1\left[\frac{2\cos^2\alpha/2}{\sin\alpha}\right]$ c) $v_1\left[\frac{3\cos^2\alpha/2}{\sin\alpha}\right]$ d) None of these

18. **Statement I** A cloth covers a table. Some dishes are kept on it. The cloth can be pulled out without dislodging the dishes from the table.
Statement II For every action there is an equal and opposite reaction.
a) Statement I is true, statement II is true; statement II is a correct explanation for statement I
b) Statement I is true, statement II is true; statement II is not a correct explanation for statement I
c) Statement I is true, statement II is false
d) Statement I is false, statement II is true

19. An ideal liquid of density ρ is pushed with velocity v through the central limb of the tube shown in the figure. What force does the liquid exert on the tube? The cross sectional areas of the three limbs are equal to A each. Assume stream-line flow



a) $\frac{9}{8}\rho\, Av^2$ b) $\frac{5}{4}\rho\, Av^2$ c) $\frac{3}{2}\rho\, Av^2$ d) $\rho\, Av^2$

20. A professor holds an eraser against a vertical chalkboard by pushing horizontally on it. He pushes with a force that is much greater than it required to hold the eraser. The force friction exerted by the board on the eraser increases if he
    a) Pushes eraser with slightly greater force
    b) Pushes eraser with slightly less force
    c) Raiser his elbow so that the force he exerts is lightly downward but has same magnitude
    d) Lowers his elbow so that the force he exerts is slightly upward but the same magnitude