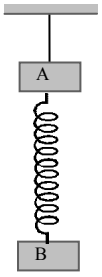
CLASS TEST

SECTION-I

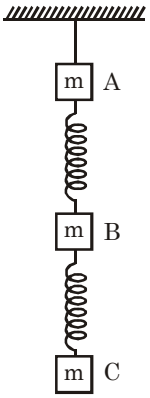
Single Correct Answer Type **7 Q. [Marks 3 (–1)]**

1. In the given figure both the blocks have equal mass. When the thread is cut, acceleration of block A & B are ?



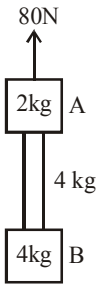
(A) 0, g↑ (B) 2g↓, 0 (C) g↓, g↓ (D) g↓ , g↑

2. Initially system is in equilibrium. If the lower spring will be cut, then acceleration of blocks A, B and C will be (in m/s^2) respectively :-



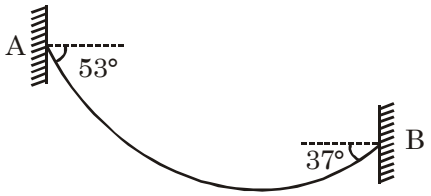
(A) 0, g↑, g↓ (B) 0, 0, g↓ (C) $\frac{g}{2}\uparrow, \frac{g}{2}\uparrow, 0$ (D) $\frac{g}{2}\uparrow, \frac{g}{2}\uparrow, g\downarrow$

3. Two objects A and B of masses 2 kg and 4kg are connected by a uniform rope of mass 4kg as shown in the diagram. A force of magnitude 80N acts on A in vertically upward direction. Tension at mid point of the rope is ($g = 10\ m/s^2$) :-



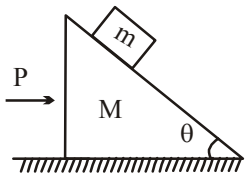
(A) 32 N (B) 40 N (C) 42 N (D) 48 N

4. A heavy rope is hanging between points A and B. If mass of the rope is 90 kg :



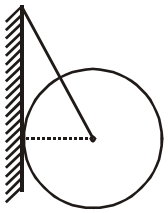
(A) Tension at point A is 900 N
(B) Tension at point B is 540 N
(C) The horizontal component of tension force is different at each point of the rope.
(D) The vertical component of tension force is same at all the points of the rope.

5. Two wooden blocks are moving on a smooth horizontal surface such that the mass m remains stationary with respect to block of mass M as shown in the figure. The magnitude of force P is:



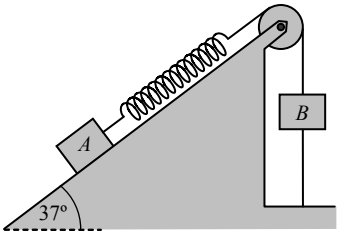
(A) (M + m)g tanθ (B) g tan θ (C) mg cos θ (D) (M + m)g cosec θ

6. A sphere of radius R and mass m is connected to a wall by a string of length 2R. The normal reaction of wall on sphere is :-



(A) mg (B) $\frac{mg}{2}$ (C) $\frac{mg}{\sqrt{3}}$ (D) 2mg

7. The setup shown is in equilibrium. Mass of block A and B are 5m and 2m respectively. The slope is frictionless. String connecting the block B with the ground is cut. Accelerations a_A and a_B of these blocks immediately after cutting the string are

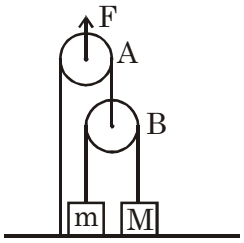


(A) $a_A = \frac{1}{3}g$ down the plane and $a_B = 0$ (B) $a_A = \frac{1}{3}g$ up the plane and $a_B = 0$

(C) $a_A = 0$ and $a_B = \frac{1}{2}g$ downwards (D) $a_A = 0$ and $a_B = \frac{1}{2}g$ upwards

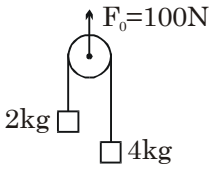
Multiple Correct Answer Type 4 Q. [4 M (–2)]

8. Two blocks of mass m = 5kg & M = 10 kg are connected by a string passing over a pulley B as shown. Another string connects the centre of pulley B to the floor and passes over another pulley A as shown. An upward force F = 300 N is applied at the centre of A. [Both pulley are ideal & massless & g = 10 m/sec^2] :-



(A) $a_m = 5$ m/sec^2 (B) $a_m = 0$ m/sec^2 (C) $a_M = 0$ m/sec^2 (D) $a_M = 5$ m/sec^2

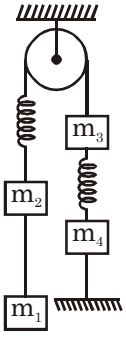
9. Two blocks of masses $m_1 = 2$ kg and $m_2 = 4$ kg hang over a massless pulley as shown in the figure. A force $F_0 = 100$ N acting at the axis of the pulley accelerates the system upwards. Then :



(A) acceleration of 2 kg mass is 15 m/s^2 (B) acceleration of 4 kg mass is 2.5 m/s^2

(C) acceleration of pulley is $\frac{35}{4}$ m/s^2 (D) acceleration of both the masses is upward

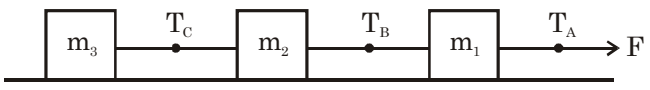
10. For the system shown in figure. $m_1 > m_2 > m_3 > m_4$. Initially the system is at rest in equilibrium condition. If the string joining m_4 and ground is cut, then just after the string is cut :



(A) Acceleration of m_1 & m_2 will be zero. (B) Acceleration of m_4 will be g downward

(C) Acceleration of m_3 will be zero. (D) Acceleration of m_3 will be non-zero.

11. A child's toy consists of three blocks as shown in figure. The blocks have mases m_1, m_2 and m_3 ($m_1 < m_2 < m_3$). If they are pulled to the right with a horizontal force 'F', mark the correct statement (T = Tension in the string.)

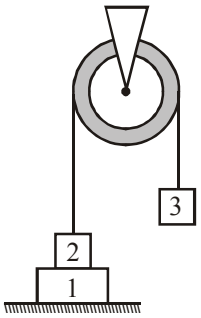


(A) $T_A > T_B > T_C$ (B) $T_A < 2T_B$ (C) $T_B < 2T_C$ (D) $T_A > 3T_C$

Linked Comprehension Type (1 Para × 2Q.) [3 M (-1)]
(Single Correct Answer Type)

Paragraph for Questions 12 and 13

The drawing shows box 1 resting on a table, with box 2 resting on top of box 1. A massless rope passes over a massless, frictionless pulley. One end of the rope is connected to box 2 and the other end is connected to box 3. The weights of the three boxes are $W_1 = 55$ N, $W_2 = 35$ N, and $W_3 = 28$ N.



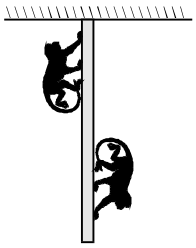
12. The magnitude of the normal force that the table exerts on box 1, is :-
(A) 55 N (B) 62 N (C) 48 N (D) 90 N

13. If the pulley is pulled upward with an acceleration that increases with time as a =t/4 where t is the time in seconds, what is the time when the box 2 is lifted off?
(A) 2.5 sec (B) 5 sec (C) 1.25 sec (D) 3.75 sec

SECTION-II

Numerical Answer Type Question 1Q.[3(0)]
(upto second decimal place)

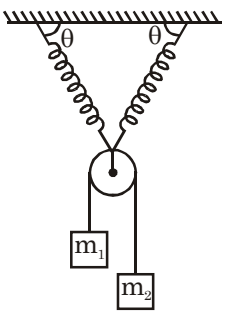
1. Two monkeys of masses 10 and 8 kg are moving along a vertical rope, the former climbing up with an acceleration of $2m/s^2$ while the latter coming down with a uniform velocity of 2m/s. Find the tension (in N) in the rope at the fixed support.



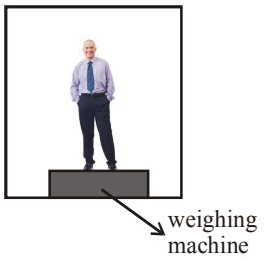
SECTION-III

Numerical Grid Type (Ranging from 0 to 9) 4 Q. [4 M (0)]

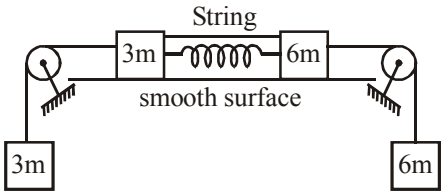
1. Two identical ideal springs of spring constant 1000 N/m are connected by an ideal pulley as shown and system is arranged in vertical plane. At equilibrium θ is 60° and masses m_1 and m_2 are 2 kg and 3 kg respectively. The elongation in each spring when θ is 60° is p cm. The value of $\frac{\sqrt{3}p}{1.6}$ is :



2. Spring constant of weighing machine reduces due to severe use of it. If a man on weighing machine gets correct reading if elevator goes with 2 m/s^2 if % change in spring constant is P, then fill (P – 16) if lift goes upward or (P – 17) if lift goes downward.



3. Consider the arrangement shown. The system is released from rest and the string (connecting two blocks) shown is simultaneously burnt. Maximum extension in the spring (initially relaxed) during the subsequent motion is nmg/k then find n.

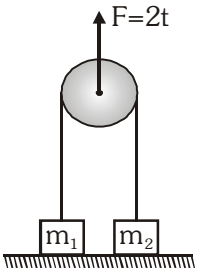


4. A monkey pulls (along the ground) the mid point of a 10 m long light inextensible string connecting two identical objects A & B each of mass 0.3 kg continuously along the perpendicular bisector of line joining the masses. The masses are found to approach each other at a relative acceleration of 5 m/s^2 when they are 6 m apart. The constant force applied by monkey is:

SECTION-IV

Matrix Match Type (4 × 5) **1 Q. [8 M (for each entry +2(0)]**

1. In shown figure m_1 = 2 kg and m_2 = 4kg. The pulley is movable. At t=0, both masses touch the ground and the string is taut. A vertically upward, time dependent force F=2t (F is in newton, t is in second) is applied to the pulley. (Take g=10 ms^{-2})



	Column I		**Column II**
(A)	The time in seconds when m_1 is lifted off the ground	(P)	10
(B)	The time in seconds when m_2 is lifted off the ground	(Q)	5
(C)	Acceleration in m/s^2 of m_1 at t = 30 s	(R)	20
(D)	Acceleration in m/s^2 of m_2 at t = 60 s	(S)	40
		(T)	30

CLASS TEST # 20 **ANSWER KEY**

SECTION-I

Single Correct Answer Type **7 Q. [Marks 3 (–1)]**

1. Ans. (B) **2. Ans. (A)** **3. Ans. (D)** **4. Ans. (B)**

5. Ans. (A) **6. Ans. (C)** **7. Ans. (D)**

Multiple Correct Answer Type **4 Q. [4 M (–2)]**

8. Ans. (A,C) **9. Ans. (A,B,C,D)** **10. Ans. (A,C)** **11. Ans. (A,B,C)**

Linked Comprehension Type **(1 Para × 2Q.) [3 M (-1)]**

(Single Correct Answer Type)

12. Ans. (B) **13. Ans. (B)**

SECTION-II

Numerical Answer Type Question **1Q.[3(0)]**

(upto second decimal place)

1. Ans. 200.00

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **4 Q. [4 M (0)]**

1. Ans. 3 **2. Ans. 3** **3. Ans. 8** **4. Ans. 2**

SECTION-IV

Matrix Match Type (4 × 5) **1 Q. [8 M (for each entry +2(0)]**

1. Ans. (A) R; (B) S; (C) Q; (D) Q