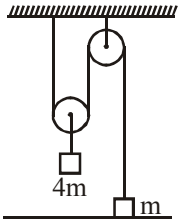
CLASS TEST

SECTION-I

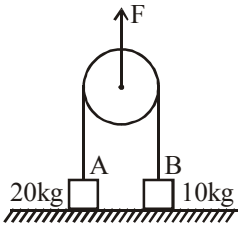
Single Correct Answer Type **6 Q. [Marks 3 (–1)]**

1. The mass of the body which is hanging on the rope attached to the movable pulley is four times as much as the mass of the body which is fixed to the ground. At a given instant the heavier body is released. What is the initial acceleration of block m (in m/s^2) ? (The mass of the pulleys and the ropes are negligible.)



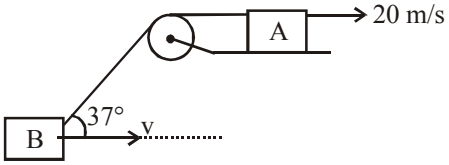
(A) 5 m/s^2 (B) 10 m/s^2 (C) 20 m/s^2 (D) 2.5 m/s^2

2. In the figure shown blocks are initially at rest on the floor. Mark the correct statement(s) :



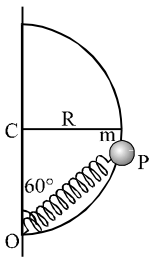
(A) When applied force on pulley is 200 N the normal reaction on block A is zero.
(B) When applied force is 400 N acceleration of B is 10 m/s^2
(C) When applied force is 240 N acceleration of pulley is 2 m/s^2
(D) For a force F = 100 N, normal reaction on B is zero.

3. Two block A & B are connected by an ideal string as shown in figure. If block B has velocity v & block A has velocity 20 m/s as shown find v :-



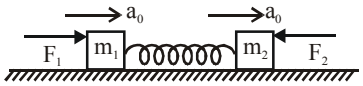
(A) 25 m/s (B) 16 m/s (C) 20 m/s (D) 10 m/s

4. A smooth semicircular wire track of radius R is fixed in a vertical plane as shown. One end of a light spring of natural length $\frac{3R}{4}$ is attached to the lower point O of the wire track. A small bead of mass m which can slide on the track, is attached to the other end of the spring.
The bead is held stationary at point P such that spring makes an angle of 60° with the vertical.
The spring constant is $k = \frac{mg}{R}$. The restoring force in the spring at that instant is :-



(A) mg (B) $\frac{mg}{4}$ (C) $\frac{mg}{8}$ (D) $\frac{mg}{2}$

5. Two blocks of masses m_1 and m_2 being connected with a light spring of stiffness k are driven with forces F_1 and F_2 on a smooth horizontal plane. If the blocks move with same acceleration a_0, the value of a_0 is:-



(A) $\frac{F_1 - F_2}{m_1 + m_2}$ (B) $\frac{F_1 m_2 - m_1 F_2}{(m_1 + m_2)^2}$

(C) $\frac{1}{2}\left(\frac{F_1}{m_1} + \frac{F_2}{m_2}\right)$ (D) decided by the stiffness of the spring

6. Figure represents a painter in a crate which hangs alongside a building. When the painter of mass 100 kg pulls the rope, the force exerted by him on the floor of the crate is 450 N. If the weight of the crate is 25 kg, the acceleration of the painter will be : (Take g = 10 m/s^2)

(A) 1 m/s^2 (B) 2 m/s^2 (C) 3 m/s^2 (D) 4 m/s^2

Multiple Correct Answer Type 6 Q. [4 M (–2)]

7. Two masses of an Atwood machine are at rest on a tabletop. A small upward force F_p on the pulley keeps the string taut. Suppose that $m_2 > m_1$. Assume that the pulley itself has negligible mass. Mark the **CORRECT** statement(s) :-

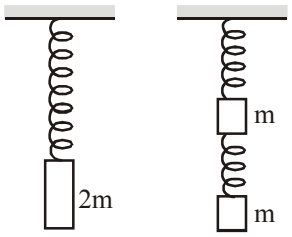
(A) if $|F_P| < 2m_1|g|$, the system remains at rest

(B) if $2m_1|g| < |F_p| < 2m_2|g|$, the pulley and m_1 move upward but m_2 stays on the table

(C) if $|F_P| > 2m_2|g|$, the whole system leaves the table.

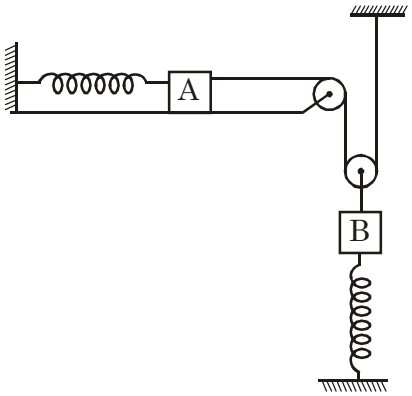
(D) if $m_1|g| < |F_p| < m_2|g|$, the pulley and m_1 move upward but m_2 stays on the table

8. A mass 2 m suspended from a given spring causes it to stretched relative to its relaxed length. The mass and the spring are then each cut into two identical pieces and connected as shown in figure.



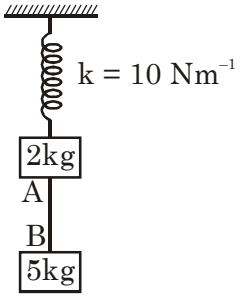
(A) Bottom of the lower mass is higher than bottom of the original mass
(B) Bottom of the lower mass is lower than bottom of the original mass
(C) Bottom of the lower mass is at the same level as the bottom of the original mass
(D) Spring constant of new springs obtained after cutting is double than the spring constant of original spring.

9. The system is released from rest with both the springs in unstretched position. Mass of each block is 1kg and force constant of each spring is 10 N/m. Assume pulleys and strings are massless and all contacts are smooth. ($g = 10\ m/s^2$). In equilibrium choose the incorrect options :-



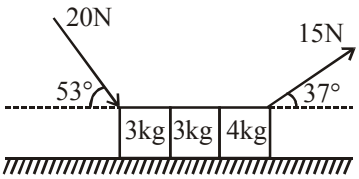
(A) Compression of vertical spring is 2/5 m and extension of horizontal spring is 4/5m
(B) Compression of vertical spring and extension of horizontal spring is 2/5 m
(C) Extension of horizontal spring is 1/5 m and compression in vertical spring is 2/5 m
(D) Compression of vertical spring is 1/5 m and extension of horizontal spring is 2/5 m

10. An ideal spring of spring constant K = 10 N/m is hung vertically by a rigid support. On the other end a system of masses 2kg & 5kg connected by a string AB is attached as shown in figure. The system is initially at rest. Now string AB is cut at t = 0 :-



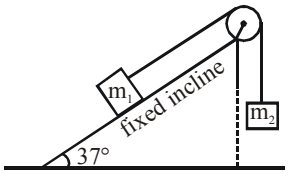
(A) Acceleration of 5kg block = 10 m/sec^2 (B) Acceleration of 5kg block = 0 m/sec^2
(C) Acceleration of 2kg block = 25 m/sec^2 (D) Acceleration of 2kg block = 0 m/sec^2

11. For the system shown below which of the statements is/are correct ?



(A) Net force on all the blocks is same
(B) Net force on 4 kg block is more than 3 kg block.
(C) Net force on both 3 kg blocks is same
(D) Normal force between 3 kg blocks is equal to normal force between 3 kg and 4 kg blocks.

12. All the surfaces are smooth and system released from rest then :-



(A) If $m_2 = \frac{m_1}{2}$, then m_1 will move down the plane

(B) If $m_2 = \frac{3}{4}m_1$, then m_1 will move up the plane

(C) if $m_1 = m_2$ then m_2 will move downwards

(D) for the system to be to rest $m_2 = \frac{3}{5}m_1$

Linked Comprehension Type (1 Para × 3Q.) [Marks 3 (0)]
(Single Correct Answer Type)

Paragraph for Question no 13 to 15

An inclined plane of angle of elevation 30° is placed in a lift which accelerates in vertical downward direction with 6 m/s^2 and an object of mass 4 kg is placed at the top of inclined plane. If object can slide on inclined plane without friction and released from rest with respect to lift then :

13. The trajectory of sliding object as seen from ground :-

(A) Must be parabola

(B) Must be straight line

(C) Either straight line or parabola depending upon initial velocity of lift

(D) May be circle

14. What is the force exerted by object on inclined plane:-

(A) 13.16 N (B) 14.25 N (C) 16.92 N (D) 14.5 N

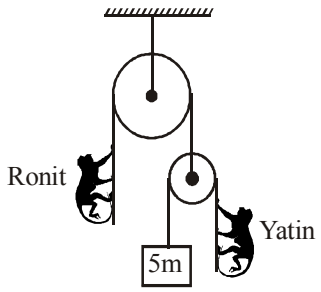
15. How much time does object take to arrive at the bottom of inclined plane if length of plane is 1.5 m :-

(A) 1.23 s (B) 1.85 s (C) 2s (D) 1s

SECTION-II

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

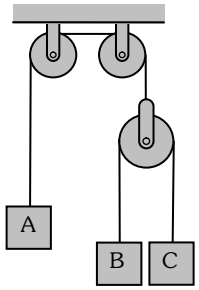
1. Two monkeys Ronit and Yatin of equal mass 'm' can climb strings of a pulley arrangement as shown in figure. Find magnitude of acceleration (in m/s^2) of Ronit with respect to rope so that block remains stationary. It is given that Yatin is just holding the string. Assume pulley is frictionless and string is massless and inextensible.



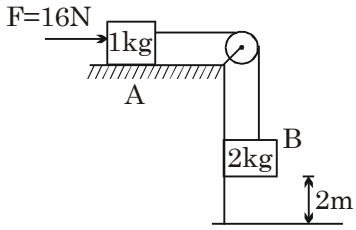
SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **2 Q. [4 M (0)]**

1. In the system shown, block A is of mass 4.0 kg and blocks B and C are of equal mass each of 3 kg. Find the acceleration in m/s^2 of block C, if the system is set free. [$g = 10\ m/s^2$]



2. The system shown in the diagram is released from rest. Treat string segments as long. Neglect friction everywhere. Pulley and string are massless. If the time in sec after which block B reaches ground is t. Fill the value of $10t^2$.



SECTION-IV

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

1. A man of mass 50 kg is hanging on a ladder of mass 10 kg. The ladder is hanging from the ceiling with help of a light rope. In first column of the following table are mentioned some situations and in the second column are mentioned values of tension in the rope in newtons. Suggest suitable matches. [$g = 10\ m/s^2$]

	Column-I		**Column-II**
(A)	The man is hanging standstill on the ladder.	(P)	540
(B)	The man is climbing the ladder with uniform speed.	(Q)	550
(C)	The man is climbing the ladder with acceleration 1 m/s^2.	(R)	600
(D)	The man is descending the ladder with acceleration 1 m/s^2.	(S)	650
		(T)	660

CLASS TEST # 19 **ANSWER KEY**

SECTION-I

Single Correct Answer Type **6 Q. [Marks 3 (–1)]**

1. Ans. (A) **2. Ans. (B)** **3. Ans. (A)** **4. Ans. (B)**
5. Ans. (A) **6. Ans. (B)**

Multiple Correct Answer Type **6 Q. [4 M (–2)]**

7. Ans. (A, B, C) **8. Ans. (A,D)** **9. Ans. (A, B, C)** **10. Ans. (A,C)**
11. Ans. (B,C) **12. Ans. (A, B, C, D)**

Linked Comprehension Type **(1 Para × 3Q.) [Marks 3 (0)]**
(Single Correct Answer Type)

13. Ans. (C) **14. Ans. (A)** **15. Ans. (A)**

SECTION-II

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

1. Ans. 110

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **2 Q. [4 M (0)]**

1. Ans. 2
2. Ans. 4

SECTION-IV

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

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