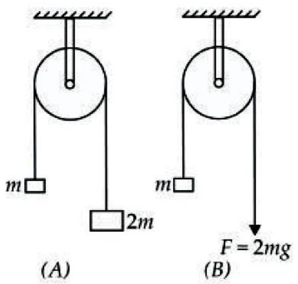
AVIRAL CLASSES
IIT-JEE | NEET | FOUNDATIONS

PHYSICS
CRASH COURSE

LECTURE - 07

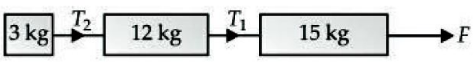
TOPICS : Laws of Motion

1. Two pulley arrangements (A) and (B) are as shown in the figure. Neglect the masses of the ropes and pulleys and the friction at the axle of the pulleys. The ratio of the acceleration of mass m in arrangement (A) to that in arrangement (B) is



(a) 1 : 1 (b) 1 : 2
(c) 1 : 3 (d) 2 : 15

2. If the surfaces shown in figure are frictionless, the ratio of T_1 and T_2 is



(a) $\sqrt{3}:2$ (b) $1:\sqrt{3}$
(c) 1 : 5 (d) 5 : 1

3. Which one of the following statements is not true about Newton's second law of motion $\vec{F} = m\vec{a}$?
(a) The second low of motion is consistent with the first law
(b) The second law of motion is a vector law
(c) The second law of motion is applicable to a single point particle
(d) The second law of motion is not a local law

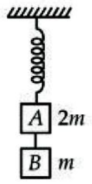
4. A body of mass 10 kg is acted upon by two perpendicular forces, 6 N and 8 N. The resultant acceleration of the body is
(a) 1 ms^{-2} at an angle of $\tan^{-1}\left(\frac{3}{4}\right)$ w.r.t 8 N force
(b) 0.2 ms^{-2} at an angle of $\tan^{-1}\left(\frac{3}{4}\right)$ w.r.t 8 N force
(c) 1 ms^{-2} at an angle of $\tan^{-1}\left(\frac{5}{4}\right)$ w.r.t 8 N force
(d) 0.2 ms^{-2} at an angle of $\tan^{-1}\left(\frac{5}{4}\right)$ w.r.t 8 N force

5. A circular racetrack of radius 300 m is banked at an angle of 15°. If the coefficient of friction between the wheels of a race car and the road is 0.2, what is the maximum permissible speed to avoid slipping ?
(Take tan 15° = 0.27)
(a) 18.2 ms^{-1} (b) 28.2 ms^{-1}
(c) 38.2 ms^{-1} (d) 48.2 ms^{-1}

6. A hockey player is moving northward and suddenly turns westward with the same speed to avoid an opponent. The force that acts on the players is
(a) frictional force along westward
(b) muscle force along southward
(c) frictional force along south-west
(d) muscle force along south-west

7. A boy of mass 30 kg starts running from rest along a circular path of radius 6 m with constant tangential acceleration of magnitude 2 ms^{-2}. After 2 s from start he feels that his shoes started slipping on ground. The friction between his shoes and ground is
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$
(c) $\frac{1}{4}$ (d) $\frac{1}{5}$

8. Two blocks A and B of masses 2 m and m, respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in the figure. The magnitudes of acceleration A and B immediately after the string is cut, are respectively



(a) $g, \frac{g}{2}$ (b) $\frac{g}{2}, g$

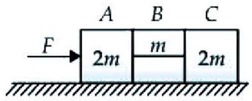
(c) g, g (d) $\frac{g}{2}, \frac{g}{2}$

9. A block of mass 10 kg is placed on rough horizontal surface whose coefficient of friction is 0.5. If a horizontal force of 100 N is applied on it, then acceleration of block will be [Take g = 10 ms^{-2}]

(a) 10 ms^{-2} (b) 5 ms^{-2}

(c) 15 ms^{-2} (d) 0.5 ms^{-2}

10. The system is pushed by a force F as shown in figure. All surfaces are smooth except between B and C. Friction coefficient between B and C is μ. Minimum value of F to prevent block B from downward slipping is



(a) $\left(\frac{3}{2\mu}\right)mg$

(b) $\left(\frac{5}{2\mu}\right)mg$

(c) $\left(\frac{5}{2}\right)\mu mg$

(d) $\left(\frac{3}{2}\right)\mu mg$