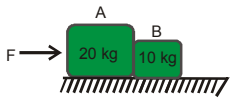
IIT PHYSICS CENTRE

BY D.B. Singh

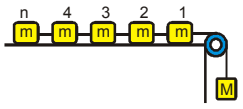
2-Ka-35, Vigyan Nagar, Kota. Phone No. (0744) 2428962, 977288 1234, 98285 35802
E-mail : dbsiit@gmail.com

1. Two bodies A and B of masses 20 kg and 10 kg respectively are placed in contact on a smooth horizontal surface (as shown in the figure) A force of 10 N is applied on either A or B in comfortable manner.Then the force F must be applied on:



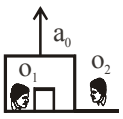
(A) A **(B)** B **(C)** either A or B **(D)** All

2. In the given arrangement, n number of equal masses are connected by strings of negligible masses. The tension in the string connected to n^{th} mass is:



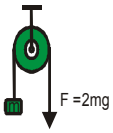
(A) $\frac{mMg}{nm+M}$ **(B)** $\frac{mMg}{nmM}$ **(C)** mg **(D)** mng

3. Observer O_1 is in a lift going upwards and O_2 is on the ground. Both apply Newton's law, and measure normal reaction on the body:



(A) the both measure the same value
(B) the both measure zero
(C) the both measure different value
(D) no sufficient data

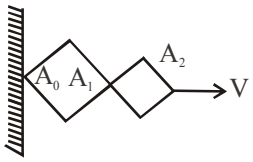
4. A pulley arrangement is shown in the figure. Pulley is frictionless and string is massless. What is the acceleration of mass m?



(A) 2g **(B)** g/2 **(C)** 3g **(D)** g.

5. In the arrangement shown in Figure, pulleys A and B are massless and the thread is inextensible. Mass of pulley C is equal to m. If friction in all the pulleys is negligible, then:
(A) tension in thread is equal to ½ mg.
(B) acceleration of pulley C is equal to g/2 (downward)
(C) acceleration of pulley A is equal to g (upward)
(D) acceleration of pulley A is equal to 2g (upward).

6. The given hing construction consists of two rhombus with the ratio 3 : 2. The vertex A_2 moves in the horizontal direction with a velocity v. The velocity A_1 is



(A) 0.6v **(B)** 0.7v **(C)** 3v **(D)** 2v

7. The acceleration a (in ms^{-2}) of a body, starting from rest varies with time t (in s) according to the relation $a = 3t + 4$. The velocity of the body at time t = 2s will be
(A) 10 ms^{-1} **(B)** 12 ms^{-1}
(C) 14 ms^{-1} **(D)** 16 ms^{-1}

8. The driver of a train A moving at a speed of 30 ms^{-1} sights another train B moving on the same track at a speed of 10 ms^{-1} in the same direction. He immediately applies brakes and achieves a uniform retardation of 2 ms^{-2}. To avoid collision, what must be the minimum distance between the trains?
(A) 80 m **(B)** 100 m
(C) 120 m **(D)** 140 m