Dear student following is a Moderate level [O O ● O O] test paper. Score of 15 Marks in 10 Minutes would be a satisfactory performance. Questions 1-8 (+3, –1). (All Questions have Single Options correct)

Q.1 A body is in equilibrium under the action of three forces $\vec{F}_1 + \vec{F}_2$ and $\vec{F}_3$. Which of the following statement is wrong ?

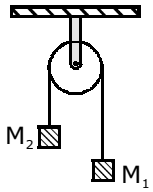
(A) $\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = 0$

(B) $\vec{F}_1, \vec{F}_2, \vec{F}_3$ can be represented by the three sides of a triangle taken in order.

(C) $F_1 + F_2 + F_3 = 0$

(D) None of the above

Q.2 Two masses M_1 and M_2 are attached to a string, which passes over a frictionless fixed pulley as shown in the fig. Given that M_1 = 10 kg, M_2 = 6 kg and g = 10 ms^{-2}.



What is the acceleration of the masses ?

(A) 40 ms^{-2} (B) 20 ms^{-2}

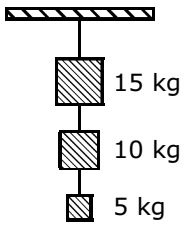
(C) 5 ms^{-2} (D) 2.5 ms^{-2}

Q.3 A rain drop of mass 0.1 g is falling with uniform speed of 10 cms^{-1}. What is the net weight of the drop ?

(A) Zero (B) 2×10^{-3} N

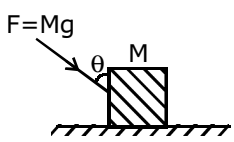
(C) 10^{-3} N (D) 10^{-2} N

Q.4 Three masses of 15 kg, 10 kg and 5 kg are suspended vertically as shown in the figure. If the string attached to the support breaks and the system falls freely, what will be the tension in the string between 10 kg and 5 kg masses ? Take g = 10 ms^{-2}. It is assumed that the string remains tight during the motion.



(A) 300 N (B) 250 N (C) 50 N (D) Zero

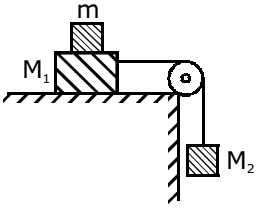
Q.5 A block of mass M is placed on a rough horizontal surface. as shown in the figure. A force F = Mg acts on the block. It is inclined to the vertical at an angle θ. The coefficient of friction is μ. The block can be pushed along the surface only when :



(A) $\tan\theta \geq \mu$ (B) $\cot\theta \geq \mu$

(C) $\tan\theta/2 \geq \mu$ (D) $\cot\theta/2 \geq \mu$

Q.6 Two blocks of mass M_1 and M_2 connected with a string passing over a pulley as shown in the fig. The block M_1 lies on a horizontal surface. The coefficient of friction between the block M and horizontal surface is μ. The system accelerates. What additional mass m should be placed on the block M_1 so that the system does not acceleration



(A) $\frac{M_2 - M_1}{\mu}$ (B) $\frac{M_2}{\mu} - M_1$

(C) $M_2 - \frac{M_1}{\mu}$ (D) $(M_2 - M_1)\mu$

Q.7 Lubrication reduces friction because :

(A) lubricant molecules act as ball bearings

(B) laws of limiting friction are not applicable

(C) the relative motion is between solid and liquid

(D) none of the above reasons

Q.8 The fast moving vehicles are given special shapes (streamlined) to reduce :

(A) limiting friction (B) static friction

(C) dry friction (D) wet friction

PHYSICS IIT JEE (JULY 2nd WEEK CLASS TEST 1) (NLM & FRICTION) ANSWER KEY

Name : ..... **Roll No. :** .....

	A	B	C	D		A	B	C	D		A	B	C	D
1	○	○	○	○	4	○	○	○	○	7	○	○	○	○
2	○	○	○	○	5	○	○	○	○	8	○	○	○	○
3	○	○	○	○	6	○	○	○	○					

ANSWER KEY

Que.	1	2	3	4	5	6	7	8
Ans.	C	D	C	D	C	B	C	D

SOLUTIONS

Sol.1 (C)

Sum of magnitudes of forces is not zero.

Sol.2 (D)

Sol.3 (C)

Since the drop is falling with uniform speed, the weight of the drop is unchanged. That is weight (0.1×10^{-3})kg $\times$ 10 $ms^{-2} = 10^{-3}$ N

Sol.4 (D)

The tension in the string will be equal to the effective weight of 5 kg mass. When the system falls freely, the effective weight is zero.

Sol.5 (C)

The vertical component of the force increases the normal reaction. Hence

$Mg \sin\theta \geq \mu (Mg + Mg \cos\theta)$,

which gives $\tan\theta / 2 \geq \mu$.

Sol.6 (B)

The motion will stop when the force of friction is equal to the weight of M_2. That is, when $M_2 g = \mu(M_1 + m)g$.

Sol.7 (C)

Wet friction is smaller than the dry friction.

Sol.8 (D)

Friction between fluid (air) and solid is called wet friction.