

Dear student following is a Moderate level [00●00] test paper. Score of 15 Marks in 10 Minutes would be a satisfactory performance. Questions 1-9 (+3, -1). (All Questions have Single Options correct)

Q.1 When a constant force is applied to a body, it moves with uniform :
 (A) Acceleration (B) Velocity
 (C) Speed (D) Momentum

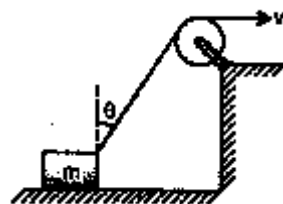
Q.2 Passengers standing in a bus are thrown outwards when the bus takes a sudden turn. This happens because of :
 (A) Out ward pull on them (B) impulse
 (C) Change in momentum
 (D) Change in acceleration

Q.3 A body is under the action of three forces \vec{F}_1 , \vec{F}_2 and \vec{F}_3 . In which case the body cannot undergo angular acceleration ?
 (A) \vec{F}_1 , \vec{F}_2 and \vec{F}_3 are concurrent
 (B) $\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = 0$
 (C) $\vec{F}_1 + \vec{F}_2$ is parallel to \vec{F}_3 but the three forces are not concurrent
 (D) \vec{F}_1 and \vec{F}_2 act at the same point but \vec{F}_3 acts at different point.

Q.4 A scooter of mass 120 kg is moving with a uniform velocity of 108 km/h. The force required to stop the vehicle in 10 sec. is
 (A) 360 N (B) 720 N
 (C) 180 N (D) 20×10.8 N

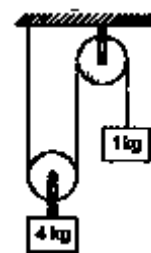
Q.5 A passenger train is running on a railway track with a speed v_1 . While driving, the driver discovers that another goods train is travelling in front of the passenger train with a speed v_2 ($v_1 > v_2$). Its retardation after applying brakes is 'a'. The least distance the passenger train must travel to avoid collision with goods. train is
 (A) $\frac{v_1^2 - v_2^2}{2a}$ (B) $\frac{v_2 - v_1}{a}$
 (C) $\frac{v_2 + v_1}{2a}$ (D) $\frac{v_2^2 + v_1^2}{2a}$

Q.6 A block is dragged on a smooth plane with the help of a rope which moves with a velocity v as shown in fig. The horizontal velocity of the block is :



- (A) v (B) $\frac{v}{\sin \theta}$
 (C) $v \sin \theta$ (D) $\frac{v}{\cos \theta}$

Q.7 In the system shown in the adjoining fig. the acceleration of the 1 kg mass is :
 (A) $g/4$ downwards
 (B) $g/4$ upwards
 (C) $g/2$ downwards
 (D) $g/2$ upwards



The following questions consist of two statements one labelled Assertion (A) and the another labelled Reason (R). Select the correct answers to these questions from the codes given below :

- (A) Both A and R are true and R is the correct explanation of A.
 (B) Both A and R are true but R is not correct explanation of A
 (C) A is true but R is false
 (D) A is false but R is true.

Q.8 Assertion : Newton's second law of motion gives the measurement of force.
Reason : According to Newton's second law of motion, force is directly proportional to the rate of change of momentum.

Q.9 Assertion : Aeroplanes always fly at low altitudes.
Reason : According to Newton's third law of motion, for every action there is an equal and opposite reaction.

PHYSICS IIT JEE (JUNE 5th WEEK CLASS TEST 4) (NLM) ANSWER KEY

Name : Roll No. :

	A	B	C	D		A	B	C	D		A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ANSWER KEY

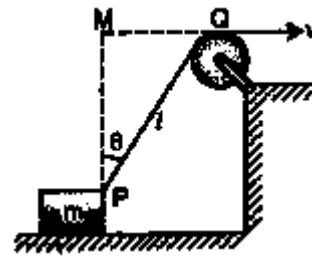
Que.	1	2	3	4	5	6	7	8	9
Ans.	A	B	A	A	A	B	D	A	A

SOLUTIONS

Sol.1 (A)

Sol.2 (B)

Due to law of inertia, the upper part of the body continues moving in the direction of initial velocity while lower part comes in motion along the direction of new velocity.



Sol.3 (A)

If the force applied to a body are such that their lines of action meet at a single point, then these force are called concurrent forces. it is thus evident that concurrent forces cannot produce a torque and the body therefore cannot undergo angular acceleration.

Sol.4 (A)

Here, $u = 108 \text{ km/h} = 30 \text{ m/s}$; $v = 0$
 $t = 10 \text{ s}$; $a = ?$

$$\text{As } a = \frac{v - u}{t} = \frac{0 - 30}{10} = -3 \text{ m/s}^2$$

$$F = ma = 120 \times 3 = 360 \text{ N.}$$

Sol.5 (A)

Here, initial velocity of passenger train $u = v_1$

Final velocity $v = v_2$, $a = -a$, distance $s = ?$

$$\text{As } v^2 = u^2 + 2as, \text{ so } v_2^2 = v_1^2 + 2(-a)s$$

$$\text{or } s = (v_1^2 - v_2^2) / 2a.$$

Sol.6 (B)

Here θ and the length PQ vary with time. Let $PQ = \ell$ at any instant.

$$PM = \ell \cos\theta,$$

$$MQ = \ell \sin\theta$$

$$V = \frac{d\ell}{dt} \text{ (given)}$$

As the block does not move vertically,

$$\frac{d}{dt} (\ell \cos\theta) = 0$$

$$\text{Further } \frac{d}{dt} (MQ) = \text{required velocity}$$

$$\text{or } \frac{d}{dt} (\ell \sin\theta) = v \text{ (say)}$$

Solving these equations, we get

$$V = \frac{v}{\sin\theta}$$

Sol.7 (D)

Suppose a be the downward acceleration of the 4 kg mass. therefore, $2a$ is the upward acceleration of the 1 kg mass. Hence, equations of motion are :

$$1 \times 2a = T - 1g \quad \dots (1)$$

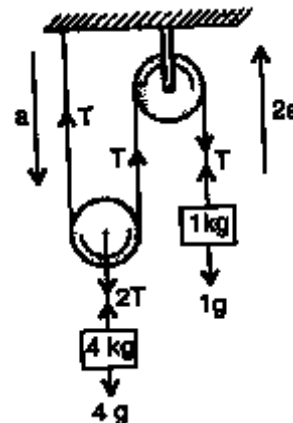
$$4a = 4g - 2T \quad \dots(2)$$

Adding after multiplying the 1st equation by 2,

$$8a = 2g \text{ or } a = \frac{2g}{8} = \frac{g}{4} \text{ or } 2a = \frac{g}{2}$$

Thus, the acceleration of the mass

1 kg is $\frac{g}{2}$ upwards.



Sol.8 (A)

$$\text{According to second law } F = \frac{dp}{dt} = ma.$$

If we know the values of m and a , the force acting on the body can be calculated and hence second law gives that how much force is applied on the body.

Sol.9 (A)

The wings of the aeroplane pushes the external air backward and the aeroplane move forward by reaction of pushed air. At low altitudes. Density of air is high and so the aeroplane gets sufficient force to move forward.