Chapter 6

Newton's Laws of Motion

Exercise

WORKSHEET

Second Law of Motion

Q.1 A Force F_1 accelerates a particle from rest to a velocity v. Another force F2 decelerates the same particle from v to rest, then

(A) |F₁| Is always equal to |F₂|
(B)|F₂|Is greater than to |F₁|
(C)|F₂|May be smaller than, greater than equal to |F₁|

 $(\mathbf{D})|\mathbf{F}_2|$ Cannot be equal to $|\mathbf{F}_1|$

Net Force

Q.2 Three forces $\vec{F}_1 = (2\hat{\imath} + 4\hat{\jmath}) N$; $\vec{F}_2 = (2\hat{\jmath} - \hat{k}) N$ and $\vec{F}_3 = (\hat{k} - 4\hat{\imath} - 2\hat{\jmath}) N$ are applied on an object of mass 1 kg at rest at origin. The position of the object at t = 2 s will be (A)(-2 m, -6 m) (B) (-4 m, 8 m) (C) (3 m, 6 m) (D) (2 m, -3 m)

Net Force

Q.3 Five persons A, B, C, D and E are pulling a cart of mass 100 kg on a smooth surface and cart is moving with acceleration 3 m/s^2 in east direction. When person A stops pulling, it moves with acceleration 1 m/s^2 in the west direction. When person B stops pulling, it moves with acceleration 24 m/s^2 in the north direction. The magnitude of acceleration of the cart when only A and B pull the cart keeping their directions same as the old directions, is

(A) 24 m/s^2 (B) $3\sqrt{71} \text{ m/s}^2$ (C) 30 m/s^2 (D) 25 m/s^2

Net Force

Q.4 The force - time $(\mathbf{F} - \mathbf{t})$ curve of a particle executing linear motion is as shown in the figure. The momentum acquired by the particle in the time interval from **0** to **8 second** will be (Assume given graph to be cosine curve)



Tension in a String

Q.5 Two blocks of mass $M_1 = 20 \text{ kg}$ and $M_2 = 12 \text{ kg}$ are connected by a metal rod of mass8 kg. The system is pulled vertically up by applying a force of 480 N as shown. The tension at the mid-point of the rod is (Taking $g = 10 \text{ m/s}^2$)



Tension in a String

Q.6 A **10 kg** monkey is climbing a massless rope attached to a **15 kg** mass over a smooth tree limb. The mass is lying on the ground. In order to raise the mass from the ground he must climb with

(A)aacceleration is greater than 5 m/s^2

(B)a acceleration is greater than 2.5 $\rm m/s^2$

(C)high speed

(**D**)aacceleration is greater than 10 m/s^2

Tension in a String

Q.7 Three equal weights **A**, **B** and **C** of mass **2** kg each are hanging on a string passing over a fixed frictionless pulley as shown in the figure. The tension in the string connecting weights **B** and **C** is



Tension in a String

Q.8 In the figure shown, a person wants to raise a block lying on the ground to a height**h**. In both the cases if time required is same then in which case he has to exert more force. Assume pulleys and strings are light



Normal Force

Q.9 A block of mass **m** is placed on a smooth wedge of inclination**θ**. The whole system is accelerated horizontally so that the block does not slip on the wedge. The force exerted by the wedge on the block (**g** is acceleration due to gravity) will be

(A) mg cos θ	(B) mg sin θ	(C) mg	$(\mathbf{D}) \frac{\mathrm{mg}}{\cos\theta}$
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Instantaneous Force and Impulse

Q.10 A bullet is fired from a gun. The force on the bullet is given by $F = 600 - 2 \times 10^5 t$, where F is in newton's and t in **seconds**. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet.

(A) 9 Ns (B) Zero (C) 0.9 NS (D) 1.8 NS

ANSWER KEY

WORK SHEET										
Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(B)	(D)	(D)	(D)	(A)	(B)	(A)	(D)	(C)