

**BCM SCHOOL, BASANT AVENUE, DUGRI ROAD,  
LUDHIANA**

**ASSIGNMENT**

**CLASS XI**

**SUBJECT – PHYSICS**

**CHAPTER – LAWS OF MOTION**

**DATE: AUG 23, 2023**

### CASE STUDY BASED QUESTIONS

**Q1.** A person weighing 60 kg is standing on a platform scale balance kept on the floor of an elevator cab. The elevator cab is capable of motion in up or down direction with either a uniform velocity or a constant acceleration. The value of velocity as well as acceleration may be adjusted at any suitable value. Newton's second law of motion can be applied for the motion of elevator cab.

- (i) The observed weight a person in an elevator is -
- (a) remains same and is equal to actual weight
  - (b) always increases
  - (c) always decreases
  - (d) Increases or decreases depending upon motion of elevator
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- (ii) Find the observed weight of the person as recorded by the balance when, the elevator cab is moving upward with a constant velocity of 2 m/s.
- (a) 0 N            (b) 30 gN            (c) 60 gN            (d) 90 gN
- (iii) The elevator cab is in an accelerated motion in vertical downward direction, with an acceleration of  $g/4$
- (a) 0 N            (b) 45 gN            (c) 90 gN            (d) 60 gN
- (iv) The elevator cab starts falling downward freely due to some mechanical failure in its control system.
- (a) 0 N            (b) 75 gN            (c) 120 gN            (d) 90 gN
- (v) The elevator cab is accelerating uniformly in upward directions with uniform acceleration of  $g/2$ .
- (a) 0 N            (b) 120 gN            (c) 30 gN            (d) 90 gN

**Q2.** When two bodies are in contact, each experiences a contact force by the other. The component of the contact force parallel to the surfaces in contact, which opposes impending or actual relative motion between the two bodies in contact is opposed by static friction. Kinetic friction opposes actual relative motion between two bodies in contact.

There is a yet another type of friction which opposes rolling motion of one body over the surface of another body. It is called rolling friction.

We often regard friction as something undesirable. However in many practical situations friction is critically needed.

- (i) What is the direction of friction?
- Friction always acts tangential to the surface in contact.
  - Friction acts normal to the surface in contact.
  - Direction depends upon weight of body which moves over surface of another body.
  - None of these.
- (ii) Which one of the statement is not correct about friction?
- friction is an self adjusting force.
  - force of friction is independent of area of contact as long as normal reaction remains same.
  - sliding friction is greater than static friction.
  - limiting friction is the maximum static friction.
- (iii) An automobile is moving on a horizontal road with a speed  $V$ . If the

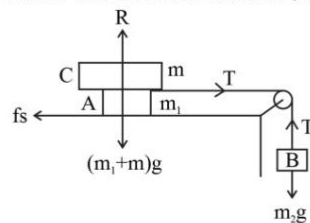
coefficient of friction between the tyres and the road is  $\mu$ . What is the shortest distance in which the automobile can be stopped?

- (a)  $\frac{v^2}{\mu g}$       (b)  $\frac{2v^2}{\mu g}$       (c)  $\frac{v^2}{4\mu g}$       (d)  $\frac{v^2}{2\mu g}$

(iv) What will be the maximum acceleration of the train in which a box lying on the floor will remain stationary? Given that the coefficient of friction between the box and trains floor is 0.15. ( $g= 10\text{m/s}^2$ ).

- (a)  $2 \text{ m/s}^2$       (b)  $2.5 \text{ m/s}^2$       (c)  $1 \text{ m/s}^2$       (d)  $1.5 \text{ m/s}^2$

(v) In figure, the masses of blocks A & B are 10 kg and 5 kg. Calculate the minimum mass of C which may stop A from slipping. Coefficient of friction between block A and table is 0.2.



- (a) 5 kg      (b) 15 kg      (c) 25 kg      (d) 35 kg