QUESTION 1: A pendulum of length 1m and period 2.01s is placed at the top of Mount Everest having an altitude of 8849m. Calculate the value of 'g' at that point.

Answer: l = 1m T = 2.01s g =?

Formula: $T = 2\pi \sqrt{(l/g)}$

$2.01 = 2\pi \sqrt{(1/g)}$

Squaring and re-arranging gives value of $g = 9.76\ m/s^2$

Question 2 : If the concave mirror produces a real image of an object, will the image be necessarily inverted?

Answer: A concave mirror always produces real and inverted images of those objects that are placed beyond the principal focus. However, if an object lies within the principal focus of the mirror, its image will be virtual and erect. Therefore, a real image will necessarily be inverted.

Question 3 : Is the restoring force on a mass attached to a spring in SHM ever zero? If so, where?

Answer: A restoring force always pushes or pulls the object performing oscillatory motion towards the mean position.

Suppose the mass attached to a spring is pulled up to extreme position A and then released. The maximum restoring force exerted by the spring on the mass will pull it towards the mean position O. The mass moves back towards the mean position O. The magnitude of the restoring force decreases with the distance from the mean position and becomes zero at O. So, at the mean position of SHM, the restoring force will be zero.

Question 4: How can a body be negatively charged by electrostatic induction?

Answer: Fix the object to be charged on an insulated stand. Bring a positively charged rod near the insulated object. The rod will attract negative charges towards it and repel positive charges away from it. Now, earth the object by a conducting wire while the rod is still near it. If we first break the earth connection and then remove the rod, negative charges are uniformly distributed over the surface of the object. By using this process of electrostatic induction, we get a negatively charged object.

Question 5: Does increase the frequency of a wave also increase its wavelength? If not, how are these quantities related?

Answer: No, wavelength does not increase with an increase in the frequency of waves because frequency depends upon the source that produces waves per second. The wavelength of the wave depends on the magnitude of vibrating particles. Frequency (f) and wavelength (λ) are inversely related to each other by the following equation:

$\lambda = V / f$

Hence, from this equation, we conclude that when the frequency (f) of waves increases, their wavelength (λ) decreases.

Question 6: Will two wires carrying current in the same direction repel or attract each other? Give reason.

Answer: Two wires carrying current in the same direction attract each other. The current in each wire generates a magnetic field around each wire. In the center, the magnetic fields tend to cancel each other as they are oppositely oriented, creating a weak field region. On the other sides of the wire, the field is strong. So, a force is exerted towards the weaker region, hence they attract each other.

Question 7: Write down differences between conductors and insulators.

Answer:

Conductors:

1. They are good conductors of electricity and offer less resistance to the flow of current.
2. They have a large number of free electrons moving randomly in all directions.
3. Metals like silver and copper are good conductors.

Insulators:

1. Current cannot flow through an insulator because they have a very large value of resistance.
2. There are no free electrons for the flow of current, and the induced charge remains static on their surface.
3. Examples of insulators are glass, wood, plastic, fur, silk, etc.