Class 09 - Science
NLM

Maximum Marks: 30   **Time Allowed: 1 hour and 30 minutes**

Section A

1. Why does a mug full of water feel lighter inside water?   **1**

2. Name the physical quantity that corresponds to the rate of change of momentum.   **1**

3. Write the C.G.S unit of force.   **1**

4. State Newton's first law of motion.   **1**

5. Write the SI unit of impulse.   **1**

6. Two balls of the same size of different materials, rubber and iron are kept on the smooth floor of a moving train. The brakes are applied suddenly to stop the train. Will the balls start rolling? If so, in which direction? Will they move with the same speed? Give reasons for your answer.   **2**

7. Two objects each of mass 1.5 kg, are moving in the same straight line but in opposite directions. The velocity of each object is 2.5 ms^{-1} before the collision during which they stick together. What will be the velocity of the combined object after collision?   **2**

8. A bullet of mass 10 g is fired with a rifle. The bullet takes 0.003 s to move through its barrel and leaves with a velocity of 300 ms^{-1}. What is the force exerted on the bullet by the rifle?   **2**

9. A bullet of mass 20 g is horizontally fired with a horizontal velocity 150 ms^{-1} from a pistol of mass 2 kg. What is the recoil velocity of the pistol?   **2**

10. Why does a cricket player move his hands backward while catching the ball?   **2**

11. It is required to increase the velocity of a scooter of mass 80 kg from 5 to 25 ms^{-1} in 2 second. Calculate the force required.   **2**

12. Two blocks made of different metals identicals in shape and sizes are acted upon by equal forces which cause them to slide on a horizontal surface. The acceleration of the second block is found to be 5 times that of the first. What is the ratio of the mass of the second to the first? **2**

13. Why it is advised to tie any luggage kept on the roof of a bus with a rope? **2**

14. A hammer of mass 500g, moving at 50 ms^{-1}, strikes a nail. The nail stops the hammer in a very short time of 0.01s. What is the force of the nail on the hammer? **2**

15. Explain why some of the leaves may fall from a tree, if we vigorously shake its branch. **2**

16. A 8000 kg engine pulls a train of 5 wagons, each of 2000 kg, along a horizontal track. If the engine exerts a force of 40000 N and the track offers a frictional force of 5000 N, then calculate: **5**
    (a) the net accelerating force;
    (b) the acceleration of the train; and
    (c) the force of wagon 1 on wagon 2.