**Section – A**

1. **Choose the correct answer: (answer any 14) 14 x 1 = 14**
2. Which of the following has the smallest mass?  
    a) 2 g of He  
    b) 6.023 × 10²³ atoms of He  
    c) 1 mole atoms of He  
    d) 1 atom of He
3. One kilogram force equals to  
    a) 980 dyne  
    b) 9.8 × 10⁴ N  
    c) 9.8 dyne  
    d) 98 × 10⁴ dyne
4. Newton’s III law is applicable  
    a) only for bodies with equal masses  
    b) both a & b  
    c) for a body at rest  
    d) for a body in motion
5. In the nucleus of ²⁰Ca⁴⁰, there are  
    a) 40 protons and 20 electrons  
    b) 20 protons and 40 electrons  
    c) 20 protons and 20 neutrons  
    d) 20 protons and 40 neutrons
6. Plotting a graph for momentum on Y-axis and time on X-axis, the slope gives  
    a) Force  
    b) Impulsive force  
    c) Rate of force  
    d) Acceleration
7. 1 mole of any substance contains  
    a) 6.023 × 10⁻²³  
    b) 3.0115 × 10²³  
    c) 6.023 × 10²³  
    d) 12.046 × 10²³
8. Impulse is equal to  
    a) rate of force and time  
    b) rate of change of mass  
    c) rate of change of momentum  
    d) change of momentum
9. The mass of a body is measured on Earth as M kg. When taken to a planet with half the Earth’s radius, its mass will be  
    a) 2M  
    b) 4M  
    c) M/4  
    d) M
10. The body of leech has  
     a) 33 segments  
     b) 23 segments  
     c) 30 segments  
     d) 38 segments
11. Which of the following is a triatomic molecule?  
     a) Hydrogen  
     b) Carbon dioxide  
     c) Glucose  
     d) Helium
12. The brain of leech lies above the  
     a) Crop  
     b) Buccal cavity  
     c) Mouth  
     d) Pharynx
13. Inertia of a body depends on  
     a) acceleration due to gravity of the planet  
     b) Both a & b  
     c) weight of the object  
     d) mass of the object
14. Mammals are \_\_\_\_\_\_\_\_\_\_ animals.  
     a) Poikilothermic  
     b) Warm blooded  
     c) All the above  
     d) Cold blooded
15. Mass of 1 mole of Nitrogen atom is  
     a) 28 amu  
     b) 14 amu  
     c) 28 g  
     d) 14 g
16. Which of the following represents 1 amu?  
     a) 1/12th of the mass of a C–12 atom  
     b) Mass of O–16 atom  
     c) Mass of a hydrogen atom  
     d) Mass of a C–12 atom
17. The unit of ‘g’ is m/s². It can also be expressed as  
     a) cm/s  
     b) cm²/s²  
     c) N/kg  
     d) Nm²/kg

**Section – B**

1. **Answer the Following Questions (Any 14): 2 x 14 = 28**
2. Define inertia. Give its classification.
3. Classify the types of force based on their application.
4. While catching a cricket ball, the fielder lowers his hands backward. Why?
5. Define moment of a couple.
6. How does an astronaut float in a space shuttle?
7. Define: Relative atomic mass.
8. Write the different types of isotopes of oxygen and their percentage abundance.
9. Define: Atomicity.
10. Give any two examples of heterodiatomic molecules.
11. What is molar volume of a gas?
12. Find the percentage of nitrogen in ammonia.
13. Why are the rings of cartilages found in the trachea of a rabbit?
14. List out the parasitic adaptations in leech.
15. State Newton’s second law.
16. Why is a spanner with a long handle preferred to tighten screws in heavy vehicles?
17. If 5 N and 15 N forces are acting opposite to one another, find the resultant force and mention its direction.

**Section – C**

1. **Answer in detail (Any 7): 3 x 7 = 21**
2. **Describe rocket propulsion.**
3. **Calculate the number of water molecules present in one drop of water which weighs 0.18 g.**
4. **How does locomotion take place in leech?**
5. **Give the salient features of Modern Atomic Theory.**
6. **Derive the relationship between Relative Molecular Mass and Vapour Density.**
7. **State and prove the law of conservation of linear momentum.**
8. **What are the types of inertia? Give an example for each type.**
9. **How is the circulatory system designed in leech to compensate for the heart structure?**
10. **N₂ + 3 H₂ → 2 NH₃**  
    (The atomic mass of nitrogen is 14, and that of hydrogen is 1)  
    → 1 mole of nitrogen (\_\_\_\_\_\_\_g) + 3 moles of hydrogen ( \_\_\_\_\_\_\_\_\_ g) → 2 moles of ammonia ( \_\_\_\_\_\_\_\_\_ g)

**Section – D**

1. **Answer in detail (Any 2): 2 x 7 = 12**
2. A ball of mass 1 kg moving with a speed of 10 ms-1 rebounds after a perfect elastic collision with the floor. Calculate the change in linear momentum of the ball.
3. Calculate the % relative abundance of B -10 and B -11, if its average atomic mass is 10.804 amu.
4. Answer the all question:
5. Give the common name of the Hirudinaria granulosa.
6. 2. How does leech respire?
7. Write the dental formula of rabbit.