SECTION A (15 Marks)

1. Multiple Choice Questions

i. B – The study of matter, energy, and their interactions
ii. C – Vernier caliper
iii. B – Newton
iv. B – 3 g/cm³
v. C – Elastic
vi. B – Force ÷ area
vii. A – 2 m/s²
viii. B – Force is applied and displacement occurs
ix. C – Its density is less than that of water
x. C – Rigidity

2. Matching Items

i. Force → C (A push or pull that changes the state of motion of a body)
ii. Density → D (The mass of a substance per unit volume)
iii. Work → A (The product of force and distance moved in the direction of force)
iv. Pressure → B (The force per unit area exerted on a surface)
v. Power → E (The rate of doing work)

SECTION B (70 Marks)

3.

(a) Physics is the branch of science that deals with the study of **matter, energy, and their interactions**.

(b) Three branches of Physics:

1. **Mechanics** – Study of motion and forces. Example: Motion of a car.
2. **Thermodynamics** – Study of heat and temperature. Example: Heat transfer in water.
3. **Optics** – Study of light and its behaviour. Example: Reflection in mirrors.

(c) Contributions of Physics to society:

1. Development of electricity and electrical appliances.
2. Improved transportation through engines and vehicles.
3. Communication technologies such as radios, mobile phones, and the internet.

4.

(a) Measurement is the **process of determining the size, quantity, or extent of a physical quantity using standard units**.

(b) Four fundamental physical quantities and SI units:

1. Length – metre (m)
2. Mass – kilogram (kg)
3. Time – second (s)
4. Temperature – kelvin (K)

(c) Measuring instruments and uses:

1. **Meter rule** – Measuring length
2. **Beam balance** – Measuring mass
3. **Stopwatch** – Measuring time

5.

(a) Force is a **push or pull that can change the state of motion of a body**.

(b) Three effects of force:

1. **Change in shape** – Stretching a spring.
2. **Change in speed** – Pushing a stationary ball to make it move.
3. **Change in direction** – Hitting a moving ball to alter its path.

(c) Newton's First Law: A body continues in its state of rest or uniform motion unless acted upon by an external force.
Example: A ball on the floor remains still until kicked.

6.

(a) Density = mass ÷ volume; Relative density = density of substance ÷ density of water.

(b) Density = 800 g ÷ 200 cm^3 = 4 g/cm^3

(c) Two ways to determine density of irregular solids:

1. **Water displacement method** – Measure volume of water displaced by the solid.
2. **Using a balance and graduated cylinder** – Find mass and volume, then divide mass by volume.

7.

(a) Mechanical properties:
i. **Elasticity** – Ability of a material to return to its original shape after deformation.
ii. **Plasticity** – Ability to retain deformed shape permanently.
iii. **Brittleness** – Tendency of a material to break without significant deformation.

(b) Application of elasticity in real life:

- Springs in mattresses and vehicles.
- Rubber bands for holding objects.

8.

(a) Pressure = force ÷ area; SI unit = Pascal (Pa)

(b) Pressure in liquids increases with depth because **the weight of the liquid above increases with depth**, exerting more force per unit area.

(c) Applications of pressure:

1. Hydraulic brakes in vehicles.
2. Ice skates concentrating weight on small area for cutting ice.

9.

(a) Linear motion is motion along a straight line.

(b) Quantities describing linear motion:

1. Displacement – metre (m)
2. Velocity – metre per second (m/s)
3. Acceleration – metre per second squared (m/s^2)

(c) Acceleration = (final velocity − initial velocity) ÷ time = (25 − 0) ÷ 5 = 5 m/s^2

10.

(a) Definitions:

- **Work** – Product of force and displacement in the direction of force.
- **Energy** – Capacity to do work.
- **Power** – Rate of doing work.

(b) Work done = Force × Distance = 40 × 2 = 80 J

Power = Work ÷ time = 80 ÷ 4 = 20 W

(c) Differences between potential and kinetic energy:

1. Potential energy is stored energy; kinetic energy is energy of motion.
2. Potential energy depends on position; kinetic energy depends on speed.

11.

(a) Archimedes' Principle: A body submerged in a fluid experiences an **upthrust equal to the weight of the fluid displaced**.

(b) A steel ship floats because it **displaces water equal to its weight** and the density of the ship as a whole (hollow structure) is less than water.

(c) Factors that determine floating or sinking:

1. Density of the body relative to the fluid.
2. Volume of fluid displaced.

SECTION C (15 Marks)

12. Essay: "The Role of Physics in Understanding the Physical World"

(a) **Meaning of Physics**: Physics is the study of matter, energy, and their interactions.

(b) **Importance of measurement**: Accurate measurements are essential for experiments, predicting outcomes, and standardization in science.

(c) **Applications in daily life**:

1. Designing safe buildings using principles of mechanics.
2. Using electricity to power homes and devices.
3. Transportation and navigation using motion and forces.

(d) **Challenges in studying Physics**:

- Requires good mathematical skills.
- Experiments may be costly or require sophisticated apparatus.
- Some concepts are abstract and difficult to visualize.

(e) **Conclusion**: Physics helps us understand natural phenomena, solve practical problems, and improve technology, making it essential for scientific and societal development.

✅ **END OF ANSWERS**