

Physics 9 Paper Pattern

| Q 1 Consist of 12 MCQs | Unit No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------------------------------------|---|-------------------------------------|---|---|-------------------------------------|---|---|-------------------------------------|---|---|
| | No of MCQs in paper | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 |
| Part II consist of three questions | | Q 2: 5 out of 8 SQ will be answered | | | Q 3: 5 out of 8 SQ will be answered | | | Q 4: 5 out of 8 SQ will be answered | | |
| | No of Short Question asked from each unit | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| Part III Long Questions | 2 LQ out of 3 LQ will be answered | 1 detail Question from Unit 1, 2, 3 | | | 1 detail Question from Unit 1, 2, 3 | | | 1 detail Question from Unit 1, 2, 3 | | |

1 MCQs from Unit 1

1. Tick the correct answer.

- The instrument that is most suitable for measuring the thickness of a few sheets of cardboard is a:
(a) metre rule (b) measuring tape (c) Vernier callipers (d) micrometer screw gauge
- One femtometre is equal to:
(a) 10^9 m (b) 10^{15} m (c) 10^9 m (d) 10^{15} m
- Which one is a non-physical quantity?
(a) distance (b) density (c) colour (d) temperature
- When using a measuring cylinder, one precaution to take is to:
(a) check for the zero error
(b) look at the meniscus from below the level of the water surface
(c) take several readings by looking from more than one direction
(d) position the eye in line with the bottom of the meniscus
- A displacement can is used to measure:
(a) mass of a liquid (b) mass of solid (c) volume of liquid (d) volume of solid
- Four students measure the diameter of a cylinder with Vernier callipers. Which of the following readings is correct?
(a) 3.4cm (b) 3.475cm (c) 3.47cm (d) 3.5cm
- Which of the following measures are likely to represent the thickness of a sheet of this book?
(a) 6×10^{-25} m (b) 1×10^{-4} m (c) 1.2×10^{-5} m (d) 4×10^{-2} m

1 MCQs from Unit 2

1. Tick the correct answer.

- The numerical ratio of displacement to distance is:
(a) always less than one (b) always equal to one
(c) always greater than one (d) equal to or less than one
- If a body does not change its position with respect to some fixed point, then it will be in a state of:
(a) rest (b) motion (c) uniform motion (d) variable motion
- A ball is dropped from the top of a tower, the distance covered by it in the first second is:
(a) 5 m (b) 10 m (c) 50 m (d) 100 m
- A body accelerates from rest to a velocity of 144 km h⁻¹ in 20 seconds. Then the distance covered by it is:
(a) 100 m (b) 400 m (c) 1400 m (d) 1440 m
- The area under the speed-time graph is numerically equal to:
(a) velocity (b) uniform velocity (c) acceleration (d) distance covered

2 MCQs from Unit 3

- When we kick a stone, we get hurt. This is due to:
(a) inertia (b) velocity (c) momentum (d) reaction
- An object will continue its motion with constant acceleration until:
(a) the resultant force on it begins to decrease. (b) the resultant force on it is zero.
(c) the resultant force on it begins to increase.
(d) the resultant force is at right angle to its tangential velocity.
- Which of the following is a non-contact force?
(a) Friction (b) Air resistance (c) Electrostatic force (d) Tension in the string
- A particle of mass m moving with a velocity v collides with another particle of the same mass at rest. The velocity of the first particle after collision is:
(a) v (b) $-v$ (c) 0 (d) $-1/2$

6. Conservation of linear momentum is equivalent to:

- (a) Newton's first law of motion (b) Newton's second law of motion
(c) Newton's third law of motion (d) None of these

9. A lubricant is usually introduced between two surfaces to decrease friction. The lubricant:

- (a) decreases temperature (b) acts as ball bearings (c) prevents direct contact of the surfaces (d) provides rolling friction

2 MCQs from Unit 4

A. Multiple Choice Questions

4.1. A particle is simultaneously acted upon by two forces of 4 N and 3 N. The net force on the particle is:

- (A) 1 N (B) Between 1 N and 7 N (C) 5 N (D) 7 N

4.2. A force F makes an angle of 60° with the x-axis. Its y-component is equal to:

- (A) F (B) $F \sin 60^\circ$ (C) $F \cos 60^\circ$ (D) $\tan 60^\circ$

4.3. Moment of force is called:

- (A) Moment arm (B) Couple (C) Couple arm (D) Torque

4.4. If F_1 and F_2 are the forces acting on a body and τ is the torque produced, the body will be completely in equilibrium when:

- (A) $\Sigma F = 0$ and $\Sigma \tau = 0$ (B) $\Sigma F = 0$ and $\Sigma \tau \neq 0$ (C) $\Sigma F \neq 0$ and $\Sigma \tau = 0$ (D) $\Sigma F \neq 0$ and $\Sigma \tau \neq 0$

4.5. A shopkeeper sells his articles using a balance having unequal arms. If he puts the weights in the pan with the shorter arm, then the customer:

- (A) Loses (B) Gains (C) Neither loses nor gains (D) Cannot be determined

4.7. In stable equilibrium the centre of gravity of the body lies:

- (A) at the highest position (B) at the lowest position
(C) at any position (D) outside the body

4.9. A cylinder resting on its circular base is in:

- (A) stable equilibrium (B) unstable equilibrium (C) neutral equilibrium (D) none of these

4.10. Centripetal force is given by:

- (A) rF (B) $rF \cos \theta$ (C) $\frac{mv^2}{r}$ (D) $\frac{mv}{r}$

1 MCQs from Unit 5

Tick (✓) the correct answer:

5.1. Work done is maximum when the angle between the force F and the displacement d is:

- (A) 0° (B) 30° (C) 60° (D) 90°

5.3. The SI unit of power is:

- (A) joule (B) newton (C) watt (D) second

5.5. A bullet of mass 0.05 kg has a speed of 300 m s⁻¹. Its kinetic energy will be:

- (A) 2250 J (B) 4500 J (C) 1500 J (D) 1125 J

5.6. If a car doubles its speed, its kinetic energy will be:

- (A) the same (B) doubled (C) increased to three times (D) increased to four times

5.8. The magnitude of momentum of an object is doubled, the kinetic energy of the object will:

- (A) double (B) increase to four times (C) reduce to one-half (D) remain the same

5.9. Which of the following is not renewable energy source?

- (A) Hydroelectric energy (B) Fossil fuels (C) Wind energy (D) Solar energy

2 MCQs from Unit 6

Choose the correct option.

1. A wire is stretched by a weight w . If the diameter of the wire is reduced to half of its previous value, the extension will become:

- (a) one half (b) double (c) one fourth (d) four times

3. Two metal plates of area 2 and 3 square metres are placed in a liquid at the same depth. The ratio of pressures on the two plates is:

- (a) 1:1 (b) 2:3 (c) 2:3 (d) 4:9

6. The principle of a hydraulic press is based on:

- (a) Hooke's law (b) Pascal's law
(c) Principle of conservation of energy (d) Principle of conservation of momentum

7. When a spring is compressed, what form of energy does it possess?

- (a) Kinetic (b) Potential (c) Internal (d) Heat

8. What is the force exerted by the atmosphere on a rectangular block surface of length 50 cm and breadth 40 cm? The atmospheric pressure is 100 kPa.

- (a) 20 kN (b) 100 kN (c) 200 kN (d) 500 kN

1 MCQs Form unit 7

Multiple Choice Questions

Tick the correct answer.

7.3. Temperature of a substance is:

- (a) the total amount of heat contained in it (b) the total number of molecules in it (c) degree of hotness or coldness (d) dependent upon the intermolecular distance

7.4. Heat is the:

- (a) total kinetic energy of the molecules (b) the internal energy (c) work done by the molecules (d) the energy in transit
- 7.5 In Kelvin scale, the temperature corresponding to melting point of ice is:
 (a) zero (b) 32 (c) -273 (d) +273
- 7.6 The temperature which has the same value on Celsius and Fahrenheit scale is:
 (a) -40 (b) +40 (c) +45 (d) -45
- 7.8. One disadvantage of using alcohol in a liquid-in-glass thermometer:
 (a) it has large expansivity (b) it has low freezing point (-112°C) (c) it wets the glass tube (d) its expansion is linear
- 7.9. Water is not used as a thermometric liquid mainly due to:
 (a) colorless (b) a bad conductor of heat (c) non-linear expansion (d) a low boiling point (100°C)

1 MCQs from Unit 8

- 8.1 Which one of the following is not a magnetic material?
 (A) Cobalt (B) Iron (C) Aluminium (D) Nickel
- 8.2 Magnetic lines of force:
 (A) are always directed in a straight line (B) cross one another
 (C) enter into the north pole (D) enter into the south pole
- 8.5. A common method used to magnetise a material is:
 (A) stroking (B) hitting (C) heating (D) placing inside a solenoid having A.C current

1 MCQs from Unit 9

- 1 Physics is a branch of:
 (a) Social science (b) Life science (c) Physical science (d) Biological science
- 2 Which branch of science plays vital role in technology and engineering?
 (a) Biology (b) Chemistry (c) Geology (d) Physics
- 3 Automobile technology is based on:
 (a) acoustics (b) electromagnetism (c) optics (d) thermodynamics
- 6 What is the ultimate truth of a scientific method?
 (a) Hypothesis (b) Experimentation (c) Theory (d) Law
- 8 Which of the following are methods of investigation?
 (a) Observation (b) Experimentation (c) Research (d) All of these
- 9 A hypothesis.
 (a) may or may not be testable (b) is supported by evidence
 (c) is a possible answer to a question (d) all of these
10. A graph of an organized data is an example of:
 (a) collecting data (b) forming a hypothesis (c) asking question (d) analyzing data

Part-III: Subjective:

This section will contain three short answer questions. Each short answer question will be asked from the content of the textbook. The detail is as follows:

Q-2: 5 short answer questions have to be answered out of 8. The detail is as follows:

Three short answer questions should be asked from chapters 1 and 3 each, and two short answer questions should be asked from chapter

3 SHORT QUESTIONS From Unit 1

Q: Is a non-physical quantity has dimensions?

1.1 Can a non-physical quantity be measured? If yes, then how?

1.2 What is measurement? Name its two parts.

1.3 Why do we need a standard unit for measurements?

1.4: Write the name of 3 base quantities and 3 derived quantities.

Q: Write the name and symbols of all SI base units.

Q: Why prefix is used? Name three sub-multiples and three multiple prefixes with their symbols.

1.6 The end of a metre scale is worn out. Where will you place a pencil to find the length?

1.7 Why is it better to place the object close to the metre scale?

Q: Is a non-physical quantity has dimensions?

Q : What is meant by the significant figures of measurement?

2 SHORT QUESTIONS From Unit 2

2.1 Define scalar and vector quantities.

2.2 Give 5 examples each for scalar and vector quantities.

2.3 State head-to-tail rule for addition of vectors.

2.4 What are distance- time graph and speed-time graph?

2.5 Falling objects near the Earth have the same constant acceleration. Does this imply that a heavier object will fall faster than a lighter object?

2.2 When a bullet is fired, its velocity with which it leaves the barrel is called the muzzle velocity of the gun. The muzzle velocity of one gun with a longer barrel is lesser than that of another gun with a shorter barrel. In which gun is the acceleration of the bullet larger? Explain your answer.

2.6 Is it possible that the velocity of an object is zero at an instant of time, but its acceleration is not zero? If yes, give an example of such a case.

Q: Explain representation of vector quantities.

Q: Define resultant vector.

Q: What is graph?

Q: What is universal speed limit?

Q : How we can determine the slope of a graph?

Q: Define Speed, Velocity and acceleration, Write its formula and its units

3 SHORT QUESTIONS From Unit 3

3.1. What kind of changes may be produced by a force?

3.2. Give 5 examples of contact forces.

3.3. object moves with constant velocity in free space. How long will the object continue to move with this velocity?

3.4. Define impulse of force.

3.5. Why has not Newton's first law been proved on the Earth?

3.6. When sitting in a car which suddenly accelerates from rest, you are are pushed back into the seat, why?

3.9. Define terminal velocity of an object.

3.1 Two ice skaters weighing 60kg and 80 kg push off against each other on a frictionless ice track. The 60 kg skater gains a velocity of 4 ms. Considering all the relevant calculations involved, explain how Newton's third law applies to this situation.

3.2 Inflatable air bags are installed in the vehicles as safety equipment. In terms of momentum, what is the advantage of air bags over seatbelts?

3.4. When a cricket ball is hit high, a fielder tries to catch it. While holding the ball he/she draws hands backward. Why?

3.5. When someone jumps from a small boat onto the river bank, why does the jumper often fall into the water? Explain.

3.6. Imagine that if friction vanishes suddenly from everything. then what could be the scenario of daily life activities?

Q-3: 5 short answer questions have to be answered out of 8. The detail is as follows:

Three short answer questions should be asked from chapters 4 and 5 each, and two short answer questions should be asked from chapter 6

3 SHORT QUESTIONS From Unit 4

- 4.1. Define like and unlike parallel forces.
 - 4.2. What are rectangular components of a vector and their values?
 - 4.3. What is the line of action of a force?
 - 4.4. Define moment of a force. Prove that $rF\sin\theta$, where θ is angle between r and F .
 - 4.7. Give an example of the body which is moving yet in equilibrium.
 - 4.1. A car travels at the same speed around two curves with different radii. For which radius the car experiences more centripetal force? Prove your answer.
 - 4.2. A ripe mango does not normally fall from the tree. But when the branch of the tree is shaken, the mango falls down easily. Can you tell the reason?
- Q: How Altering the Base of Support Influences Stability
- 4.4. Why an accelerated body cannot be considered in equilibrium?

3 SHORT QUESTIONS From Unit 5

- 5.1. What is the work done on an object that remains at rest when a force is applied on it?
 - 5.2. A slow-moving car may have more kinetic energy than a fast-moving motorcycle. How is this possible?
 - 5.4. A woman runs up a flight of stairs. The gain in her gravitational potential energy is 4500 J. If she runs up the same stairs with twice the speed, what will be her gain in potential energy?
 - 5.5. Define work and its SI unit.
 - 5.7. Find an expression for the kinetic energy of a moving body.
 - 5.8. Define efficiency of a working system. Why a system cannot have 100% efficiency?
 - 5.9. Why a system cannot have 100 percent efficiency?
 - 5.1. Can the kinetic energy of a body ever be negative?
 - 5.3. A car is moving along a curved road at constant speed. Does its kinetic energy change?
 - 5.4. Comment on the statement. "An object has one joule of potential energy."
 - 5.6. While playing cricket on a street, the ball smashes a window pane. Describe the energy changes in this event.
 - 5.7. A man rowing boat upstream is at rest with respect to the shore. Is he doing work?
- LQ.6: What is Efficiency?

2 SHORT QUESTIONS From Unit 6

- 6.1. Why heavy animals like an elephant have a large area of the foot?
- 6.3. Why is it painful to walk bare footed on pebbles?
- 6.4. State Pascal's law. Give an application of Pascal's law.
- 6.5. State what do you mean by elasticity of a solid.
- 6.7. Distinguish between force and pressure.
- 6.8. What is the relationship between liquid pressure and the depth of the liquid?
- 6.10. State the basic principle used in the hydraulic brake system of the automobiles.
- 6.2. Springs are made of steel instead of iron. Why?
- 6.5. What will happen to the pressure in all parts of a confined liquid if pressure is increased in one part? Give an example from your daily life where such principle is applied.

Q-3: 5 short answer questions have to be answered out of 8. The detail is as follows:

Three short answer questions should be asked from chapters 7 and 8 each, and two short answer questions should be asked from chapter 9

3 SHORT QUESTIONS From Unit 7

- 7.4. What is the effect of raising the temperature of a liquid?
- 7.5. What is meant by temperature of a body?
- 7.7. What is meant by thermometric property of a substance? Enlist some thermometric properties.
- 7.8. State the main scales used for the measurement of temperature.
- 7.12. What does determine the direction of heat flow?
- 7.13. Distinguish between the heat and internal energy.
- 7.2. Why is mercury usually preferred to alcohol as a thermometric liquid?
- 7.3. Why is water not suitable for use in thermometers? Without calculations, guess what is equivalent temperature of 373 K on Celsius and Fahrenheit scales?
- 7.6. Why are there no negative numbers on the Kelvin scale?
- 7.9. Which is greater: an increase in temperature 1°C or one 1°F ?
- 7.13. Discuss whether the Sun is matter.

3 SHORT QUESTIONS From Unit 8

- 8.1 What are temporary and permanent magnets?
- 8.2 Define magnetic field of a magnet.
- 8.3 What are magnetic lines of force?
- 8.4 Name some uses of permanent magnets and electromagnets.
- 8.1 Two bar magnets are stored in a wooden box. Label the poles of the magnets and identify P and Q objects.
- 8.2 A steel bar has to be magnetised by placing it inside a solenoid such that end A of a bar becomes N-pole and end B becomes S-pole. Draw circuit diagram of solenoid showing steel bar inside it.
- 8.4 Electric current or motion of electrons produce magnetic field. Is the reverse process true, that is the magnetic field gives rise to electric current? If yes, give an example and describe it briefly.

2 SHORT QUESTIONS From Unit 9

- 9.1 State in your own words, what is science? Write its two main groups.
- 9.2 What is physics all about? Name some of its branches.
- 4 List the main steps of scientific method.
- 5 Q: What is a hypothesis? Give an example.
- 1.6 Distinguish between a theory and a law of physics.
- 9.1 Is the theory of science an ultimate truth? Describe briefly.
- 9.2 Do you think that the existing laws of nature may need a change in future? Describe briefly.
- Q: Describe three jobs that need the use of scientific knowledge.
- Q: Describe when a theory is rejected or need its modification.
- 9.7 If a hypothesis is not testable, is the hypothesis wrong? Explain.

Part III Long Questions

2 Detail Questions out of 3 Detail Questions will be answered

| 1 detail Question from Unit 1, 2, 3 | 1 detail Question from Unit 4, 5, 6 | 1 detail Q from Unit 7, 8, 9 |
|---|---|--|
| <p style="text-align: center;">Unit 01 Physical Quantities</p> <p>Q: Distinguish between base and derived physical quantities.</p> <p>Q: What is SI? Name SI base quantities and their unit.</p> <p>LQ 5: What are prefixes? What are their use in measurement.</p> <p>Q 6: What is Standard form or scientific notation of noting down a measurement, Give at least five examples?</p> <p style="text-align: center;">UNIT 2 KINEMATICS</p> <p>Q: How vectors are added by graphical method? explain head to tail rule.</p> <p>Q: Differentiate between rest and motion. With the help of example, show that rest and motion are relative to observer?</p> <p>Q: Differentiate between speed and velocity.</p> <p>6. What are freely falling bodies? What is gravitational acceleration?</p> <p>Q: Draw Distance-time graph for rest, uniform speed, Increasing speed and decreasing speed?</p> <p>2.1 How a vector can be represented graphically? Explain.</p> <p>2.2 Differentiate between: (i) rest and motion (ii) speed and velocity</p> <p>2.4 Explain the difference between distance and displacement.</p> <p>2.6 Prove that the area under speed-time graph is equal to the distance covered by an object.</p> <p style="text-align: center;">UNIT 3 DYNAMICS</p> <p>Q: Explain the concept of force with practical examples of daily life.</p> <p>Q: Write Types of Forces</p> <p>Q: Explore the concept of force diagram.</p> <p>Q: State first law of motion. Explain with the help of examples. Why is it called law of inertia?</p> <p>Q: Define inertia. Why is it important to have knowledge of inertia in our daily life?</p> <p>3. State and prove Newton's second law of motion.?</p> <p>4. State Newton's 3rd law of motion..</p> <p>Q: Differentiate between mass and weight.</p> <p>Q 10. What are gravitational field and gravitational field strength?</p> <p>Q: Write a note of force-metre.</p> <p>Q: What is friction? What are microscopic basis of friction? What is normal force. how it affects friction.</p> <p>Q: Differentiate between static and kinetic friction by giving an example.</p> <p>Q: Define Rolling and sliding friction?</p> <p>Q: Define and explain the term terminal velocity.</p> <p>10. Analyse the dynamics of an object reaching terminal velocity.</p> <p>8. Define momentum. What is its formula and unit? Is it a scalar or vector quantity?</p> <p>Q: State and prove Newton's second law of motion in term of momentum.</p> <p>13. Define isolated system. State law of conservation of linear momentum. Explain with example.</p> | <p style="text-align: center;">Unit:4 Turning Effects of Force</p> <p>1. Differentiate between like and unlike parallel forces.</p> <p>Q2: Explain addition of forces.</p> <p>2. What is moment of force or torque? On what factors it depends? Write its mathematical formula?</p> <p>Q 5: what is couple? Explain with examples.</p> <p>Q4: What is resolution of force? Explain with an example how forces can be resolved into rectangular components.</p> <p>Q: Define principle of moments?</p> <p>6. What is equilibrium? Describe the conditions of equilibrium.</p> <p>Q: What is stability of an object</p> <p>Q: What is uniform circular motion? What are the factors on which magnitude of acceleration (centripetal acceleration) in uniform circular motion depend.</p> <p>11. Define centripetal force. Describe the motion of a body in a circular path under the action of centripetal force.</p> <p>12. Identify different sources of centripetal force in real life examples.</p> <p style="text-align: center;">CHAPTER 5TH WORK, ENERGY AND POWER</p> <p>Q: Define work, What is Relation between Work and Energy:</p> <p>LQ.1: Define work and its unit. Describe the conditions for maximum and minimum work</p> <p>Q: Define energy? Write its units.</p> <p>LQ.2: What is Kinetic energy (k.E). Derive its expression by using graphical analysis.</p> <p>LQ.3: What is potential energy? What are its different types?</p> <p>Q: What is Einstein's equation about mass and energy?</p> <p>LQ.5: Explain how useful energy is obtain from natural resources?</p> <p>Q: Differentiate between renewable and non-renewable resources.</p> <p>Q: Define power? What is the relation of its SI unit with horse power?</p> <p>Q: Write a note on perpetual motion machine.</p> <p style="text-align: center;">UNIT 6 MECHANICAL PROPERTIES OF MATTER</p> <p>Q.1: Define deformation terms in detail.</p> <p>2. What is Hook's law? Also, define and calculate spring constant.</p> <p>LQ.2: Define and explain density?</p> <p>4. Define and explain pressure. What is effect of area on pressure acting on surface?</p> <p>7. Show that liquid in a container exerts pressure equal to $P = \rho g h$. What is effect of depth on pressure of liquid?</p> <p>5. Explain the term atmospheric pressure along with its units.</p> <p>6. Explain with examples how atmospheric pressure varies with altitude.</p> <p>8. State Pascal's law? Describe working principle of hydraulic lift using Pascal's law? What do you mean by force multiplier?</p> <p>Q: Explain the Hydraulic car brake system.</p> | <p style="text-align: center;">UNIT 7 THERMAL PROPERTIES OF MATTER</p> <p>Q: Define and Explain the Temperature</p> <p>Q: Define and Explain Heat?</p> <p>Q: Define and Explain the internal Energy of a substance.</p> <p>Q: What are Basic Thermometric Properties</p> <p>Q: Discuss Fixed Points in the Calibration of Thermometer.</p> <p>Q: Write Types of Scales</p> <p>Q: What is thermocouples?</p> <p style="text-align: center;">CHAPTER 8 MAGNETISM</p> <p>Q: Differentiate between magnetic and non-magnetic materials with examples.</p> <p>Q: Explain properties of magnet.</p> <p>Q: How magnetism is induced in a magnetic materials? Explain.</p> <p>Q: Differentiate between temporary and permanent magnet.</p> <p>Q: Explain magnetic field strength and magnetic shielding.</p> <p>Q: Enlist some uses of permanent magnets.</p> <p>Q: Describe electromagnets in detail.</p> <p>Q: State some uses of electromagnets.</p> <p>Q: A magnets attracts only a magnet. Explain the statement.</p> <p>Q.16: Explain magnetization.</p> <p>Q.17: Explain de-magnetization.</p> <p style="text-align: center;">UNIT 9 NATURE OF SCIENCE</p> <p>Q.1: Describe scope of physics.</p> <p>Q: Different branches of physics</p> <p>Q2: Briefly discuss the importance of physics in other disciplines of science</p> <p>Q.5: What is scientific method? Explain its steps.</p> |