Question bank

Chapter-1 Topic 1 Fundamental and derived quantities and units

Q-1 **Answer the following questions:**

a) What do we mean by a 'fundamental quantity'?

b) Give the names of four fundamental quantities.

Q-2 **Give two examples of derived quantities and explain why they are called 'derived quantities'.**

Q-3 **Give two examples of fundamental units and two examples of derived units.**

Q-4 **Why is the abbreviation for coulomb written in upper case?**

Q-5 **What do you understand by the term 'operational definition'?**

Q-6 **What is involved in the study of electrostatics?**

Q-7 **Answer the following questions:**

a) After whom is the standard unit of force named?

b) What is the correct form of the abbreviation of this unit?

Q-8 **What two quantities, multiplied together, give the quantity of force?**

Q-9 **What are the standard units in which acceleration is measured?**

Q-10 **What is 'rectilinear acceleration'?**

Chapter-2 Topic 2 Position, distance and displacement

Q-1 **State clearly, in your own words and using good English, the difference between distance and displacement.**

Q-2 **Explain clearly, using your own words and good English, why the displacement of A from B is not the same as the displacement of B from A. Use a simple diagram to illustrate your explanation.**

Q-3 **You are at a point, A. You now move 3 km south of Point A to Point B. From Point B, you move to Point C, which is 3 km east of Point B. Draw a diagram to show these movements, and use your diagram to find your distance (at Point C) from the starting Point A. With Point C as your reference, what is the displacement of A? (This exercise would best be done on graph paper.)**

Q-4 **What are 'reference points' in the context of physics?**

Q-5 **What is a 'scalar quantity'? Give one example of such a quantity.**

Q-6 **What does it mean to say that distance is 'route dependent'?**

Q-7 **What is the displacement of Lagos from Abuja?**

Q-8 **What is the standard unit in which the magnitude of displacement is measured?**

Chapter-3 Topic 3 Time

Q-1 **What is an interval?**

Q-2 **What do you understand by the term 'repetitive events' or 'repetitive activity'?**

Q-3 **Answer the following questions:**

a) What is a 'pendulum'?

b) Do you think a pendulum could be used to measure time intervals in deep space? Briefly give a reason for your answer.

Q-4 **If you change the weight of the bob of a pendulum, does this change the rate at which the pendulum swings? (In other words, does it change the period of the pendulum?)**

Q-5 **If you extend the length of a pendulum, how does this affect its period?**

Q-6 **What does 'pm' stand for in the context of time measurement?**

Q-7 **What does 'etymology' mean?**

Q-8 **What does 'chronos' (or chrono-) mean?**

Chapter-4 Topic 4 Motion

Q-1 **List the different types of motion.**

Q-2 **Using your own words, and good English, write one sentence to describe what is meant by 'uniform motion in a straight line'.**

Q-3 **What do you know about a body that is moving with uniform motion in a straight line?**

Q-4 **What do you know about a body that is moving along a curved path?**

Q-5 **Write one sentence to explain the meaning of the word 'friction'.**

Q-6 **What name is given to a substance which is used to reduce friction?**

Q-7 **Define the word 'centripetal'.**

Q-8 **Give an example of a body which moves with oscillatory motion.**

Q-9 **What is 'Brownian motion'?**

Chapter-5 Topic 5 Speed and velocity

Q-1 **'The velocity of the bullet is 100 m/s'. Is there anything wrong with this statement? Explain your answer.**

Q-2 **A train moves from Town A to Town B in 35 minutes. The towns are 30 km apart. Calculate the average speed of the train and express your answer in standard units. Show your working neatly and clearly.**

Q-3 **What is another name for the x-axis of a graph?**

Q-4 **If you were plotting the height of a young plant as a function of time on a graph, which variable would you put on the x-axis? Give a reason for your answer.**

Q-5 **What name is given to the point on a graph at which the x-axis and the y-axis meet?**

Q-6 **The bob of a pendulum swings for exactly four hours, making one complete swing every second. Over four hours, its average velocity is 0 m/s. Briefly explain this.**

Q-7 **What symbol is usually used for displacement in mathematical equations?**

Chapter-6 Topic 6 Rectilinear acceleration

Q-1 **Define the terms 'rectilinear' and 'uniform'.**

Q-2 **Think of the concept of 'negative acceleration'.**

a) What is meant by a 'negative acceleration'?

b) In what circumstances might a body have negative acceleration? Give an example.

c) Give a single word that means the same as 'negative acceleration'.

Q-3 **A car starts to move along a straight road. A drop of oil falls from the car's engine onto the road every three seconds. Table 1.5 gives the distances along the road (in metres) between the drops of oil.**

a) From the information in Table 1.5, draw a graph of distance (y-axis) against time (x-axis). Both axes of your graph should start at zero.

b) Explain how you would use the graph to determine where the car is speeding up (accelerating), where it is travelling at constant speed, and where it is slowing down (decelerating).

Q-4 **How much speed is added in each second to a body falling freely towards the Earth?**

Q-5 **Which famous physicist developed the equations we use for calculating velocity, displacement and acceleration?**

Q-6 **Disregarding air resistance, how far does a body move during the first second of its fall?**

Q-7 **Briefly explain why a planet moving in its orbital path around the sun is accelerating.**

Q-8 **Imagine that someone dug a hole through the Earth – from one side to the other, and passing through the centre of the Earth. Now imagine that you drop a heavy ball down this hole. Where will it stop? Explain your answer.**

Q-9 **In your own words, briefly explain why a falling body moves faster and faster, yet the acceleration is constant (unchanging).**

Chapter-7 Topic 7 Scalars and vectors

Q-1 **The pendulum bob of a 'grandfather clock' moves through a distance of 25 cm in each half-period. The period of the pendulum is exactly one second.**

a) Calculate the distance through which the pendulum will have moved in the course of three hours. Show your working clearly and neatly.

b) Calculate the average speed of the pendulum bob over this time. Express your answer in m/s. Show your working clearly and neatly.

c) Calculate the average velocity of the bob during the three hours. Show your working clearly and neatly and briefly explain your answer.

Q-2 **What does 'magnitude' mean?**

Q-3 **Why can we not add vector quantities in the same way that we add scalars?**

Q-4 **A girl walks 2 km east, then 3 km west, then 5 km east again. What is her total displacement from her starting point?**

Q-5 **Space is three-dimensional. Is there a fourth dimension? If so, what is it?**

a) Is there a fourth dimension?

b) If so, what is it?

Q-6 **Mass is a scalar, but weight is a vector. Why is weight not also a scalar?**

Q-7 **How should the word 'torque' be pronounced?**

Q-8 **Answer the following Question.**

a) Briefly explain why the velocity of a body can change while its speed remains constant.

b) Is it possible for the velocity of a body to remain constant while its speed changes?

Chapter-8 Topic 8 Work, energy and power

Q-1 **Give an operational definition of 'work'.**

Q-2 **A strong man stands with a heavy log on his shoulders. The log presses down on him with a force of 300 newtons. He stands like this for 10 minutes. How much work has he done? Explain your answer.**

a) How much work has he done?

b) Explain your answer.

Q-3 **A man pushes against a truck. He uses a force of 60 newtons and he pushes the truck a total of five metres. How much work has he done? Show your working neatly and clearly.**

Q-4 **A mass of 100 kg is dropped from an aircraft flying 500 metres above the sea. How much work has gravity done on the body when it hits the water? Ignore friction.**

Q-5 **'Mechanical energy' can be divided into two types. What are they?**

Q-6 **A 'grandfather clock' uses a pendulum to regulate its mechanism. Would a grandfather clock work in deep space – millions of kilometres from the nearest body? Explain your answer.**

a) Would a grandfather clock work in deep space – millions of kilometres from the nearest body?

b) Explain your answer.

Q-7 **Explain why the water in a dam may be said to have potential energy.**

Q-8 **A child pushes her toy box one metre along the floor of her room. Even though she is moving the box horizontally, and therefore not working against the force of gravity, she does perform work in this activity. Briefly explain why work is performed.**

Q-9 **A man uses a total force of 900 N to carry his suitcase up some stairs. The vertical height of the stairs is three metres. He takes 10 seconds to do this. Calculate the amount of work he has performed and the power he has used. Show your working neatly and clearly.**

a) Calculate the amount of work he has performed.

b) Calculate the power he has used.

Chapter-9 Topic 9 Heat energy

Q-1 **On a day when the temperature is 20 °C, steel train rails are laid in 12 m long segments, placed end to end. How much space must be left between adjacent rails if they are just to touch on a hot day when the temperature is 40 °C? (Hint: Take the linear expansivity of steel to be 9 × 10■■ (°C)■¹.)**

Q-2 **The longest bridge in Nigeria is the 11.8 km long Third Mainland Bridge connecting Lagos Island to the mainland. What temperature change would cause a 25 m concrete span of the bridge to expand by 10 mm? (Hint: Take the linear expansivity of concrete to be 9.8 × 10■■ (°C)■¹.)**

Q-3 **The Eiffel Tower in Paris, France, was constructed in 1889 by Alexandre Eiffel. The tower structure is made of steel. If the tower is 301 m high on a day on which the temperature is 22 °C, by how much will the height decrease when the temperature cools down to –2 °C on a very cold day in Paris? (Hint: Take the linear expansivity of steel to be 9 × 10■■ (°C)■¹.)**

Q-4 **Aluminium rivets used in aeroplane construction are made slightly larger than the rivet holes. The rivets are cooled to –78 °C before being inserted into a rivet hole of diameter 4.50 mm. What must the diameter of the rivet be at manufacturing stage when the temperature is 22 °C? (Hint: Take the area expansivity of aluminium to be 4.8 × 10■■ (°C)■¹.)**

Q-5 **A cook struggles to loosen the lid on a jar of pickles. Both the outer diameter of the glass jar opening and the inner diameter of its iron lid are 500 mm at a room temperature of 25 °C. The cook puts the jar under hot water until the temperature of the jar and lid reaches 50 °C. Will the lid come off the jar? Use calculations to prove your answer. (Hint: The volume expansivity of glass is 1.4 × 10■■ (°C)■¹ and that of iron is 3.6 × 10■■ (°C)■¹.)**

Q-6 **A copper flask with a volume of 200 cm³ is filled to the brim with olive oil at room temperature of 25 °C. If the flask and its contents are heated to a temperature of 40 °C, how much oil spills from the flask? (Hint: The volume expansivity of copper is 5.1 × 10■■ (°C)■¹ and that of oil is 6.8 × 10■■ (°C)■¹.)**

Multiple Choice Questions

Q-1 **Temperature is a measure of the average:**

(a) kinetic energy of the molecules

(b) elastic potential energy of the molecules

(c) gravitational potential energy of the molecules

(d) kinetic and potential energy of the molecules

Q-2 **A block of metal is heated until its temperature is above its melting point. Which one of the following will not change as a result of the heating?**

(a) the volume of the block

(b) the mass of the block

(c) the state of the block

(d) the density of the block

Q-3 **Which one of the following does not need a medium for the transfer of heat?**

(a) radiation

(b) conduction

(c) convection

(d) both B and C

Q-4 **You place your hand above an electric heater. The heat is transferred to your hand by:**

(a) radiation only

(b) convection only

(c) both radiation and convection

(d) by radiation, convection and conduction

Q-5 **Equal quantities of very hot water are poured into a dull black teapot and a teapot with a shiny surface. After 30 minutes, in which teapot will the temperature of the water be higher and for what reason?**

(a) the dull black teapot because black bodies are good absorbers of radiant energy

(b) the shiny teapot because shiny surfaces are good absorbers of radiant energy

(c) the dull black teapot because black bodies are bad radiators of radiant energy

(d) the shiny teapot because shiny surfaces are bad radiators of radiant energy

Q-6 **Metal rod A is twice as long as Metal rod B. When both rods are heated to increase their temperatures by the same amount (ΔT), they have the same increase in length. We can conclude that the linear expansivity of Rod A is:**

(a) equal to the linear expansivity of Rod B

(b) half the linear expansivity of Rod B

(c) twice the linear expansivity of Rod B

(d) four times the linear expansivity of Rod B

Q-7 **When water is boiled in an electric urn, the transfer of heat to the water is mainly by:**

(a) conduction

(b) conduction and convection

(c) convection

(d) radiation

Q-8 **The boiling point and melting point of carbon dioxide are –57 °C and –78 °C, respectively. In what state will carbon dioxide be at a temperature of 0 °C?**

(a) liquid

(b) both liquid and solid

(c) solid

(d) gas

Q-9 **The human body produces large amounts of perspiration (sweat) on very hot days. This helps to keep the body cool because the perspiration:**

(a) is a good conductor of heat

(b) radiates all the heat to the atmosphere

(c) vaporizes and lowers the body temperature

(d) loses energy by setting up convection currents

Chapter-10 Topic 10 Electric charges

Q-1 **A rubber rod is rubbed with a woollen cloth. a) Which of the two will become positively charged? b) Which of the two will gain electrons?**

Q-2 **Diagram shows a negatively charged electroscope.**

a) Were electrons added to or removed from the electroscope ?

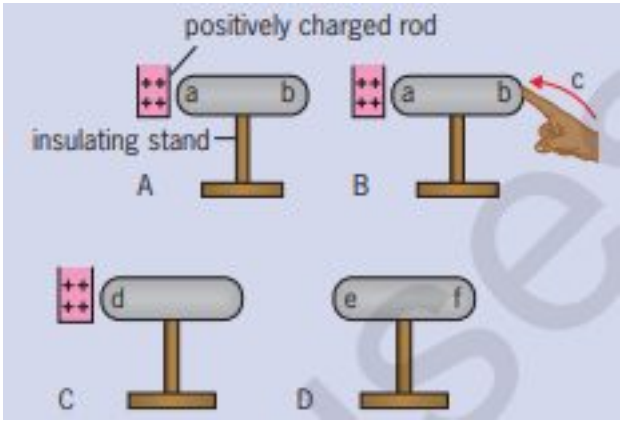
b) If the electroscope was charged by touching the dome with a rod, was the rod positively charged or negatively charged?

c) If the electroscope was charged by the method of induction, was the rod used positively charged or negatively charged?

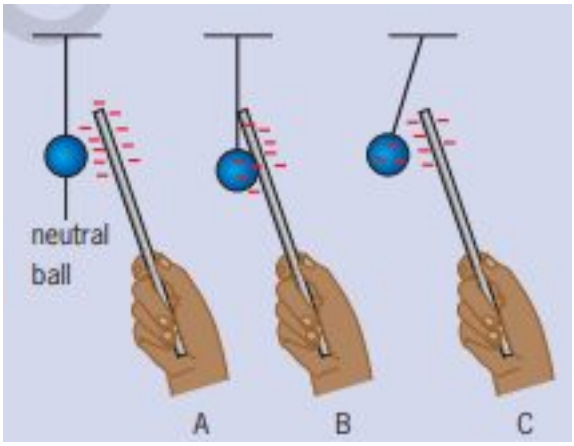
d) If a negatively charged rod is brought near the dome of the electroscope, describe what will happen to the leaves of the electroscope.

e) If a positively charged rod is brought near the dome of the electroscope, describe what will happen to the leaves of the electroscope.

Q-3 **Study the diagrams (which show charge transfer by induction) and indicate the type of charge found at each area marked a, b, c, d, e and f.**



Q-4 **A neutral polystyrene ball is suspended from a support and a negatively charged rod is brought into contact with it. The sequence of diagrams shows what happens to the ball.**



a) Explain what happens to the ball in each diagram. Your explanation must include how the transfer of electrons takes place.

b) Explain how you would use the negatively charged rod to give the polystyrene ball a positive charge.

Multiple Choice Questions

Q-1 **When you charge a Perspex ruler by rubbing it with a cotton cloth, you give the ruler a:**

(a) positive charge by the method of friction

(b) negative charge by the method of contact

(c) positive charge by the method of contact

(d) negative charge by the method of friction

Q-2 **When an object becomes positively charged, it:**

(a) gains protons

(b) loses protons

(c) gains electrons

(d) loses electrons

Q-3 **Which one of the following cannot be used to store charges for a long period of time?**

(a) a capacitor

(b) a gold leaf electroscope

(c) an electrophorus

(d) a Leyden jar

Q-4 **A charged acetate sheet (P) attracts a second charged acetate sheet (Q), but repels a negatively charged acetate sheet (R). We can conclude that:**

(a) P is positively charged and Q is negatively charged

(b) P is negatively charged and Q is positively charged

(c) both P and Q are negatively charged

(d) both P and Q are positively charged

Q-5 **A negatively charged rod is used to positively charge a polystyrene ball. The method used in this charging process is most probably:**

(a) by friction (by rubbing the polystyrene ball with the rod)

(b) by contact (by touching the polystyrene ball with the rod)

(c) by induction (by bringing the rod near the polystyrene ball and then earthing the ball)

(d) by contact and induction (by touching the polystyrene ball with the rod and then earthing the ball)

Q-6 **Figure 2.61 shows the metal disc of a charged electrophorus being removed from its insulating base. By touching the metal disc with a finger, we will finally have:**

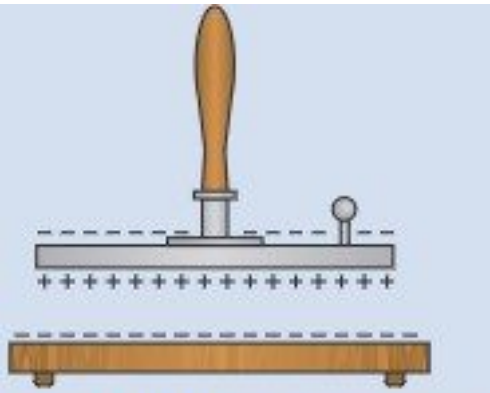


Figure 2.61 A charged electrophorus

(a) a negatively charged electrophorus

(b) a positively charged electrophorus

(c) a neutral electrophorus

(d) an electrophorus with both types of charge

Chapter-11 Topic 11 Description and properties of fields

Q-1 **Define the following terms:**

a) gravitational field

b) electric field

c) magnetic field

d) line of force

Q-2 **Consider the gravitational fields of the sun and the Earth. The mass of the sun is about 3.3 × 10■ larger than the mass of the Earth.**

a) Which of the two gravitational fields is stronger at a point midway between the sun and the Earth? Why?

b) The Earth and Mars are approximately 1.5 × 10■ km and 2.3 × 10■ km, respectively, away from the sun. Where is the gravitational field of the sun stronger – on Earth or on Mars?

c) The moon is on average 3.8 × 10■ km away from the Earth and 1.5 × 10■ km away from the sun. Why does the moon orbit the Earth and not the sun?

Q-3 **You are given a bar magnet with eight positions marked 1 to 8 in its force field, as shown in Figure 4.9. Alongside the magnet are four plotting compasses marked a to d, with the needle coloured in red pointing towards the south pole.**

a) Match each of the positions 1 to 8 in the magnetic field with a compass showing the correct direction at that point. Each compass may be used more than once.

b) At which point(s) is the magnetic field the strongest?

Q-4 **Figure 4.10 shows a negative charge with three points marked a to c around it.**

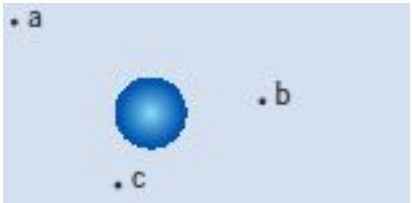


Figure 4.10 A negative charge

a) Draw the direction of the electric field at each of the points marked a to c.

b) At which of the three points is the electric field the weakest?

Q-5 **The diagrams in Figure 4.11 show part of magnetic field patterns using adjacent bar magnets. Identify the poles marked A and B in each diagram.**

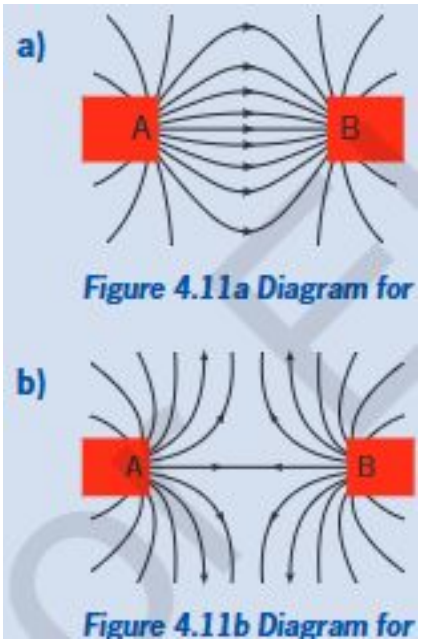


Figure 4.11a Diagram for

Figure 4.11b Diagram for

Multiple Choice Questions

Q-1 **Which one of the following is not correct?**

(a) Force fields are characterized by forces at an action.

(b) The strength of the force field increases with increasing distance from the source of the field.

(c) The sources of a force field could be a mass or a charge or a magnet.

(d) Force fields are vectors because they have both magnitude and direction.

Q-2 **Which one of the following statements about lines of force in a force field is correct?**

(a) The lines of force in an electric field always point towards a positive charge.

(b) The lines of force in a magnetic field always point towards the north pole.

(c) The force field is stronger where the lines of force are further apart.

(d) Lines of force do not cross each other.

Chapter-12 Topic 12 The gravitational field

Q-1 **Using your own words, and good English, briefly explain why bodies of different weight accelerate towards Earth at the same rate if air resistance is excluded.**

Q-2 **What is the value of g?**

Q-3 **What is the name of the standard unit of force? How is this unit defined?**

Q-4 **What equation relates mass, force and acceleration?**

Q-5 **What single word is used to describe the shape of our planet?**

Q-6 **What causes the slight bulge at Earth's equator?**

Q-7 **What simple apparatus can be used to measure small differences in the strength of a gravitational field?**

Q-8 **Where, on the surface of Earth, is the gravitational field strongest? Give a brief reason for your answer.**

Q-9 **What is the equatorial circumference of our planet?**

Q-10 **In which year, and by whom, was the famous demonstration performed of dropping a hammer and a feather on the surface of the moon?**

Chapter-13 Topic 13 Electric fields

Q-1 **5 × 10^–4 J of work moves 50 μC of charge across the ends of a resistor.**

a) Calculate the potential difference across the resistor.

b) If the charges take 20 s to travel across the resistor, what is the resistance of the resistor?

Q-2 **A 0.7 m length of nichrome wire has a diameter of 1.45 mm. The resistivity of nichrome is 1 × 10^–6 Ω·m.**

a) Calculate the resistance of the wire.

b) If the wire is connected to a 3.0 V cell, determine the current in the wire.

c) If the nichrome wire were cut in half and one of the pieces connected to the same 3.0 V cell, will the current be the same as that in 9b? Explain your answer.

Q-3 **Two equal lengths of tungsten and aluminium wire of the same diameter are connected in parallel to a 3.0 V cell. Refer to Table 4.6 (page 113). Which of the wires will have the larger current? Explain your answer.**

Q-4 **In the circuit in Figure 4.49, the voltmeter reads 12 V. Determine:**

a) the current through the 60 Ω resistor.

b) the current through the 50 Ω resistor.

c) the heat generated in the 50 Ω resistor in two minutes.

Q-5 **In the circuit in Figure 4.50, the ammeter reads 1.5 A. Calculate:**

a) the potential difference across the 8 Ω resistor.

b) the current through the 12 Ω resistor.

c) the power generated in the 4 Ω resistor.

d) the reading on the voltmeter.

Q-6 **The circuit in Figure 4.51 has three resistors, a fuse (F) with a rating of 4 A and a light bulb marked '12 V, 4 W'.**

a) Determine the current passing through the bulb at its maximum brightness.

b) Calculate the potential difference across the parallel resistors.

c) What is the reading on the voltmeter?

d) If points P and Q in the circuit are joined by a piece of low resistance wire, forming a short circuit, will the fuse blow? Support your answer with calculations.

Multiple Choice Questions

Q-1 **Which statement about the properties of electric field lines is incorrect?**

(a) The field lines are imaginary lines.

(b) The field lines point away from a negative charge and end on a positive charge.

(c) The tangent points in the direction of the force at that point.

(d) The density of the field lines in any region indicates the strength of the electric field at that region.

Q-2 **The resistance of conductors depends on their: i) resistivity ii) length iii) cross-sectional area. Resistance is directly proportional to:**

(a) (i), (ii) and (iii)

(b) (i) and (iii) only

(c) (ii) and (iii) only

(d) (i) and (ii) only

Q-3 **Which energy type does a generator convert into electrical energy?**

(a) chemical

(b) solar

(c) thermal

(d) mechanical

Q-4 **If 4 × 10–5 J of work is done to move a charge of 2 μC between two points in an electric field, the potential difference between the two points will be:**

(a) 0.2 V

(b) 2 × 10–5 V

(c) 8 × 10–5 V

(d) 20 V

Q-5 **A light bulb is connected to a 2 V cell and the power generated in the bulb is P. If the bulb is connected to a 4 V cell (with no change in the resistance of the bulb), the power generated will be:**

(a) P

(b) 2 P

(c) 4 P

(d) 1 /2 P

Chapter-14 Topic 14 Particulate nature of matter

Q-1 **Copy and complete Table 5.4, comparing the properties of solids, liquids and gases.**

Table 5.4 Comparison of the properties of solids, liquids and gases

Property	Solids	Liquids	Gases
Size of spaces between particles			
Type of motion of particles			
Degree of compressibility			
Strength of attractive forces			

Q-2 **When potassium permanganate crystals are dropped into a beaker of water, the water slowly becomes coloured a reddish purple.**

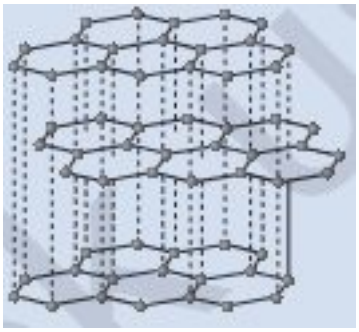
Figure 5.20 Potassium permanganate crystals in water

a) What is the name given to the process by which the potassium permanganate molecules are distributed throughout the water?

b) What property of liquids does this process display?

c) Explain why solid potassium permanganate has a crystalline structure.

Q-3 **Figure 5.21 shows the crystal structure of graphite. Identify, with reasons, the crystal structure type.**



Q-4 **Crystalline sulphur exists as two allotropes.**

a) What are the crystalline structures of the two allotropes?

b) Explain how crystalline sulphur can be made into plastic sulphur.

c) Give one property of plastic sulphur which classifies it as an amorphous solid.

Q-5 **In an oil drop experiment, the diameter of an oil drop molecule was found to be 2 × 10■■ mm. If the diameter of the oil drop used was 0.5 mm, calculate the diameter of the oil film formed when the oil drop was dropped on the surface of the water. (Hint: $V = 4/3\ \pi r^3$.)**

Q-6 **What is a photon of light? What property of light can be explained using photons?**

Multiple Choice Questions

Q-1 **According to the particulate model of matter, diffusion can be explained in terms of:**

(a) the existence of very strong forces between the particles

(b) the existence of large spaces between the particles

(c) the continuous motion of the particles

(d) the orderly arrangement of the particles

Q-2 **Which one of the following pieces of experimental evidence can be used to support the theory that there are empty spaces between liquid and gas particles?**

(a) Brownian motion

(b) Food colouring dissolving in water

(c) A gas takes the shape and volume of its container

(d) When two liquids are added to each other, the total volume is less than the volume of each liquid

Q-3 **The motion of the particles in a solid is mainly:**

(a) random motion at high speeds

(b) vibratory motion in fixed positions

(c) gliding motion

(d) both random motion and vibratory motion

Q-4 **The random motion of the bright spots in a smoke cell is that of:**

(a) air particles pushed around by smoke particles

(b) air particles pushed around by light rays

(c) smoke particles pushed around by light rays

(d) smoke particles pushed around by air particles

Q-5 **When water boils, the water molecules:**

(a) move more slowly

(b) have smaller spaces between them

(c) move further apart

(d) attract each other with greater force

Q-6 **The nucleus of an atom consists of:**

(a) electrons, protons and neutrons

(b) neutrons only

(c) protons only

(d) protons and neutrons

Q-7 **Which one of the following is not a property of a crystalline solid? The solid:**

(a) has a recognizable geometrical shape

(b) has particles which are highly ordered in three-dimensional units forming lattices

(c) has well-defined melting and boiling points

(d) has large spaces between the particles

Q-8 **Which one of the following solid substances is an amorphous solid?**

(a) Epsom salts

(b) plastic

(c) potassium permanganate

(d) gold

Q-9 **A source of ultraviolet light is incident on a zinc plate placed on a neutral electroscope. The leaves of the electroscope:**

(a) will not deflect because the light has no charge

(b) diverge because the zinc became positively charged

(c) diverge because the zinc became negatively charged

(d) diverge because the ultraviolet light is negatively charged

Q-10 **A photon is a bundle of:**

(a) light energy which demonstrates the particle property of light

(b) light energy which demonstrates the wave property of light

(c) negative charge which demonstrates the particle property of light

(d) light energy which demonstrates the particle property of matter

Chapter-15 Topic 15 Fluids at rest and in motion

Q-1 **What do you understand by the word 'fluid'?**

Q-2 **Explain why surface tension applies only to liquids.**

Q-3 **Explain why the air pressure inside a soap bubble is greater than the surrounding pressure.**

Q-4 **What are forces of cohesion and forces of adhesion?**

Q-5 **How does surface tension change as a liquid is heated?**

Q-6 **What does 'viscostatic' mean?**

Q-7 **What does 'lumen' mean?**

Q-8 **What is the contact angle between pure water and clean glass?**

Q-9 **If the contact angle between a liquid and a solid is 90º, what effect would this have on the behaviour of this liquid in a narrow tube made of that solid?**

Q-10 **Using your own words, and good English, explain why surface tension is important in the lungs.**

Q-11 **What is 'viscosity'?; In what units is it measured?**

a) What is 'viscosity'?

b) In what units is it measured?

Q-12 **In general, how do viscometers work?**

Chapter-16 Topic 16 Units of measurement

Q-1 **Make the following unit conversions: a) 50 °F into K b) 30 °C into °F c) 1.7 acres into m² d) 85 hp into watts e) 5 000 J into kWh f) 212 hp into kW**

a) 50 °F → K

b) 30 °C → °F

c) 1.7 acres → m²

d) 85 hp → W

e) 5 000 J → kWh

f) 212 hp → kW

Q-2 **The Benin distribution company charges their Residential 2 customers electricity at the rate of N18.46 per kilowatt-hour. A resident in this district has a meter reading of 99.96 kWh. How much must the homeowner pay for electricity for this month?**

Q-3 **A resident in the Yola district, where the electricity tariff is N19.44/kWh for Residential 2 customers, buys a prepaid voucher for N4 500. Taking into account that VAT at 5% is deducted from this amount, calculate:**

a) How many kilowatt-hours of electricity he would get for this amount

b) How many days he could use this voucher for, if he uses an average of 8 kWh per day

Q-4 **Table 6.1 shows the crude oil price, domestic production and crude oil export (mbd) for the month of March 2015 in Nigeria. Calculate:**

a) How many litres of oil were produced for the month?

b) How much did Nigeria earn in March for oil exportation?

c) How many m³ of crude oil were used locally in Nigeria?

Multiple Choice Questions

Q-1 **The melting point of pure 24 K gold is 1 945 °F. This temperature is equivalent to:**

(a) 3 533 °C

(b) 2 218 K

(c) 1 063 °C

(d) 1 672 K

Q-2 **The size of a farm is 1 000 acres. What is this area in hectares? (Hint: 1 hectare = 10 000 m2.)**

(a) 0.1 ha

(b) 4.047 ha

(c) 404.7 ha

(d) 4 047 ha

Q-3 **A diesel generator for home usage is rated at 40 hp. What is the power rating of this generator in kilowatts?**

(a) 29.84 kW

(b) 298.4 kW

(c) 29 840 kW

(d) 40 kW

Q-4 **The following statements are made about the kilowatt-hour unit. i) The kilowatt-hour measures electrical power. ii) The kilowatt-hour is equivalent to 3.6 × 10^6 J. iii) The kilowatt-hour measures time. Which of the above statement(s) is/are correct?**

(a) (i) only

(b) (ii) only

(c) (i) and (ii) only

(d) all of (i), (ii) and (iii)

Chapter-17 Topic 17 Electrical continuity testing

Q-1 **Explain what is meant by a continuity fault in an electric circuit.**

Q-2 **What are the two essential features of a continuity tester?**

Q-3 **Your friend brings an electric flashlight (torch) to you because it is not working. He wants you to use your continuity tester to find the fault in the flashlight. Figure 6.4 shows a cross-section of the flash light. Which two points (labelled A to J) would you connect to the probes of your continuity tester to check if each of the following components are in working order?**

a) bulb

b) Cell 1

c) Cell 2

d) slide switch

Chapter-18 Topic 18 Solar collectors

Q-1 **Give the main functions of the following parts of a solar panel system for use in homes:**

a) solar cell

b) charge controller

c) back-up batteries

d) inverter

Q-2 **Write a brief report comparing and contrasting the following types of electricity production: a) electricity grid (power supplied by a power station) b) diesel or petrol generators c) solar panel systems. Your report should include the following headings: • start-up cost (if any) • cost per day of using the type of power • maintenance costs • reliability • effects on the environment.**

a) electricity grid (power supplied by a power station)

b) diesel or petrol generators

c) solar panel systems

Multiple Choice Questions

Q-1 **A solar panel is used for converting:**

(a) solar energy into thermal energy

(b) solar energy into both thermal and electrical energy

(c) electrical energy into thermal energy

(d) solar energy into electrical energy

Q-2 **An inverter in a solar panel system providing electricity for homes is used to:**

(a) convert solar energy to electrical energy

(b) regulate the amount of current passing to the back-up batteries

(c) change the direct current to alternating current

(d) change the alternating current to direct current

Q-3 **Which one of the following statements concerning the solar collector is incorrect?**

(a) The solar collector converts solar energy into electrical energy.

(b) The glass panel of the collector allows light rays to enter the collector, but prevents them from leaving.

(c) The pipes and metal base are all painted black so as to be good heat absorbers.

(d) The heated water in the collector flows out through the top of the collector.

Q-4 **The following statements refer to the use of solar cells for generating electricity. i) High start-up costs. ii) High efficiency in conversion of solar energy into electrical energy. (iii) Low contribution to emission of greenhouse gases. Which of the above statement(s) is (are) true?**

(a) (i) only

(b) (i) and (ii) only

(c) (i), (ii) and (iii)

(d) (i) and (iii) only