Class: 7th
Amazing Science

Unit: 7 “Composition of matter”

Q1: Fill in the blanks.

(i) Matter is made up of tiny particles called ______________. (Atoms)
(ii) ______________ is the positively charged particle. (Proton)
(iii) An ______________ is a negatively charged. (Electron)
(iv) The number of protons in an atom is called its ______. (Atomic Number)
(v) The sum of the number of protons and neutrons in an atom is called its ______. (Mass Number)

Q2: True and false Statements.

(i) Atoms are the building blocks of all substances. (T / F)
(ii) An atom is indivisible. (T / F)
(iii) All atoms consist of a nucleus. (T / F)
(iv) Electron is heavier than proton. (T / F)
(v) First shell can hold a maximum of two electrons. (T / F)

Q3: Multiple choice questions. MCQs

(i) The number of protons in sodium atom is.
   (a) 12 (b) 11 (c) 10 (d) 23

(ii) The number of protons in an atom is called.
   (a) mass number (b) real number
   (c) atomic number (d) prime number

(iii) The number of electrons in an atom is always equal to the.
   (a) number of protons (b) number of neutrons
   (c) number of shells (d) none of these

(iv) The symbol of sodium is.
   (a) S (b) N (c) M (d) Na

(v) A substance that is made up of only one kind of atom is called.
   (a) Compound (b) Element (c) Mixture (d) None of these.
Q4: Match Column “A” with column “B”.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Isotopes</td>
<td>A Mass number</td>
</tr>
<tr>
<td>(2) To kill cancer cells</td>
<td>B Radioactive</td>
</tr>
<tr>
<td>(3) Carbon – 14</td>
<td>C Gamma rays</td>
</tr>
<tr>
<td>(4) Valency</td>
<td>D Combining power</td>
</tr>
<tr>
<td>(5) Protons + neutrons</td>
<td>E Same atomic number but different mass numbers</td>
</tr>
</tbody>
</table>

Q5: Answer the following questions. (Short Questions)

Q1. Describe the structure of an atom.
Ans: An atom consists of a nucleus and a cloud of electrons that move around the nucleus. In a nucleus protons and neutrons are present; these particles are also called nucleons’. Electrons revolve around the nucleus in definite layers called energy levels, shells or orbits. Different shells can hold different numbers of electrons.

Q2. (a) What is an element?
Ans: A substance that is made of only one kind of atom, such a substance is called an element. One kind of atoms means, that all atoms of an element have same atomic number. Example: carbon, Gold, Silver, Copper etc.
Types of elements: There are two types of elements.
(i) Natural (ii) Artificial or man made
Number of Natural elements = 92 Number of Artificial elements = 26
Hence total number of elements = 118
(b) Write the symbols of the following elements.
Carbon, nitrogen, hydrogen, oxygen, sulphur, phosphorous, calcium, chlorine.
Ans:

<table>
<thead>
<tr>
<th>Name of elements</th>
<th>Symbol of element</th>
</tr>
</thead>
<tbody>
<tr>
<td>i Carbon</td>
<td>C</td>
</tr>
<tr>
<td>ii Nitrogen</td>
<td>N</td>
</tr>
<tr>
<td>iii Hydrogen</td>
<td>H</td>
</tr>
<tr>
<td>iv Oxygen</td>
<td>O</td>
</tr>
<tr>
<td>v Sulphur</td>
<td>S</td>
</tr>
<tr>
<td>vi Phosphorus</td>
<td>P</td>
</tr>
<tr>
<td>vii Calcium</td>
<td>Ca</td>
</tr>
<tr>
<td>viii Chlorine</td>
<td>Cl</td>
</tr>
</tbody>
</table>

Q3. Define valency. What does the valency of an element depend upon?
Ans: The combining power of an element with another element is called the valency. The valency of an element depends on the number of electrons the elements has in its outermost shell.
Example: The valency of Hydrogen is one because it has one electron in its valence shell.
Rules: If an element has four or fewer (one, two, three) electrons in its outer shell, then the number of electrons is the same as the valency. If the element has more than four electrons its valency is eight minus the number of electrons.

Q4. What is compound?
Ans: When two or more than two elements chemically combine together, entirely new substance is formed which is called a compound.
Compounds are of two types (i) Ionic (ii) Covalent
Example: Water, Sodium chloride (Table salt)

Q5. Answer the following questions.
(i) What kind of bond exists between a sodium atom and chlorine atom?
Ans: Ionic bond exists between sodium atom and a chlorine atom. Sodium atom has one electron in its outer shell while chlorine atom has seven electrons in its outer shell. Sodium atom loses one electron and becomes positive ion, this electron is gained by chlorine atom and becomes negative ion, these oppositely charged ions attract each other and form an ionic bond.
(ii) What kind of bond exists between two oxygen atoms?
Ans: Covalent bond exists between two oxygen atoms, oxygen atom has six electrons in its outer shell. Its valency is 2 to complete its outer shell. Oxygen atom shares its two electrons with another oxygen atom and as a result double covalent bond forms between two oxygen atoms.

Q6. Explain the difference between the following terms.
(a) Proton and Electron.
Ans: **PROTON**: The sub atomic particle of an atom present in the nucleus of an atom. It carries positive charge. It is 1837 times heavier than electron.
**ELECTRON**: The sub atomic particle of an atom present in shell, extra nuclear region. It carries negative charge. It is 1837 times lighter than proton. It takes part in chemical reactions.
(b) Symbol and formula.
Ans: SYMBOL: The abbreviated or short hand representation of the name of an element is called symbol. For example carbon = C, Hydrogen = H etc.
A symbol may be single letter or two letters. Single letter is always capital and in case of two letters the first will be capital and second will be small eg, H, Na etc.
FORMULA: The symbolic representation of a chemical compound is called formula. A formula tells us which atoms are present in a compound. For example the formula of water is “H₂O”.

(c) Atomic Number and Mass Number.
Ans: ATOMIC NUMBER: The number of protons or electrons in an atom is called atomic number. It is represented by “Z”. Different elements have different atomic number.
MASS NUMBER: The number of protons and neutrons is called mass number. It is represented by “A”.

(d) Atom and Molecule.
Ans: ATOM: The smallest particle of a matter which can take part in a chemical reactions, is called an atom. An atom may or may not exist free in nature eg, “H” C, O etc. represent the atom of Hydrogen, Carbon, Oxygen respectively.
MOLECULE: The smallest entity of an element or compound which can exist independently is called a molecule. For example. H₂, O₂, H₂O, etc. It represents an element or compound.

(e) Element and Compound.
Ans: ELEMENT: A pure substance which is made up of identical atoms (all atoms have same atomic numbers). They may be metals, non-metals or metalloids. The known elements are 118. For example. Iron, Aluminum, Carbon etc.
COMPOUND: A pure substance which is made up of two or more atoms (elements) such a substance is called a compound. The atoms always combine chemically in fix mass ratio. For example. H₂O (water), NaCl (Table salt) etc.

(f) Ionic bond and Covalent bond.
Ans: IONIC BOND: A bond formed between positive ion and negative ion, is called an ionic bond, ionic bond forms when an atom completely transfers its electron to another atom. Compounds having ionic bonds are called ionic compounds.
Covalent bond: A bond formed by mutual sharing of electrons is called a covalent bond, compounds having covalent bonds are called covalent compounds.

(g) Symbol and Chemical Formula:
Ans: SYMBOL: The symbolic representation of an element is called symbol. A symbol is simply abbreviation for an element. For example Hydrogen “H”, Oxygen “O”, Nitrogen “N” etc.
CHEMICAL FORMULA: The symbolic representation of a compound is called a chemical formula. It shows the composition of a compound. For example. H₂O is the formula of water.

(h) Element and Isotopes:
Ans: ELEMENT: A pure substance that cannot be broken down into simpler substances by ordinary chemical or physical means, such a substance is called an element. There are 118 elements known up till now. Among these 92 are naturally occurring elements while the rest have been made by scientists.
ISOTOPES: Atoms of the same element having same atomic number but different mass numbers such atoms are called isotopes they have same chemical properties but different physical properties.

Unit: 8 “Changes in matter”

Q1: Fill in the blanks.

(i) Melting and dissolving are examples of _____________ changes (physical)
(ii) _____________ turns to water at 0°C. (ice)
(iii) Physical changes are easy to _____________. (reverse)
(iv) A new substance is made in ____________ change. (chemical)
(v) The iron fillings stick to _____________. (magnet)

Q2: True and false Statements.

(i) The three elements plants need most are nitrogen, potassium and phosphorus. (T / F)
(ii) Calcium nitrate is not a fertilizer. (T / F)
(iii) Ammonium nitrate is made by reacting ammonia with nitric acid (T / F)
(iv) A plastic is a natural material. (T / F)
(v) Polyethylene, nylon and poly vinyl chloride are polymer. (T / F)

Q3: Multiple choice questions. MCQs

(i) Polyethylene is made from the monomer.___________.
   (a) Ethene (b) Ethane
   (c) Ethyne (d) Methane
(ii) Plastics are very good electrical _____________.
     (a) Conductors (b) instruments
     (c) Insulators (d) None of these
(iii) Crude oil is a mixture of compound called _____________.
     (a) Hydrocarbons (b) Hydronitrogens
     (c) Hydronium ions (d) None of these
(iv) Fractional distillation is used for the refining of___________.
     (a) Musured oil (b) Olive oil
     (c) Soybean oil (d) Crude oil
(v) Fats belong to a group of substances called.
     (a) Carbohydrate (b) Lipids
     (c) Vitamins (d) Enzymes
Q4: Match Column “A” with column “B”.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Melting and dissolving</td>
<td>A Chemical change</td>
</tr>
<tr>
<td>(2) Valuable food</td>
<td>B Crude oil</td>
</tr>
<tr>
<td>(3) Polymer</td>
<td>C Margarine</td>
</tr>
<tr>
<td>(4) Fossil fuel</td>
<td>D Plastic</td>
</tr>
<tr>
<td>(5) Burning of candle</td>
<td>E Examples of physical changes</td>
</tr>
</tbody>
</table>

Q5: Answer the following questions. (Short Questions)

Q1. Explain the differences between a physical and a chemical change.

Ans: A change in which only the behaviour of the particles changes. The actual particles are the same throughout and the total mass of the substance remains the same, such a change is called a physical change. For example ice turns to water at 0°C. It is easy to change the water back to ice again by cooling it. No new substance is formed in the change.

A change in which the behavior as well as composition of the substance entirely change and completely new substances are produced, such a change is called a chemical change. For example: On burning a piece of paper changes into carbon dioxide, water vapours and ashes.

Q2. How do we know that a chemical change has taken place?

Ans: A change in which completely new substances are formed is called a chemical change, hence when completely new substances are produced during a change we know that a chemical change has taken place.

Q3. What is a reversible reaction? Give an example.

Ans: A reaction in which reactants change into products and at the same conditions, the products change back into reactants, such reaction is called reversible reaction. The symbol for this reaction is $\leftrightarrow$.

Example: When Ammonia gas and hydrogen chloride come into contact with each other. A white cloud of Ammonium chloride vapours is formed, if solid Ammonium chloride is heated, it decomposes to give Ammonia gas and Hydrogen chloride gas.

Ammonia + Hydrogen chloride $\leftrightarrow$ Ammonium chloride.

Q4. What are fertilizers? What are the qualities of a good fertilizer?

Ans: Those chemicals which are needed by plants for their proper growth, such chemicals are called fertilizers.

A good fertilizer contains the elements (Nitrogen, Potassium, Calcium, Phosphorous etc) in sufficient amount which are needed to promote healthy growth in plants.

Q5. How is the fertilizer, Ammonium nitrate manufactured?

Ans: Ammonium nitrate is manufactured by reacting two chemicals. (i) Ammonia and (ii) Nitric acid the reaction is given below.

$$\text{NH}_3 + \text{HNO}_3 \rightarrow \text{NH}_4\text{NO}_3$$

Ammonia Nitric acid Ammonium Nitrate

Q6. What are plastics? Write the names of the plastics that is used for making. Plastic bags, ballpoint pens, hosepipes, rope, clothing, saucepan handles, rulers electrical fittings.

Ans: Plastic are polymers, which are synthetic materials which can easily be shaped. They are tough and versatile. The items and the names of the plastics from which they are made are as follows.
<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of item</th>
<th>Name of plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plastic bags</td>
<td>Polyethene</td>
</tr>
<tr>
<td>2</td>
<td>Ball point pens</td>
<td>Polystyrene</td>
</tr>
<tr>
<td>3</td>
<td>Hose pipe</td>
<td>Pvc</td>
</tr>
<tr>
<td>4</td>
<td>Rope</td>
<td>Nylon</td>
</tr>
<tr>
<td>5</td>
<td>Clothing</td>
<td>Nylon / terylene</td>
</tr>
<tr>
<td>6</td>
<td>Saucepan handles</td>
<td>PTFE</td>
</tr>
<tr>
<td>7</td>
<td>Rulers</td>
<td>Perspex</td>
</tr>
<tr>
<td>8</td>
<td>Electrical fitting</td>
<td>Bakelite</td>
</tr>
</tbody>
</table>

Q7. Explain why crude oil is called a fossil fuel?
Ans: Crude oil was made from microscopic plants and animals which lived in sea. On their death they buried under mud and due to high temperature and pressure they changed into crude oil, therefore it is called fossil fuel.

Q8. Name two fuels produced by fractional distillation.
Ans: The name of two fuels produced by fractional distillation are (i) Petrol (ii) Diesel

Q9. Name two solid fuels, two liquid fuels and two gaseous fuels.
Ans: Solid fuels. (i) Wood (ii) Coal
Liquid fuels. (i) Petrol (ii) Diesel
Gaseous Fuels. (i) Natural gas (ii) Hydrogen gas

Q10. Describe the process by which fats and plants oils are turned into valuable foods such as margarine.
Ans: The oil for making margarine is squeezed from seeds, this oil is refined by heating with sodium hydroxide. The purified oil is heated with hydrogen gas in the presence of a catalyst (Nickel, which speeds up this process), and oil converts into fat. The fat is heated and steam is blown over it to take away the unpleasant smell. To make this fat good looking and healthier to eat, colouring, flavouring materials, salts and vitamins are added.

Q11. What is the difference between soap and detergent?
Ans:

<table>
<thead>
<tr>
<th>Soap</th>
<th>Detergent</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soap is produced from edible oil or fat.</td>
<td>• Detergent is produced from petrochemical materials.</td>
</tr>
<tr>
<td>• Soap is bio degradable.</td>
<td>• Detergent is bio-non degradable.</td>
</tr>
<tr>
<td>• Soap can act best in soft water.</td>
<td>• Detergent can act best in soft as well as hard water.</td>
</tr>
</tbody>
</table>

Q12. How was crude oil formed?
Ans: According to scientists, millions years ago. When microscopic plants and animals died their bodies collected at the bodies collected at the bottom of the ocean. They were covered by mud and sand and due to high temperature and pressure they converted into crude oil.
Q13. List the fractions obtained from crude oil.
Ans: (i) Gas  (ii) Petrol  (iii) Kerosene oil  (iv) Diesel oil  (v) Lubricating oil  (vi) Fuel oil  
(vii) Paraffin waxes  (viii) Bitumen

Q14. Write whether the following changes are physical or chemical.
Ans: 
(i) Burning of paper: Chemical change  
(ii) Dissolving sugar in tea: Physical change  
(iii) A mixture of salt and sand: Physical change  
(iv) Boiling an egg: Physical change  
(v) Burning a candle: Chemical change  
(vi) Glowing of an electric bulb: Physical change  
(vii) Melting of ice: Physical change  
(viii) Freezing water into ice: Physical change  
(ix) Burning coal: Chemical change  
(x) Exploding a fire cracker: Chemical change

Unit: 9 “Heat and Energy”

Q1: Fill in the blanks.

(i) Matter is made up of __________ particles. (tiny)  
(ii) If a metal bar cools down, its internal energy __________. (decrease)  
(iii) Iron, steel are copper are good ________ of heat. (conductors)  
(iv) Air is good __________. (insulator)  
(v) ________ occurs when heat is transferred from one part of a fluid to another by the movement of the fluid itself. (magnet)

Q2: True and false Statements.

(i) Fire fighters wear clothes made of fibre glass. (T / F)  
(ii) Heat can travel through solids by radiation. (T / F)  
(iii) The ventilation of a room is an example of convection. (T / F)  
(iii) The upward currents of warm air that rise by convection are called thermals. (T / F)  
(v) Radiation cannot travel in space. (T / F)

Q3: Multiple choice questions. MCQs

(i) Radiation from the sun passes easily through the walls of a.  
(a) Beautiful house  (b) Green house  
(c) Black house  (d) Red house  
(ii) A device consist of a double walled glass bottle which has vacuum between the two walls is a.  
(a) Thermos flask  (b) Conical flask
(c) Distillation flask  (d) None of these

(iii) The degree of hotness or coldness of a body is called.
  (a) Pressure  (b) Volume
  (c) Speed  (d) **Temperature**

(iv) A thing glass tube called a capillary tube which has a wide bulb
  containing mercury is a part of.
  (a) **Thermometer**  (b) Barometer
  (c) Statgmometer  (d) None of these

(v) -273°C is the lower point of.
  (a) **Celsius scale**  (b) Fahrenheit scale
  (c) Kelvin scale  (d) Measuring scales

Q4: Match Column “A” with column “B”.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) -273°C</td>
<td>A Melting point of ice</td>
</tr>
<tr>
<td>(2) 32°F</td>
<td>B Absolute Zero</td>
</tr>
<tr>
<td>(3) Cannot measure</td>
<td>C Digital thermometer</td>
</tr>
<tr>
<td>temperature below</td>
<td></td>
</tr>
<tr>
<td>(4) Electronic thermometer</td>
<td>D Good absorbers of heat</td>
</tr>
<tr>
<td>(5) Dull black surfaces</td>
<td>E Mercury thermometer</td>
</tr>
</tbody>
</table>

Q5: Answer the following questions. (Short Questions)

Q1. What is heat?
Ans: Heat is the degree of hotness or coldness (Temperature) in scientific terms, heat is a type of energy found in an object that has a higher temperature than its surroundings when an object is heated, its molecules gain energy and start moving faster.

Q2. How does heat travel from one end of an object to the other?
Ans: When an object is heated, its molecules gain energy and start moving faster. As they vibrate they bump into each other at a faster rate and push the particles in front of them. As this movement continues, heat travels from one end to the other.

Q3. What is an insulator? How are insulators useful?
Ans: Material that do not conduct heat or electricity easily is called an insulator.
USEFULNESS OF INSULATORS: (i) The handleless of pots and pans are made of wood or plastic, so that heat is not conducted from the pan to the handle and we do not burn our hands. (ii) Fire fighters wear clothes made of an insulating material called fiber glass. (iii) We wear woolen clothes in winter to keep warm because wool is an insulator.

Q4. What are the methods of heat transfer?
Ans: The methods of heat transfer are (i) Conduction (ii) Convection (iii) Radiation
   (i) **CONDUCTION**: The transfer of heat through solids is called conduction. The particles of solids only vibrate.
   (ii) **CONVECTION**: The transfer of heat through fluids (liquids and gases) is called convection. The particles of fluids move from one place to another place
   (iv) **RADIATION**: The transfer of heat through space is called radiation. Solids, liquids and gases are not required in this method of transfer of heat.
Q5. What is conductivity? How can the conductivity of different materials be compared experimentally?

Ans: The ability of a material to conduct heat is called conductivity.

To compare the conductivity of different materials. Take some rods which are of the same length and thickness but are made of different materials such as wood iron, copper, aluminum etc. Dip them in molten wax and allow them to cool, then pass them through a metallic box which has roles in its sides. Pour hot water in the box. After a few minutes, remove the rods. You will observe that the wax melts to a different distance on each rod.

Q6. Prove by an experiment that water is a bad conductor of heat.

Ans: “To prove that water is a bad conductor of heat” wrap a cube of ice in a piece of Guaze and drop it into a test tube full of water. Hold the top of the tube close to a Bunsen flames you will observe that although the water at the top boils, the ice at the bottom of the tube does not melt. So it shows that water is a bad conductor of heat.

Q7. How do convection currents move in a liquid?

Ans: To demonstrate convection in liquids.

Fill a conical flask with tap water and drop l large crystal of potassium permanganate into it. Heat the flask an upward current of coloured water (purple) will rise and spread outwards it will move down the sides of the flask showing that a convection current has set up.

Q8. Explain what causes land and sea breezes?

Ans: Convection causes land and sea breezes.

Sea Breeze: During the daytime the land heats up quickly as a result the air above it becomes hot and expand are rises the cooler air above the sea blows in to take it place. This is called sea breeze.

Land Breeze: At night the air above the sea warms up. It expands and rises up and in this way new the breeze blows from the cooler land to the sea and is called a bland breeze.

Q9. Explain the radiation of heat.

Ans: Radiation is a particular way in which energy travels for its transmission medium such as solid and liquid are not required it can travel in space. The earth is heated by radiation of sun light this heat travels through space and reaches the earth some of it is absorbed and some of it is reflected back white objects reflects more heat and black absorbs more heat.

Q10. How does the temperature of a liquid in a thermos flask remain the same for a long time?

Ans: The temperature of a liquid in a thermos flask remains the same for a longtime because it reduces the transfer of heat that might take place by conduction, convection and radiation. A thermos flask consist of a double walled glass bottle which has a vacuum between the two walls. The inner sides of the walls are shiny. The mouth of the bottle is closed with a cork or plastic stopper (insulator) so heat cannot travel in or out of the flask.

Q11. What is temperature? What does the temperature of a body depend on?

Ans: The degree of hotness or coldness of a body is called its temperature.

Temperature of a body depends on the internal kinetic energy of the molecules of that body.
Q12. How is temperature measured?
Ans: Temperature is measured with an instrument called thermometer. A thermometer consists of a thin glass tube which has a wide bulb at one end. The bulb contains mercury or alcohol and is sealed. The tube is enclosed in a glass case which has a scale marked on it. When the bulb is held close to the body whose temperature is to be checked the liquid in the capillary tube expands and indicates the temperature on the scale.

Q13. Describe the various types of thermometers.
Ans: The various types of thermometers are (i) Mercury Thermometer (ii) Alcohol thermometer (iii) Maximum and minimum thermometer (iv) Digital thermometer (v) Electrical thermometer
   (i) Mercury Thermometer: It contains mercury which expands and contract with the rise and fall of temperature.
   (ii) Alcohol Thermometer: It contains alcohol it is cheap and easy to use it can measure very low temperatures.
   (iii) Maximum and minimum Thermometer: This is used to record the maximum and minimum temperatures of place every 24 hours. It consist of two bulbs.
   (iv) Digital Thermometer: This is an electronic thermometer. It is compact and inexpensive used for great precision.
   (v) Electrical Thermometer: It has a digital display. It is used in furnace or a kiln. Its reading can be read by computer its range is -200 to 1600°C or more.

Q14. Convert the following temperatures from the centigrade scale to the Kelvin scale.
(a) 0 (b) 100 (c) 180 (d) -173 (e) -100
Ans: The formula of conversion is as follows.
K = C° + 273
(a) K = 0 + 273 = 273 Ans
(b) K = 100 + 273 = 373 Ans

(c) K 180 + 273 = 453 Ans

(d) K ≠ C° + 273 K = -173 + 272 = 100 Ans
(e) K = C° + 273 K = -100 + 273 = 173 Ans

Q15. Convert the following temperatures from the Kelvin scale to the Celsius scale.
(a) 0 K (b) 73 K (c) 150 K (d) 473 K (e) 561 K
Ans: The conversion formula is as follows
C° = K – 273
(a) C° = 0 – 273 = -273 C° Ans
(b) C° = 73 – 273 = -200 C° Ans
(c) C° = 150 – 273 = -123 C° Ans
(d) C° = 473 – 283 = 200 C° Ans
(e) C° = 561 – 273 = 288 C° Ans
**Unit: 10 “Dispersion of light”**

**Q1: Fill in the blanks.**

(i) Light waves travel at a speed of about_______ km/s. (300,000)
(ii) The refractive index of_______ is 1.5. (Glass)
(iii) A ray of_______ is always refracted in a definite direction. (Light)
(iv) At angle greater than_______ all the light is reflected. (42°)
(v)_______ are thin fibres of glass through which light can pass. (optical fibres)

**Q2: True and false Statements.**

(i) The periscope uses total internal reflection. (T / F)
(ii) The range of colours is called paint. (T / F)
(iii) The critical angle of diamond is 24°. (T / F)
(iv) The bending of light in transparent material is called reflection. (T / F)
(v) As light passes from water to air it bends away from the normal. (T / F)

**Q3: Multiple choice questions. MCQs**

(i) The angle at which much more of the light is being reflected is called.
   (a) Right angle (b) Triangle
   (c) Critical angle (d) None of these
(ii) The refractive index of water is.
   (a) 1.00 (b) 1.33
   (c) 1.51 (d) 24
(iii) For capturing images of objects cameras also use.
   (a) Prisms (b) Machines
   (c) Phones (d) None of these
(iv) The combination of red and green colour produces.
   (a) White colour (b) Blue colour
   (c) Red colour (d) Yellow Colour
(v) Primary colours are.
   (a) 3 (b) 7
   (c) 2 (d) 10

**Q4: Match Column “A” with column “B”.**

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Light pipe</td>
<td>A Dispersion of white light</td>
</tr>
<tr>
<td>(2) Prism</td>
<td>B 42°</td>
</tr>
<tr>
<td>(3) Secondary colour</td>
<td>C Primary pigments</td>
</tr>
<tr>
<td>(4) Critical angle of glass</td>
<td>D Combination of primary colour</td>
</tr>
<tr>
<td>(5) Three</td>
<td>E Optical fibres</td>
</tr>
</tbody>
</table>
Q5: Answer the following questions. (Short Questions)
Q1. What is the speed of light in air?
Ans: The speed of light in air is about 300,000 km/s in air.
Q2. What is refraction of light?
Ans: The bending of light when it enters from rare (lighter) medium like air into denser medium like water, glass etc, it bends this bending of light is called refraction.
Q3. What is meant by the refractive index of a material?
Ans: The ratio of the speed of light in a vacuum to the speed of light in the material (liquid, solid) is called the refractive index of the material. 
Refractive index = \(\frac{\text{Speed of light in vacuum}}{\text{Speed of light in material}}\)
Q4. Calculate the speed of light in water when the refractive index of water is 1.33.
Ans: Refractive index = \(\frac{\text{Speed of light in vacuum}}{\text{Speed of light in material}}\)
\[
\text{Speed of light in water} = \frac{\text{Speed of light in vacuum}}{\text{Refractive index of water}}
\]
\[
\text{Speed of light in water} = \frac{300000}{1.33} = 225563.91 \text{ km/s} \quad \text{Ans}
\]
Q5. Why do pools appear shallower than they actually are?
Ans: Pools appear shallower than they actually are because light bends as it passes from transparent material to another. As light passes from water to air it bends away from the normal. Due to this pools appear shallower.
Q6. When can glass prism act like perfect mirror?
Ans: A glass prism can act like perfect mirror when light rays strike on inside face at an angle greater than its critical angle.
Q7. What is meant by total internal reflection.
Ans: At angle greater than 42° all the light is reflected this is called total internal reflection.
Q8. Show by diagram how total internal reflection of prism is used in periscope.
Ans: Page No 96
Q9. What is an optical fibre what are optical fibres used for?
Ans: Optical fibre is thin fibre through which light can pass. They are bundled together and used as a light pipe optical fibres can be used for inspection inside machines and even inside the human body. They are used to transmit telephone signals.
Q10. Draw a diagram to show the dispersion of white light into a spectrum.
Ans: Page No 97
Q11. Which colour has. (a) The longest wavelength (b) The shortest wavelength.
Ans: (a) Red colour has the longest wave length.
(b) Violet colour has the shortest wave length.
Unit: 11  “Oscillations and Waves”

Q1:  Fill in the blanks.

(i)  We can use __________ waves to send information in the form of TV programmes. (Radio)
(ii)  The to and fro movement is called an __________. (Oscillation)
(v)  A simple _______ can be made by hanging a bob on a length of string. (Pendulum)
(iv) __________ can be used to make waves. (Oscillations)
(v)  Waves transfer __________ from one place to another. (Energy)

Q2:  True and false Statements.

(i)  Transverse waves are produced when the oscillations is from side to side.  (T / F)
(ii)  The waves on the spring and sound waves are transverse wave.  (T / F)
(iii) The critical angle of diamond is 24°.  (T / F)
(iv)  The bending of light in transparent material is called reflection.  (T / F)
(v)  Musical instruments make sounds which are pleasing.  (T / F)

Q3:  Multiple choice questions. MCQs

(i)  The stretches are called.
   (a) Reflection  
   (b) Rarefaction
   (c) Compression  
   (d) Pitch

(ii)  If you strick a drum gently with a drum it makes a.
   (a) Hard soft  
   (b) Loud sound
   (c) Soft Sound  
   (d) Dangerous sound

(iii) The loudness of sound also depends on the surface area of the.
   (a) Vibrating body  
   (b) None vibrating body
   (c) Falling body  
   (d) None of these

(iv)  A sound is considered highest frequency sound if its frequency is.
   (a) 1000 Hz  
   (b) 20000 Hz
   (c) 100 Hz  
   (d) 200 Hz

(v)  All smoke detectors consist of.
   (a) 2 basic parts  
   (b) 3 basic parts
   (c) 10 basic parts  
   (d) 4 basic parts

Q4:  Match Column “A” with column “B”.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Turns voice sounds into electrical signals</td>
<td>A Frequency</td>
</tr>
<tr>
<td>(2) Hertz</td>
<td>B Longitudinal waves</td>
</tr>
<tr>
<td>(3) Sound waves</td>
<td>C 10000 Hz</td>
</tr>
<tr>
<td>(4) Frequency of whistle</td>
<td>D Distance between wave fronts</td>
</tr>
</tbody>
</table>
Q5: Answer the following questions. (Short Questions)
Q1. What is an oscillation?
Ans: The to and fro movement of a body is called oscillation.
Examples of oscillation: A child swing moves backwards and forwards if it is pushed. A clock keeps good time because the pendulum moves backwards and forward regularly.
Q2. What is a period?
Ans: The time taken for one complete oscillation is called a period.
Q3. What is meant by the frequency of an oscillation?
Ans: The number of oscillations that are completed in one second is called the frequency of the oscillation.
Q4. A child on a swing goes backwards and forwards 100 times in five minutes calculate the period of the oscillation and frequency in hertz.

Unit: 12 "Current electricity"
Q1: Fill in the blanks.
(i) Electricity energy is commonly known as ___________. (Electricity)
(ii) Materials through which____ can flow easily are called conductors. (Oscillation)
(iii) A ______ is a complete loop through which a charge flows. (Circuit)
(iv) A fuse is made of a thin fuse wire which has a low______. (Melting point)
(v) The size of the ____is measured in units called amperes. (Current)

Q2: True and false Statements.
(i) The unit of charge is coulomb. (T / F)
(ii) Voltage can be measured using battery. (T / F)
(iii) Current easily passes through a piece of copper wire. (T / F)
(iv) If the circuit has a high resistance, only a small voltage is needed. (T / F)
(v) Resistance is measured in units called ohms. (T / F)

Q3: Multiple choice questions. MCQs

Page No 123
Q4: Match Column “A” with column “B”.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Current measuring instrument</td>
<td>A Wood</td>
</tr>
<tr>
<td>(2) Switch</td>
<td>B Good conductors</td>
</tr>
<tr>
<td>(3) Semiconductors</td>
<td>C Ammeter</td>
</tr>
<tr>
<td>(4) Insulator</td>
<td>D To open or close a circuit</td>
</tr>
<tr>
<td>(5) Metals</td>
<td>E Conductors at high temperature</td>
</tr>
</tbody>
</table>

Q5: Answer the following questions. (Short Questions)

Q1. What are free electrons? How do free electrons produce an electric current?
   Ans: Electrons that can move from one place to another are called free electrons. When free electrons are forced to move in one particular direction, an electric current is produced.

Q2. Define conductor and insulator.
   Ans: CONDUCTORS: Materials through which electrons can flow easily are called conductors, that is, they can carry an electric current.
        INSULATORS: Materials through which electrons cannot flow easily are called insulators, that is, they cannot carry an electric current.

Q3. What is a current? How is it measured?
   Ans: The flow of free electrons in one particular direction is called a current.
        Ammeter is used to measure the current. Ammeter is connected in the main circuit and it measures the strength of current.

Q4. Draw a simple circuit and label it. Why is a switch necessary in a circuit?
   Ans: Page No: 12 A switch is used to open or close a circuit.

Q5. What is a fuse? How does a fuse protect electrical appliances from damage?
   Ans: A thin wire which can melt and protect the electrical appliances from damage is called a fuse when a large current flow, it may damage the electrical appliances but when the fuse melts, its stops the flow of large current and saves the appliances.

Q6. Describe a voltaic cell.
   Ans: VOLTAIC CELL: It is chemical cell. It consists of zinc and copper plates, or electrodes, dipped in an electrolyte such as dilute sulphuric acid. When the electrodes are connected by a copper wire, an electric current begins to flow in the circuit. (Diagram Page 116). Voltaic cell
Q7. Draw the inside of a dry cell and label it.
Ans: Page No: 116 Dry Cell

Q8. What is the motor effect? How is the motor effect used in electric motors?
Ans: When an electric current flow through a wire in a magnetic field, a force is produced. The force makes the wire move. This is called the motor effect.
When a single loop of wire carries the current in the direction shown the piece of wire on the left feels a force upwards, but the piece on the right feels a force downwards. These opposite forces make the loop of wire to start turning this twisting effect is used in electric motors.
Diagram form book should be drawn by the students/

Unit: 13 “Investigation space”

Q1: Fill in the blanks.

(i) ____________ is black because it has no light of its own. (Space)
(ii) The smallest stars are called ____________stars. (Dwarf)
(iii) The ____________ stars are the coolest of all. (Red)
(iv) ____________ is a part of an even bigger cloud of stars. (Milky Way)
(v) Our ____________ is one of the stars in milky way. (Sun)

Q2: True and false Statements.

(i) Some galaxies are round or oval. (T / F)
(ii) People south of the equator can see the Andromeda Galaxy. (T / F)
(iii) Pulsars were once giant stars. (T / F)
(iv) Quasars are the brightest things in space. (T / F)
(v) Great clouds of gas and dust are called black holes. (T / F)

Q3: Multiple choice questions. MCQs

(i) A very heavy dwarf stars has colour.
   (a) White
   (b) red
   (c) Blue
   (d) Green

(ii) In the telescope the first lens called the objective a.
   (a) Concave lens
   (b) Mirror
   (c) Convex lens
   (d) None of these

(iii) The number of other galaxies is.
   (a) 2 billion
   (b) 3 billion
   (c) Eleven Billion
   (d) Ten billion

(iv) According to the expanding universe theory the universe will never.
   (a) Expand
   (b) Collapse
   (c) Expand or collapse
   (d) Increase in size
Q4: Match Column “A” with column “B”.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Patterns of stars</td>
<td>A Milky way</td>
</tr>
<tr>
<td>(2) Giant stars</td>
<td>B Dwarf stars</td>
</tr>
<tr>
<td>(3) Primodial atom</td>
<td>C 100 times bigger than the sun</td>
</tr>
<tr>
<td>(4) Smallest stars</td>
<td>D Big bang theory</td>
</tr>
<tr>
<td>(5) Spiral Galaxy</td>
<td>E constilations</td>
</tr>
</tbody>
</table>

Q5: Answer the following questions. (Short Questions)

Q1. What is space?
Ans: Space is emptiness. It is black because it has no light of its own it is neither hot nor cold and there no air or water in space there are billions and billions of stars, huge clouds of dust and gas.

Q2. What produces radiations in space?
Ans: Radiations in space are produced by stars, quasars, planets and nebulae.

Q3. What kind of radiations reaches the earth?
Ans: Heat, light, radio waves, X-rays, Cosmic rays and gamma rays reach the earth.

Q4. Briefly explain the big bang theory?
Ans: This theory suggests that the universe began 10,000 million years ago with an enormous explosion scientists believe that all matter now in universe was contained in one primitive atom, called a primodial atom. This atom blew up and its contents flew up in all directions.

Q5. Compare the expanding universe theory with the pulsating universe theory to explain the origin of the universe. Which theory do you think could be most accurate why?
Ans: EXPANDING UNIVERSE THEORY:
This theory suggest that the universe is continually contracting and expanding.
PULSATING UNIVERSE THEORY:
This theory suggests that the universe will never collapse; it will keep on expanding. I think pulsating theory could be most accurate because the heat of the universe is increasing day by day and with this it should expand.
Q6. What is Galaxy? Describe the various kinds of Galaxies in space.
Ans: The huge mass of stars is called a Galaxy. There are, at least, ten billion galaxies and each of them contains many billions of stars. Galaxies are of different shapes like spiral, round or oval (elliptical). Some galaxies have no regular shape. Most galaxies are so far away that we cannot see them without a telescope.

Q7. What is Milky Way Galaxy? How does the sun take to orbit the Milky Way?
Ans: A bright haze in a part of the sky is called the Milky Way it is a gigantic cloud of stars, close together its shape is like a disc with a bulge in the centre. Milky Way is very big and the sun is very far from the centre of Milky way, it takes the sun 200 million year to orbit the Milky Way.

Q8. What is a star? What do scientists think about how stars are formed?
Ans: A star is a ball of hot and glowing gas. Stars may be medium sized, giant and super giant. The smallest stars are called dwarf stars the colour of a star shows how hot it is. The hottest stars shine with brilliant blue light white stars are less hot yellow stars, such as our sun are cooler while the red stars are the coolest of all. Scientists think that stars may form in nebulae. As gas and dust particles become tightly packed or compressed it heats up. The temperature rises to over one million Celsius (10000000°C) and the mass of gas and dust begins to shine as a star.

Q9. What is the difference between:
(a) Nebulae and Stars (b) pulsars and Quasars (c) Red giants and White dwarf

Ans: (A) NEBULAE AND STARS:
(a) Nebulae: (i) Great clouds of gas and dust, loosely packed.
(ii) Comparatively very large.
(iii) Have low temperature.
(b) Stars: (i) Tightly packed gas and dust mass.
(ii) Smaller than nebulae.
(iii) Have higher temperature.

(B) PULSARS AND QUASARS:
(a) Pulsars: (i) Smaller than earth.
(ii) Give energy as ordinary stars like a beating heart.
(iii) Closer to earth.
(b) Quasars: (i) Bigger than earth.
(ii) They seem dim.
(iii) Far away from earth.

(C) RED GIANTS AND WHITE DWARFS:
(a) Red giants: Red giants are formed from yellow star such as our sun when get old and ready to die.
(b) White dwarfs: White dwarfs are formed from Red giant when they get old.
Q10. What are black holes in space?
Ans: Astronomers think that a black hole could be an enormous star that has shrunk until it is squeezed together so tightly that nothing left of it but gravity. The pull of gravity would be so strong that nothing could get away from it, not even light. That is why they are called black holes.

Q11. Name some heavenly bodies that do not emit light.
Ans: Some heavenly bodies that do not emit light are: (i) Moons (ii) Planets (iii) Comets and (iv) Asteroids

Q12. How do stars and the sun emit light?
Ans: Nuclear fusion take place at stars and sun due to which stars and sun emit light.

Q13. Draw a telescope and explain its working.
Ans: Diagram Page No: 129
A telescope has two lenses mounted in a long tube. The first lens, called the objective is a convex lens. This bring the distant object in to focus. A small real image is formed. The second lens, called the eyepiece is also convex, but it is much more powerful than the objective the eyepiece can be moved, so that the small image formed by the objective, so a much larger image is seen.