Q.1. (A) Choose the correct alternative. **[5]**

(i) The device used for producing current is called
_____ .

    (a) a voltmeter   (b) an ammeter

    (c) a galvanometer   (d) a generator

(ii) If a ray of light passes from a denser medium to a rarer medium in a straight line, the angle of incidence must be
_____.

    (a) $0°$ (b) $30°$ (c) $60°$ (d) $90°$

(iii) The power of convex lens of focal length 20 cm is
_____.

    (a) +5.0 D   (b) 0.20 D   (c) –5.0 D   (d) 0.5 D

(iv) Good conductor of electricity is _____.

    (a) Bromine   (b) Iodine   (c) Graphite   (d) Sulphur

(v) The height of medium earth orbit above the surface of the earth is:

    (a) 1,500 km   (b) 250 km

    (c) 45,000 km   (d) 25,000 km

(B) Answer the following questions. [5]

(i) Find the odd one out:
Loudspeaker, Microphone, Electric motor, Magnet

Ans. Magnet

(ii) Complete the co-relation:

Ans. CuI_2 : Brown : : AgCl : <u>White</u>

(iii) Match the pair.

Group 'A'	Group 'B'
Substance	Refractive index
Air	(a) 1.33
	(b) 1.46
	(c) 1.0003

Ans. Air – 1.0003

(iv) State true or false.
Wavelength of red light is close to 700 nm.

Ans. True.

(v) Write the name of small satellite made by a group of students from COEP (College of Engineering, Pune) sent to the space through ISRO in 2016.

Ans. Swayam.

Q.2. (A) Give scientific reasons. (Any two) [4]

(i) For electric power transmission, copper or aluminium wire is used.

Ans.

1. Copper and aluminium are good conductors of electricity and have low resistivity. [1]

2. Therefore, these wires offer low resistance to the flow of current and hence increase the amount of current in the circuit. As a result, they have large current-carrying capacity. [1]

Hence, copper or aluminium wires are used for electric power transmission.

(ii) Lemon or tamarind is used for cleaning copper vessels turned greenish.

Ans.

1. Copper slowly reacts with moisture and carbon dioxide in the air to form copper carbonate, which is basic in nature. Hence, copper vessels get tarnished due to the formation of a greenish coat of copper carbonate. [1]

2. Lemon contains a weak acid called citric acid, and tamarind contains a weak acid called tartaric acid. These acids neutralize and dissolve the layer of basic copper carbonate formed on the vessels. [1]

   Hence, lemon or tamarind is used for cleaning copper vessels turned green.

(iii) Elements belonging to the same group have the same valency.

Ans.

1. Valency is the number of electrons given, taken, or shared by an atom. [1]

2. All the elements in the same group have the same number of electrons in the outermost shell. Thus, all elements in a particular group give, take or share the same number of electrons. [1]

   Hence, elements in the same group show the same valency.

(B) Answer the following questions. (Any three) [6]

(i) How do we feel about air in each of the following conditions?
   (a) Relative humidity is more than 60%.
   (b) Relative humidity is less than 60%.

Ans.

   (a) Air is humid when relative humidity is more than 60%. [1]

   (b) Air is dry when relative humidity is less than 60%. [1]

(ii) Complete the following reaction:

Ans. $C_{12}H_{22}O_{11} \xrightarrow{\text{heat}} \underline{12C} + \underline{11H_2O}$ [1 mark for each product]

(iii) Distinguish between Mass and Weight.

Mass	Weight
(a) Mass is the amount of matter present in an object.	(a) Weight is the force with which Earth attracts an object.
(b) SI unit of mass is kg.	(b) SI unit of weight is Newton.
(c) Its value is a constant.	(c) Its value varies.
(d) It is a scalar quantity.	(d) It is a vector quantity.

[Note: Students can write any two points, 1 mark each.]

(iv) Complete the following table:

Ans.

Type of Satellite	The names of Indian Satellite and launcher
(a) Navigational Satellite	Satellite: <u>IRNSS</u> Launcher: <u>PSLV</u>
(b) Earth observation Satellite	Satellite: <u>IRS</u> Launcher: <u>PSLV</u>

(1/2 mark for each blank)

(v) Define periods and groups of modern periodic table.

Ans. A period is a horizontal row of the modern periodic table. [1]

A group is the vertical column of the modern periodic table.

[1]

Q.3. Answer the following questions. (Any five) [15]

(i) Calculate the escape velocity on the surface of the moon given the mass and radius of the moon to be 7.34×10^{22} kg and 1.74×10^6 m respectively. (Given: $G = 6.67 \times 10^{-11}$ Nm^2/kg^2).

Ans.

Given: $G = 6.67 \times 10^{-11}$ Nm^2/kg^2,

Mass of the moon $= M = 7.34 \times 10^{22}$ kg

Radius of the moon $= R = 1.74 \times 10^6$ m

Escape velocity = $v_{esc} = \sqrt{\dfrac{2GM}{R}}$ [1]

$$= \sqrt{\dfrac{2 \times 6.67 \times 10^{-11} \times 7.34 \times 10^{22}}{1.74 \times 10^6}}$$ [1]

$$= 2.37 \text{ km/s}$$ [1]

Escape velocity on the surface of the moon is 2.37 km/s.

(ii) An element has its electron configuration as 2, 8, 1. Now answer the following questions:
   (a) What is the atomic number of this element?
   (b) What is the group of this element?
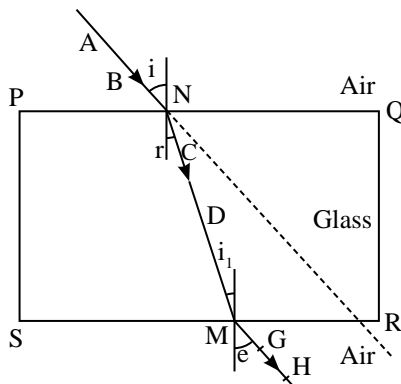   **(c) To which period does the element belong?**

Ans.
   (a) The atomic number of this element is 11. [1]
   (b) Group of this element is 1st group. [1]
   (c) This element belongs to 3rd period. [1]

(iii) Observe the figure and name the ray AB, ray CD, ray GH:

Ans.
   Ray AB- Incident ray [1]
   Ray CD- Refracted ray [1]
   Ray GH- Emergent ray / Refracted ray [1]

(iv) Read the following sentence and answer the questions:
   NaCl is an ionic compound.

(a) Why is NaCl an ionic compound?

Ans.

(i) The compounds formed from two units namely cation and anion are called ionic compounds. [1/2]

(ii) The cation and anion being oppositely charged has an electrostatic force of attraction called ionic bond. [1/2]

(iii) In the compound, sodium chloride (NaCl), sodium ion has a positive charge and chlorine ion has a negative. Hence, these two are attracted to each other and form an ionic bond. [1/2]

(iv) Since NaCl possesses ionic bond it is an ionic compound. [1/2]

(b) State any *two* properties of ionic compounds.

Ans. General properties of ionic compounds are:

(i) Ionic compounds exist in solid state and are hard.

(ii) Ionic compounds are brittle and can be broken into pieces by applying pressure.

(iii) The melting and boiling points of ionic compounds are high.

(iv) Ionic compounds are water soluble and insoluble in solvents like kerosene and petrol.

(v) Ionic compounds cannot conduct electricity when in solid state. In the fused/molten state they can conduct electricity. The aqueous solutions of ionic compounds conduct electricity.

[Note: Students can write any two points. ½ mark for each.]

(v) Identify the physical and chemical changes from the following phenomena:

(a) Transformation of ice into water

(b) Ripening of fruit

(c) Milk turned into curd

(d) Evaporation of water

(e) Digestion of food in the stomach

**(f) Iron fillings get attracted towards the magnet**

Ans. Physical changes:

(a)   Transformation of ice into water   [1/2]

(d)   Evaporation of water   [1/2]

(f)   Iron fillings get attracted towards the magnet.   [1/2]

Chemical changes:

(b)   Ripening of fruit   [1/2]

(c)   Milk turned into curd   [1/2]

(e)   Digestion of food in the stomach   [1/2]

(vi) Observe the following figure and answer the questions.

Wax layer

Lead

Copper
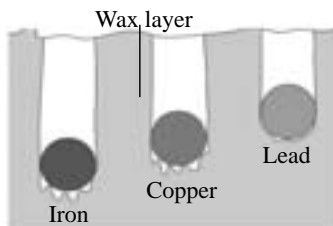
Iron

Specific heat capacity of metals

(a)   Which element has maximum specific heat capacity? Justify.

(b)   Which element has minimum specific heat capacity? Justify.

(c)   Define specific heat of object.

Ans.

(a)   Iron has the maximum specific heat capacity because it absorbs more heat and has high specific heat capacity.   [1]

(b)   Lead has the minimum heat capacity because it absorbs less heat and has low specific heat capacity.   [1]

(c)   Specific heat of object: The amount of heat energy required to raise the temperature of a unit mass of an object by 1°C is called the specific heat of object.   [1]

(vii) Identify figures A, B, C and give their uses:
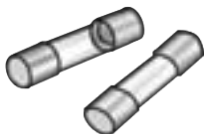
(a)   (b)   (c)

(a) This is a Fuse. [1/2]

Use: It is used as a safety device in electrical circuits. When excess current flows through the circuit, the metal wire melts and the power supply is disconnected. Thus, it provides protection from short-circuit and overloading. [1/2]

(b) This is an MCB (Miniature Circuit Breaker) switch. [1/2]

Use: When the current in the circuit suddenly increases, this switch opens and the current stops. Thus, it provides protection from short-circuit and overloading. [1/2]

(c) This is a Galvanometer. [1/2]

Use: It detects the presence of current in an electric circuit. [1/2]
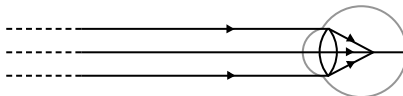
(viii) Complete the following flowchart:

Ans.
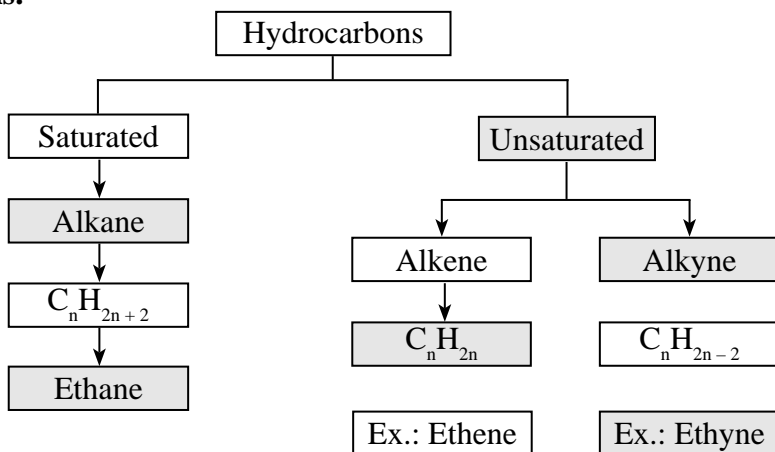
[1/2 mark for each blank]

**Q.4. Answer any *one* of the following questions.** [5]

(i) Observe the figure and answer the following questions:

(a) Name the defect of vision represented in above figure.

(b) State the reasons for this defect.

(c) How is it corrected?

(d) Draw the diagram to show the correction of this defect.

Ans.

(a) The defect of vision represented in the above figure is Myopia/ Nearsightedness. [1]

(b)

1. In myopia, the curvature of the cornea and of the eye lens increases. The muscles near the lens cannot relax; hence the converging power of the lens remains large. [1]

2. The eyeball elongates along the axis; hence the distance between the lens and the retina increases. [1]

(c) This defect can be corrected using spectacles with concave lens of proper focal length. This lens diverges the incident rays and these diverged rays can be converged by the lens in the eye to form the image on the retina [1]

(d) [1]
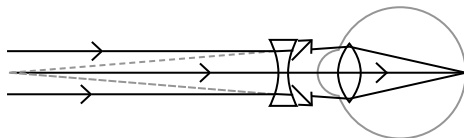
Correction of myopia or nearsightedness

(ii) Complete the following table:

S.N.	Common Name	Structural Formula	IUPAC Name
(a)	Ethylene	$CH_2 = CH_2$	Ethene
(b)	Acetylene	$HC \equiv CH$	Ethyne
(c)	Acetic acid	$CH_3–COOH$	Ethanoic acid
(d)	Methyl alcohol	$CH_3–OH$	Methanol
(e)	Acetone	$CH_3–CO–CH_3$	Propan-2-one

[1 mark for each blank]

★★★