

Q. 1. (A)

- (i) (D)
- (ii) (A)
- (iii) (A)
- (iv) (A)
- (v) (D)

Q. 1. (B)

- (i) Gravitational force of sun
- (ii) False
- (iii) generator
- (iv) Anomalous behaviour of water — 0 °C to 4 °C
- (v) Simple microscope

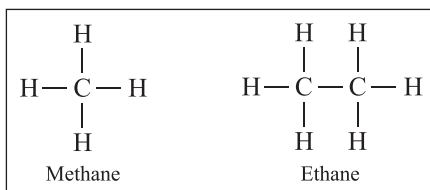
Q. 2. (A)

- (i) (1) The rays of light coming from the fish bend away from the normal as they travel from water (denser medium) to air (rarer medium).
(2) Hence, the position of the fish in water appears to be above its real position. Therefore, while shooting a fish in a lake, the gun is aimed below the apparent position of the fish.
- (ii) (1) Copper undergoes oxidation in air to form black copper oxide. Copper oxide reacts slowly with carbon dioxide in air and gains a green coat. This green substance is copper carbonate.
(2) Lemon and tamarind contain acid. The acid dissolves the green coating of basic copper carbonate present on the surface of a tarnished copper utensil and makes it shiny again.
- (iii) (1) A geostationary satellite revolves in the equatorial plane of the earth. It revolves in the same sense as the rotation of the earth and its period of revolution equals the period of rotation of the earth. It is stationary as observed from the earth.
(2) It does not fly above the polar regions. Hence, geostationary satellites are not useful for studies of polar regions.

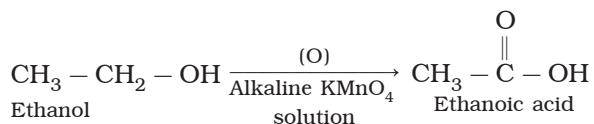
Q. 2. (B)

- (i) Alkane : In hydrocarbon, the four valencies of carbon atom are satisfied only by the single bonds, such compounds are called alkane.

Example : In methane, four hydrogen atoms are bonded to carbon atom by four single covalent bonds. In ethane, six hydrogen atoms are bonded to two carbon atoms by six single covalent bonds.



- (ii) When ethanol is treated with alkaline potassium permanganate solution, ethanol gets oxidized by alkaline potassium permanganate solution to form ethanoic acid.



- (iii) When light travels from a denser medium to a rarer medium, the angle of incidence for which the angle of refraction becomes 90° , is called the critical angle.

$${}_2n_1 = 0.5 = \sin i$$

$$\therefore \text{Critical angle } i = 30^\circ.$$

- (iv) Data : $m = 500 \text{ g}$, $\Delta T = 20^\circ \text{C}$, $c = 0.110 \text{ cal/g}^\circ \text{C}$

Heat needed to raise the temperature of piece of iron

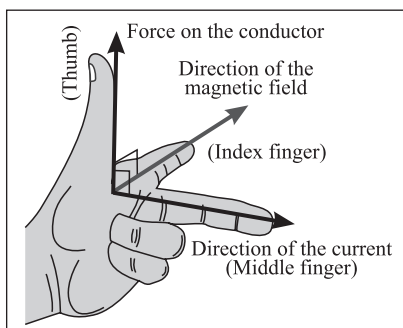
$$= mc\Delta T$$

$$= 500 \text{ g} \times 0.110 \text{ cal/g}^\circ \text{C} \times 20^\circ \text{C}$$

$$= 1100 \text{ cal.}$$

Quantity of heat needed is 1100 calories.

- (v) **Fleming's left hand rule** : The left hand thumb, index finger, and the middle finger are stretched so as to be perpendicular to each other. If the index finger is in the direction of the magnetic field, and the middle finger points in the direction of the current, then the direction of the thumb is the direction of the force on the conductor.



Fleming's left hand rule

Q. 3.

- (i) (a) From the given description we understand Kepler's three laws.
 (b) Kepler's law of areas : The line joining the planet and sun sweep equal areas in equal intervals of time.
 (c) Kepler's law of periods : The square of the period and revolution of a planet around the sun is directly proportional to the cube of the mean distance of the planet from the sun.

(ii) The modern periodic table contains seven horizontal rows, called the periods. Similarly, the eighteen vertical columns in the table are groups. The arrangement of the periods and groups result into formation of boxes. Atomic numbers are serially indicated in the upper part of these boxes. Each box corresponds to the place for one element.

(iii) (1) The distance between the centre of the atom and the outermost shell of the atom is called the atomic radius. The size of an atom is indicated by its radius. Atomic radius is expressed in unit picometre (pm). ($1 \text{ pm} = 10^{-12} \text{ m}$). The size of atom depends on number of shells, more the number of shells larger is the atomic size.

(2) In a group, while going down a group the atomic size goes on increasing, because while going down a group newer shells are successively added. This increases the distance between the outermost electron and the nucleus. Hence, the nuclear attraction on these electrons goes on decreasing. Thus in a group atomic size increases.

(3) While going from left to right within a period, atomic radius goes on decreasing and the atomic number goes on increasing one by one. The positive charge on the nucleus increases by one unit at a time. However, the additional electron gets added to the same outermost shell. Due to the increased nuclear charge the electrons are pulled towards the nucleus to a greater extent, as a result, the size of the atom decreases.

(iv) (a) The instrument shown in the figure is electric generator.

(b) This machine is used to generate electricity.

(c) The generator generates electricity through following transformation :

Mechanical Energy \rightarrow Electrical Energy

(v) Data : $n_g = \frac{3}{2}$, $n_w = \frac{4}{3}$, ${}_g n_w = ?$

$$n_g = \frac{c}{v_g}, n_w = \frac{c}{v_w}, {}_g n_w = \frac{v_w}{v_g}$$

$$\therefore {}_g n_w = \frac{n_g}{n_w} = \frac{\frac{3}{2}}{\frac{4}{3}} = \frac{3 \times 3}{4 \times 2} = \frac{9}{8}.$$

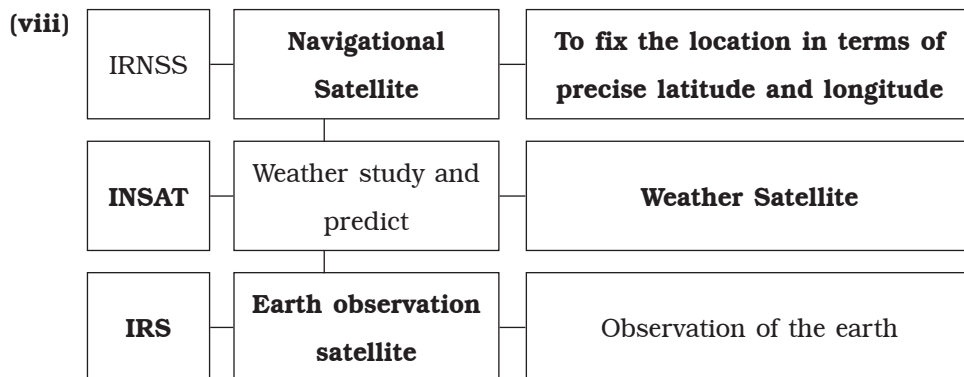
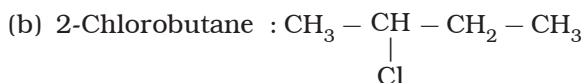
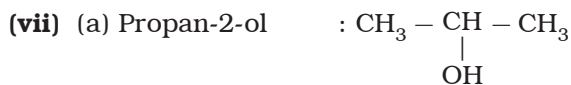
This is the refractive index of glass with respect to water.

(vi) **Alloy** : The homogeneous mixture formed by mixing a metal with other metals or nonmetals in certain proportion is called an alloy. Corrosion does not take place easily in the form of alloy.

Examples :

(1) **Bronze** : Bronze is an alloy formed from 90% copper and 10% tin. Bronze statues stay well in sun and rain.

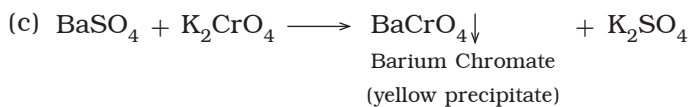
(2) **Stainless steel** : Stainless steel alloy is made from 74% iron, 18% chromium and 8% carbon. This alloy does not get stained with air or water and does not rust.



Q. 4.

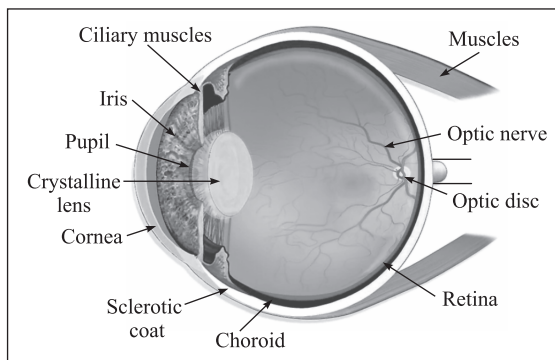
(i) (a) Yellow colour

(b) Barium Chromate (BaCrO_4)



(d) This is a double displacement reaction.

(ii)



Construction of the human eye

(a) Biconvex crystalline

(b) Cornea (thin transparent membrane)

(c) Real and inverted.