

1. (c) In a cylindrical mirror, one finds his image long and thin. (1 mark)
2. (b) When an object absorbs all the seven colours and reflects none, it looks black. (1 mark)
3. (d) Animals which are in danger of becoming extinct are called endangered animals. Cat is not an endangered animal. (1 mark)
4. (a) The soap solution in water is not neutral and cannot be used to wash all kinds of fabrics. (1 mark)
5. (d) The resistance of a conducting wire doesn't depend upon applied voltage. (1 mark)
6. (a) Budding is a kind of asexual reproduction in which new organisms is developed from an out-growth or bud of the cell due to cell division. (1 mark)
7. (c) e.g. $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$ (1 mark)
8. (a) The book 'origin of species' was written by Darwin. (1 mark)
9. (c) The name of the compound is 4-ethyl-3-methyl octane. (1 mark)
10. (a) A - S ; B - R ; C - Q ; D - P (1 mark)
11. Sodium chloride (NaCl) is a crystalline salt that does not contain water of crystallisation. (1 mark)
12. Abscisic acid (ABA) (1 mark)
13. Carbon steel and Alnico are the two alloys used for making permanent magnet. (1 mark)

OR

Electric motor is a device which converts electrical energy to mechanical energy.

14. Silver (Ag) is more reactive, on the basis of reactivity series. (1 mark)

OR

Double reaction is named so because it involves simultaneous displacement of two ions from two compounds.

15. Gills are the respiratory organ of a fish. (1 mark)
16. Homologous organs are those organs which have the same basic structure and developmental origin but have different functions and appearance.
E.g. The fore limb of a frog, a bird and a man seem to be built from the same basic design of bones but they perform different functions. (1 mark)

OR

Analogous organs are those organs which have different basic structure and developmental origin but have similar appearance and perform similar functions.

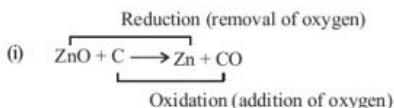
E.g. The wings of an insect and a bird have different structures or designs but they perform same basic function of flying. (1 mark)

17. The two natural indicators are: (1 mark)
 - (a) Litmus
 - (b) Turmeric
18. (c) Coal gas is obtained by destructive distillation of coal. (1 mark)
19. (b) Al is a 13 group element. It has three electrons in the valence shell so its valency is 3 while Br is 17 group element. It has seven electrons in the valence shell so its valency is $8 - 7 = 1$. Hence, formula of aluminium bromide is AlBr_3 . (1 mark)
20. (d) Runners are special, narrow, green, above ground horizontal or prostrate branches which develop at the bases of erect shoots. (1 mark)
21. (a) Redox reaction is a process in which oxidation and reduction take place simultaneously. (1 mark)
(b) The reaction between MnO_2 and HCl is called as a redox reaction because oxidation and reduction takes place simultaneously.
$$\text{MnO}_{2(s)} + 4\text{HCl}_{(aq)} \longrightarrow \text{MnCl}_{2(aq)} + \text{Cl}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$$
In above reaction MnO_2 is reduced to MnCl_2 and HCl is oxidised to Cl_2 (1 mark)

- (c) Oxidising agent— MnO_2
 Reducing agent— HCl

($\frac{1}{2} + \frac{1}{2} = 1$ mark)

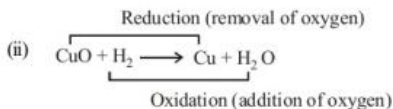
22. (a)



Therefore the substance

Oxidised = C , Reduced = Zn

(1 mark)



Therefore the substance:

Oxidised = H_2 , Reduced = CuO

(1 mark)

- (b) H_2S is the reducing agent while SO_2 is the oxidising agent.

(1 mark)

23. (a) The oil and fat containing food when left exposed to air reacts with oxygen and gets oxidised forming a toxic chemical called rancid, this process is called rancidity. The general name of the chemicals that are added to prevent this oxidation are called as antioxidants. For example, Nitrogen gas is anti-oxidant.

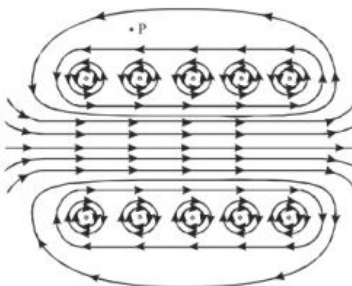
(2 marks)

- (b) Metal X is copper. Green compound is due to formation of copper carbonate and black colour compound is due to the formation of copper oxide.

(1 mark)

24. A solenoid is a long cylindrical helix. It is made by winding closely a large number of turns of insulated copper wire over a tube of card-board. When electric current is passed through the solenoid, a magnetic field is produced around and within the solenoid.

Consider a long solenoid of radius 'a' carrying a current I. Let n be the number of turns per unit length of the solenoid and P be a point on the axis of the solenoid. The lines of force of magnetic field inside the solenoid are nearly parallel which indicate that the magnetic field 'within' the solenoid is uniform and parallel to the axis of the solenoid.

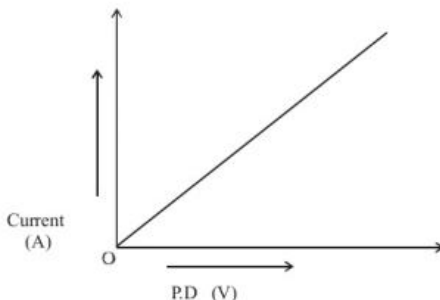


(3 marks)

Fig. : Magnetic field within and around solenoid

OR

The graph between current and potential difference is a straight line. It indicates that current is directly proportional to the potential difference and ratio $\frac{V}{I}$ is constant.



(3 marks)

25. For distant vision, (defect is short sightedness)
Focal length (f) = distance of defective far point = -2 m

$$\therefore P = -\frac{1}{2\text{ m}} = -0.5 \text{ dioptre (Concave lens)} \quad (1\frac{1}{2} \text{ marks})$$

For near vision, u = normal distance of distinct vision = 0.25 m ; v = defective near point = -1 m (virtual image)

$$P = \frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-1} - \frac{1}{-0.25} = -1 + 4 = 3 \text{ dioptre (Convex lens)} \quad (1\frac{1}{2} \text{ marks})$$

26. The main organs of human digestive system involved in the process of digestion of food, *i.e.*, starting from mouth in the correct order are as follows:

Mouth \rightarrow Oesophagus \rightarrow Stomach \rightarrow Small intestine (consisting of duodenum, jejunum and ileum) \rightarrow Large intestine (consisting of caecum, colon and rectum). (1 mark)

- **Digestion of carbohydrate:** Carbohydrate digestion begins in the buccal cavity, as human saliva contains an enzyme ptyalin or salivary amylase which hydrolyses starch into the disaccharides, maltose, isomaltose and small dextrins.
 - Pancreatic amylase digests remaining polysaccharides and disaccharides into their respective monosaccharides (glucose) in alkaline medium. Enzyme maltase present in the intestinal juice hydrolyses maltose into glucose.
 - The monosaccharides are absorbed into the bloodstream and delivered to the liver.
 - Some of the indigestible carbohydrates are digested by bacteria in the large intestine. (2 marks)

OR

- (a) Digestion of fat occurs in duodenum and jejunum parts of small intestine with the help of enzyme lipase that acts on emulsified fat to form fatty acids and glycerol. (1 mark)
- (b) Small intestine is lined by epithelium which is specialised to absorb food. It has following structure to increase its absorbing surface area several times:
- (i) **Villi:** They are transverse folds of intestine wall that not only increase surface area but also reach deep into the lumen of intestine for absorption of digested food. Villi possess blood capillaries and lacteals (lymph vessels) for quick transport of absorbed food. (1 mark)
 - (ii) **Microvilli:** The columnar cells of the intestinal epithelium have fine microscopic outgrowths called microvilli. They increase the surface area of epithelial cells. (1 mark)

27. Coal and petroleum are resources which are non-renewable. They will exhaust in due course of time. Coal and petroleum have been formed by the bio-mass degradation million of years ago. Therefore, they have carbon, hydrogen, nitrogen and sulphur. When they are burnt, the products are carbon dioxide, water, oxides of nitrogen and oxides of sulphur. All of these are pollutants of the atmosphere. More use of fossil fuels causes more and more release of these pollutants. Thus, management of fossil-fuels is to be from the environmental and economic angle. (3 marks)
28. HCl gas is produced when conc. H_2SO_4 is added to solid NaCl solution.



When the gas is passed through dry blue litmus paper, there is no change in colour because it cannot show acidic properties, as H^+ is not present.

The gas when passed through moist blue litmus paper, colour is changed to red as it shows acidic properties. Because H^+ ions are produced when HCl dissolves in water. (3 marks)

OR

- (a) $Pb(NO_3)_2(aq) + 2KI \longrightarrow PbI_2(s) + 2KNO_3(aq)$
(Colourless) (Yellow) (1 mark)
- (b) $Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2$
In this reaction, heat is evolved, hence, there will be change in temperature. (1 mark)
- (c) $BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$
(White ppt.) (1 mark)

S.No.	Translocation	Transpiration
1.	It is a process in which the food prepared by leaves is transported to various parts in the dilute aqueous solution form.	It is a process in which the water is lost in the form of vapours into the atmosphere.
2.	Food gets transferred from one part to another with the help of phloem cells.	The water gets transferred from roots to the leaves with the help of xylem cells.
3.	The CO_2 enters the leaves through stomata.	The water evaporates from the leaf surface through stomata.

30. **Power of accommodation:** It is the ability of eye lens to adjust its focal length in such a way that one can see the far distant objects as well as nearby object, clearly. It is done with the help of ciliary muscles. When the object is far distant, ciliary muscles are relaxed and the eye lens becomes thinner due to which focal length increases and power decreases and the rays get converged at retina. When the object is near by, ciliary muscles are tensed so that eye lens becomes thicker and its power increases due to which light rays get easily converged to form an image at retina.
31. (a) Sex of an offspring can be determined at the time of fertilisation. When a sperm carrying X-chromosome fertilises an egg, the zygote develops into female (XX condition). When sperm carrying Y-chromosome fertilises an egg, the zygote develops into a male (XY condition). (3 marks)
- (b) Unisexual plants are those, whose flowers contains either stamens or carpels but not both.
e.g., Papaya, Watermelon.
Bisexual plants are those, whose flowers contains both stamens and carpels.
e.g., *Hibiscus*, Mustard. (2 marks)

32. (a) A flower is a seed-bearing part of a plant, consisting of reproductive organs (stamens and carpels) that are typically surrounded by a brightly coloured corolla (petals) and a green calyx (sepals). A typical flower consists of following parts:
- Sepals:** It is the outer whorl of the flower. It is usually green in colour but in some flower it may be coloured to attract insects.
 - Petals:** It is the second whorl of flower and consists of coloured petals.
 - Stamen:** It is male reproductive part of a flower. Each stamen consists of a stalk called filament and a flattened top called the anther.
 - Carpel:** Carpels have a swollen ovary at the base, an elongated middle style and a terminal stigma. The ovary contains ovules. Each ovule possess an egg which is female gamete. (3 marks)

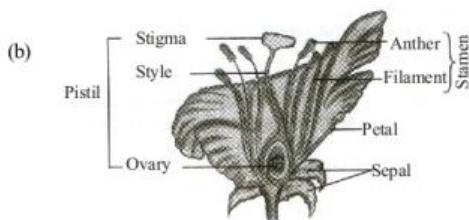


Fig.: Longitudinal section of a typical flower

(2 marks)

33. (a) (i) An electropositive element is the one that has tendency to lose electrons and form positively charged ion. Metals like Na, Mg, K, Ca, Fe lose electrons and form positively charged ion. Due to this, metals are called electropositive elements. (1 mark)
- (ii) Aluminium is a reactive metal and reacts readily with moisture and water. On reaction, it forms a layer of aluminium oxide (Al_2O_3), which acts as a non-penetrating layer and protects aluminium from being corrode. (1 mark)
- (b) When zinc metal is placed in solution of mercuric chloride, Zn displaces mercury and a shining silvery surface is formed because zinc is more reactive than mercury.
- $$Zn(s) + HgCl_2(aq) \longrightarrow ZnCl_2(aq) + Hg(l)$$
- When zinc metal is placed in $MgSO_4$ solution, no reaction takes place because Zn is less reactive than Mg, therefore, it cannot displace Mg from $MgSO_4$. (3 marks)

OR

- (a) X — Na; Y — NaOH; Z — H_2



- (b) Gold and platinum are the two metals that do not corrode easily. (1 mark)
- (i) Corrosion of some metals is an advantage. For example: a thin impervious layer of aluminium oxide forms a protective layer which protects the aluminium metals underneath from further damage. (1 mark)
- (ii) Corrosion of metal is a serious problem. For example: corrosion of iron in the presence of oxygen and air leads to formation of brown solid known as rust. It causes damage to car bodies, bridges, ships, iron railings and all objects made of metals (specially iron). (1 mark)

34. (a) **Diagram of human alimentary canal**

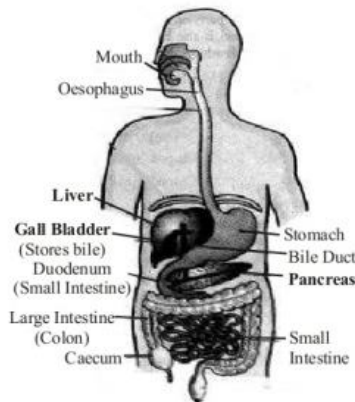


Fig.: Human alimentary canal

- (b) (i) **Role of Liver:** Decomposition of haemoglobin, formation and secretion of bile for emulsification of fat. Formation of urea, heparin, fibrinogen and prothrombin. Detoxification of chemicals and elimination of pathogens.
- (ii) **Role of Pancreas:** Secretion of pancreatic juice having lipase, trypsin, and amylase, secretion of hormones, insulin and glucagon.
- (c) (i) **Absorption of Digested Food:** Ileum part of small intestine.
- (ii) **Absorption of Water:** Large intestine. (5 marks)

35. Given, power of one heater (P) = 250 Watt
potential (V) = 100 volt, time (t) = 5 hours.

(a) The three 250 watt heaters are connected in parallel then total current, $I = I_1 + I_2 + I_3$

$$= \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} = \frac{100}{40} + \frac{100}{40} + \frac{100}{40}$$

$$= 2.5 + 2.5 + 2.5 = 7.5 A \quad (2 \text{ marks})$$

(b) $P = \frac{V^2}{R}$; $R = \frac{V^2}{P} = \frac{100 \times 100}{250} = 40 \Omega$
The resistance of each heater is 40 Ω (1 mark)

(c) The energy supplied to the first heater is
 $H = I^2 R t = (2.5)^2 \times 40 \times 5 \text{ Wh}$, As current flowing each heater is 2.5 A.
 $\therefore H = 6.25 \times 200 \text{ Wh} = 1250 \text{ Wh}$
 $= \frac{1250}{1000} \text{ kWh} = 1.25 \text{ kWh}$
Then three heaters in connection = $3 \times 1.25 \text{ kWh}$
 $= 3.75 \text{ kWh}$ energy is used in the circuit. (2 marks)

OR

- (a) We know that,

$$R = \rho \frac{L}{A}$$

- (i) **Area is halved:** If $A' = \frac{A}{2}$ then, $R' = \rho \frac{L}{\frac{A}{2}}, R' = 2R$
- (ii) **Length is doubled:** If $L' = 2L$ then, $R' = \rho \frac{2L}{A}, R' = 2R$
- (iii) **Area is doubled:** If $A' = 2A$ then, $R' = \rho \frac{L}{2A}, R' = \frac{R}{2}$
- (iv) **Both area and length are doubled:** If $A' = 2A, L' = 2L$ then, $R' = \rho \frac{2L}{2A}, R' = R$ (4 marks)
- (b) Length of a wire (L) = 60 cm = 0.6 m, Specific resistance (ρ) = $2.6 \times 10^{-8} \Omega \text{ m}$, Resistance (R) = ?, Cross sectional area (A) = 1 mm^2

$$1 \text{ mm}^2 = \frac{1}{10^6} = 10^{-6} \text{ m}^2$$

$$\text{Therefore, } R = \rho \frac{L}{A}$$

$$R = \frac{2.6 \times 10^{-8} \times 0.6}{10^{-6}} = 1.56 \times 10^{-2} \Omega \quad (1 \text{ mark})$$

36. (a) (i) **Optical centre:** The centre point of a lens is known as its optical centre. It always lies inside the lens. A light beam passing through the optical centre emerges without any deviation.
- (ii) **Centre of curvature:** It is defined as the centre of the spheres of which the lens is originally a part of. Because the spherical lens consists of two spherical surfaces, the lens has two centres of curvature.
- (iii) **Focal length:** The distance of the point from the centre of lens or mirror at which a parallel ray of beam converge (or diverge) is called focal length and the point is called focus. (3 marks)
- (b) Focal length of the converging lens, $f = 12 \text{ cm}$

Image distance, $v = 48 \text{ cm}$

Using the lens formula, we get:

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{12} = \frac{1}{48} - \frac{1}{u} \Rightarrow \frac{1-4}{48} = \frac{-3}{u}$$

$$\therefore u = -\frac{48}{3} = -16 \text{ cm}$$

So, the distance of the object from the lens is 16 cm.

(2 marks)