# Solutions

(*Ref: Question Paper Code 31/3/1*)

## SECTION A

**1.** Covalent bonds are formed by sharing of electron pair/pairs between two atoms.

**2.** Electropositivity is the tendency of an element to lose electrons.

**OR**

Atomic radius increases from Na to Cs due to addition of new shells.

**3.** (*a*) Hydropower is harnessed by converting the potential energy of falling water from a height into electricity.

(*b*) It is the power developed when $10^6$ J of work is done per second. 1MW = $10^6$ watts.

(*c*) Loss of agricultural land/displacement of a large number of peasants and tribals/destruction of ecosystem. **(any two)**

(*d*) The blades of turbine move the armature of a generator with high speed to generate electricity.

**4.** (*a*) She should monitor iodine intake in her diet.

(*b*) During menstruation/during pregnancy and after going through menopause. **(any two)**

(*c*) Low TSH level leads to swelling of neck region, a disease called goiter.

(*d*) Iodine

**5.** (*a*) Scattering of light is not enough at such heights.

**6.** (*c*) 2 A

**7.** (*a*) 2 Ω

**8.** (*a*) This is an ideal setting of the Khadin system and A = catchment area; B = Saline area; C = Shallow dugwell.

**OR**

(*a*) biodiversity which faces large destruction.

**9.** (*c*) Lead storage battery manufacturing factories near A and soaps and detergents factories near B.

**10.** (*b*) Formation of crystals by process of crystallisation.

**11.** (*c*) A has pH greater than 7 and B has pH less than 7.

**12.** (*d*) Group 16 and Period 3

**OR**

(*d*) (A), (B) & (C)

**13.** (*a*) Both (A) and (R) are true and (R) is the correct explanation of the assertion.

**14.** (*c*) A is true but R is false.

## SECTION B

**15.** (*i*) Colour change: White to grey
Reason: Silver chloride decomposes to produce silver and chlorine.

(*ii*) Colour change: Brown to black
Reason: Copper oxide is produced on heating.

(*iii*) Colour change: Blue to colourless
Reason: Zinc sulphate is formed.

**16.** (*i*) $2NaOH(aq) + Zn(s) \rightarrow Na_2ZnO_2(aq) + H_2(g)$

(*ii*) $CaCO_3(s) + H_2O(l) + CO_2(g) \rightarrow Ca(HCO_3)_2(aq)$

(*iii*) $HCl(aq) + H_2O(l) \rightarrow H_3O^+(aq) + Cl^-(aq)$

**OR**

(*i*) $G = Cl_2$

$C = CaOCl_2$

(*ii*) $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

(*iii*) **Common name**–Bleaching Powder. **Chemical name**–Calcium Oxychloride

**17.** (*i*) Category A: Li, Na, K

(*ii*) Because the physical as well as chemical properties of elements of category A, B and C are different.

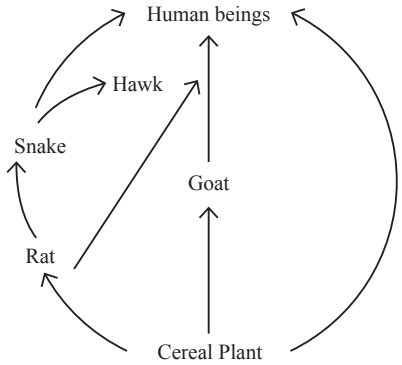
(*iii*) No.

Reason: Because Newlands' law of octaves was applicable only up to calcium.

**18.** (*a*) Cereal Plant → Human Beings.

(*b*) Pesticides being non-biodegradable accumulate progressively at each trophic level which leads to Biomagnification.

(*c*)




**OR**

(*a*) ● Harmful effects of using plastic bags:

(*i*) They lead to land and water pollution when disposed improperly.

(*ii*) Burning of plastic would produce toxic gases leading to air pollution.

(*iii*) Plastic bags can block the drainage system. **(Any two)**

● Alternatives to the usage of plastic bags:

(*i*) Use of cloth bags/jute bags/paper bags.

(*ii*) Metal or glass containers.

(*b*) (*i*) Segregation of biodegradable and non-biodegradable wastes for recycling; Segregation of dry and wet waste for recycling.

(*ii*) Reuse of already used items like glass bottles for storage.

(*iii*) composting **(Any two)**

**19.** (*a*) (*i*) Enzyme trypsin: It helps in the digestion of proteins.

(*ii*) Enzyme lipase: It helps in the breaking down of emulsified fats.

(*b*) Two functions:

- Increase the surface area.
- Help in absorption of digested food.

**20.** (*a*) (*i*) Analogous

(*ii*) Analogous

(*iii*) Homologous

(*iv*) Analogous

(*b*) Homologous organs have similar origin and basic structure but perform different functions whereas Analogous organs have different basic structure but perform similar functions.

**21.** (*a*) (*i*) Green (*ii*) 25%

(*iii*) GG : Gg = 1 : 2

(*b*) The traits which are expressed in $F_1$ progeny are called dominant traits whereas the traits which are unable to express themselves in $F_1$ progeny but reappear in the $F_2$ progeny are called recessive traits.

**22.** (*i*) Converging lens.

(*ii*) Magnifying Glass and Microscope.

(*iii*) Three characteristics of the image:

(*a*) Virtual

(*b*) Erect

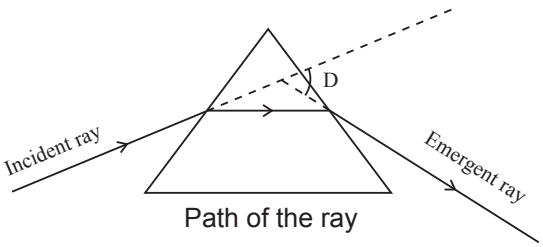
(*c*) Magnified

**23.** (*i*) The strength of magnetic field is higher near the poles, *i.e.*, ends of solenoid.

(*ii*) A current carrying solenoid behaves as a bar magnet.

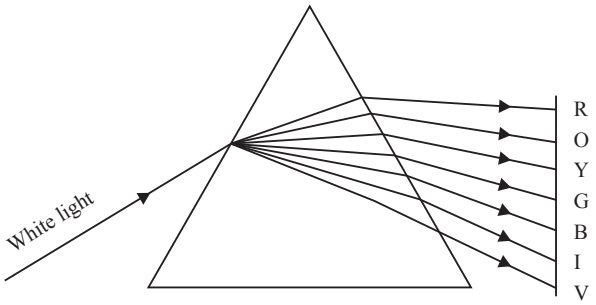
(*iii*) If a fuse, with a defined rating, is replaced by one with a larger rating then the fuse wire will not burn even when a current greater than safe limit is flowing. As a result the electrical circuit/appliances will be damaged.

**24.** (*a*)



Path of the ray

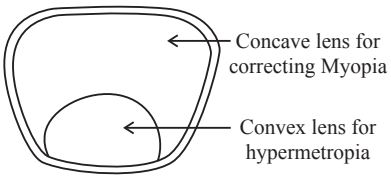
(*b*) A ray of white light, passing through a prism undergoes dispersion, *i.e.*, it splits into its (seven) constituent colours. These constituent colours get refracted differently. The red ray bends the least while the violet ray bends the most.



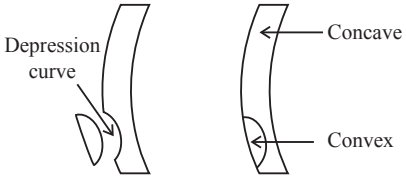

**OR**

(*a*) (*i*) Bifocal Lens

(*ii*) Upper part of lens is concave and lower part of the lens is convex.




**Frontal view of bifocal lens**




**Side-view of bi-focal lens**

In a Bifocal lens, a convex lens is carefully attached to a concave lens. Generally, the upper part is concave and the lower part is convex.

(*b*) P = +3D

$$f = \frac{1}{P} = \frac{1}{3}\ \text{m} = \frac{+100}{3}\ \text{cm} = +\ 33.3\ \text{cm}$$

P = –3D

$$f = \frac{-100}{3} = -33.3\ \text{cm}$$

## SECTION C

**25.** (*i*) $2\ HgO \xrightarrow{\text{Heat}} 2\ Hg + O_2$

(*ii*) $2\ Cu_2O + Cu_2S \xrightarrow{\text{Heat}} 6\ Cu + SO_2$

(*iii*) $3\ MnO_2 + 4\ Al \rightarrow 2\ Al_2O_3 + 3\ Mn + \text{Heat}$

(*iv*) $Fe_2O_3 + 2\ Al \rightarrow Al_2O_3 + 2\ Fe + \text{Heat}$

(*v*) $ZnCO_3 \xrightarrow{\text{Heat}} ZnO + CO_2$

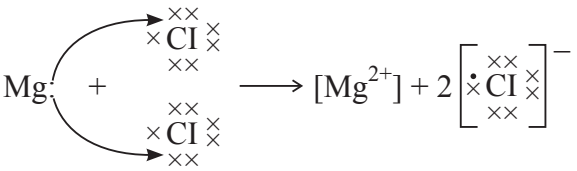
**OR**

(*i*) $Mg \longrightarrow Mg^{2+} + 2e^-$

2, 8, 2 2, 8

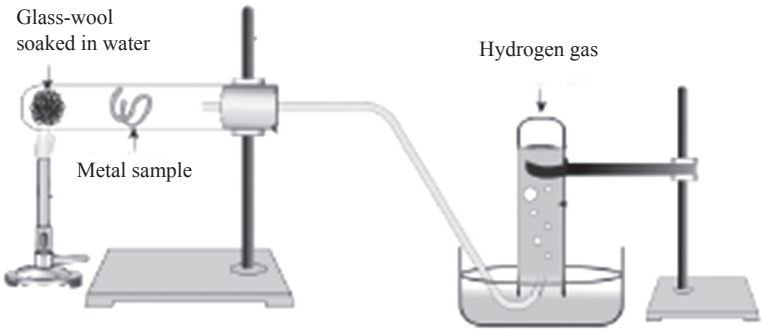
(Magnesium cation)

$$Cl + e^- \longrightarrow Cl^-$$
2, 8, 7 — 2, 8, 8 (Chloride anion)



(*ii*) In ionic compounds, very strong forces of attraction exist between positive and negative ions.

(*iii*)




**26.** (*a*)

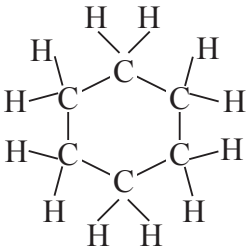
| Soaps | Detergents |
|---|---|
| • **Composition –** Sodium or Potassium salts of long chain fatty acids or carboxylic acids. | Ammonium or Sulphonate salts of long chain carboxylic acids. |
| • **Cleansing action in hard water –** Forms scum. | Does not form any scum. |

(*b*) Ethanol reacts with active metal such as sodium to liberate hydrogen gas and form sodium ethoxide. The reaction is:

$$\underset{\text{Sodium}}{2\,Na} + \underset{\text{Ethanol}}{2\,CH_3CH_2OH} \longrightarrow \underset{\text{Sodium ethoxide}}{2\,CH_3CH_2O^-Na^+} + \underset{\text{Hydrogen}}{H_2\uparrow}$$

Ethanol behaves like an acid in this reaction.

(*c*)



(*d*) Ethanal or Acetaldehyde

**27.** (*a*) Oxygenated Blood from Lungs into →

Pulmonary Vein → Left Atrium (Collects blood on relaxation)

(1) (2) (3) ↓

Contraction of Left Atrium

(4) ↓

Left Ventricle

(5) ↓

Collects blood on expansion

(6) ↓

Contraction of Left Ventricle

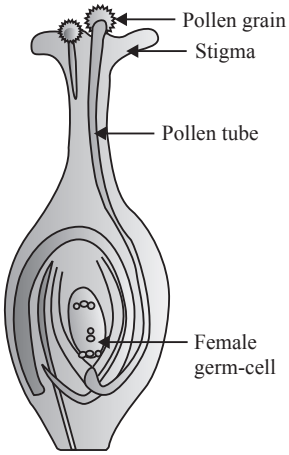
(7) ↓

Various organs of human body ← Aorta

(8)

(*b*) Leakage results in loss of blood pressure which would reduce the efficiency of the pumping system.

**28.** (*a*)




(*b*) Pollen tube carries the male germ cell to reach the ovary and fuse with the female germ cell.

(*c*) (*i*) Ovule → Seed (*ii*) Ovary → Fruit

**OR**

(*a*) Two reasons for using condom:

- It avoids unwanted pregnancy.
- It does not transfer STD's (ex: –HIV–AIDS).

(*b*) Oral contraceptives change the hormone balance of the body so that the eggs are not released.

(*c*) Sex selective abortion is a procedure that is done for female foeticide.

It adversely affects the human sex–ratio (The relative number of males to females in a given age group).

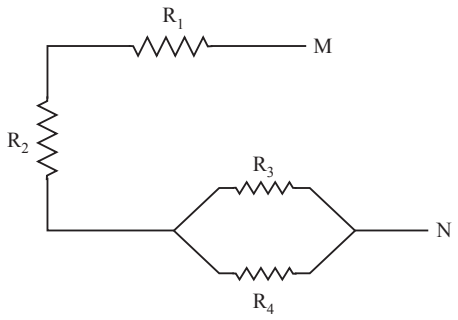
**29.** (*a*) $R_3$ and $R_4$ are in parallel combination.

$\therefore$ $R_{parallel}$ is given by

$$\frac{1}{R_P} = \frac{1}{R_3} + \frac{1}{R_4}$$

$$\frac{1}{R_P} = \frac{R_4 + R_3}{R_3 R_4}$$

$$R_P = \frac{R_3 R_4}{R_4 + R_3}$$




Now, $R_1$ $R_2$ and $R_p$ are in series.

$\therefore$ Req. $= R_1 + R_2 + R_p$

$$= R_1 + R_2 + \frac{R_3 R_4}{R_4 + R_3}$$

(*b*) Joules Law: The heat produced in a resistor is directly proportional to

- square of current for a given resistance.
- the resistance for a given current, and
- the time for which the current flows through the resistor.

(*c*) $P = VI$ or $I = \frac{P}{V}$

$$I = \frac{1000 \text{ watt}}{220 \text{ volt}} = 4.54 \text{ A}$$

Since 4.54 ampere current flows in the circuit, a 5 A fuse must be used.

(*d*) Electric bulb & electric heater will not get currents and voltages as per their requirement.

**30.** (*a*) It is a convex mirror. So, focal length should be positive.

Radius of curvature R = +5 m

$\therefore$ focal length $f = \frac{5}{2} = +2.5$ m

Object distance $u = -20$ m

Mirror formula: $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

$$\Rightarrow \quad \frac{1}{v} + \frac{1}{-20} = \frac{1}{2.5}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{1}{20} + \frac{1}{2.5}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{1}{20} + \frac{10}{25}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{5+40}{100} = \frac{45}{100}$$

$$\Rightarrow \quad v = \frac{100}{45} = \frac{20}{9} = +2.2 \text{ m}$$

- Nature of image: Virtual and erect
- Size of image: Diminished image

(*b*) It is a concave mirror.
Reason of use: To obtain erect and enlarged image of teeth.

**OR**

(*i*) It is a convex lens. It is used to get a magnified image of the lines on the palm.

(*ii*) He should hold the lense between F and 2F of the lens or at F of the lens.

(*iii*) Focal length $f = +10$ cm

Object distance $u = -5$ cm

Lens formula:

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

$$\Rightarrow \quad \frac{1}{v} - \frac{1}{-5} = \frac{1}{10}$$

$$\Rightarrow \quad \frac{1}{v} + \frac{1}{5} = \frac{1}{10}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{1}{10} - \frac{1}{5} = \frac{1-2}{10}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{-1}{10}$$

$$\Rightarrow \quad v = -10 \text{ cm}$$

$$\text{Magnification } m = \frac{h_{image}}{h_{object}} = \frac{v}{u}$$

$$= \frac{-10}{-5} = 2$$

Size of image is 2 times the size of object.