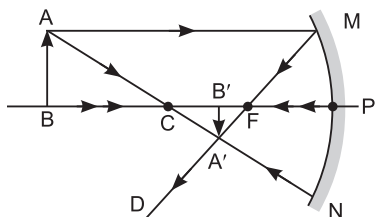


Answers to RST-DS2/Set-1

1. (b)

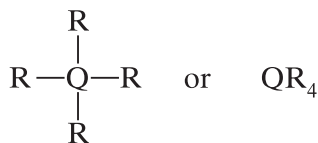
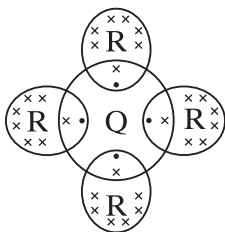


2. (d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscles

3. (b) Q and R

Element	Electronic configuration	Valence electrons	Nature of element
P	2, 8, 1	1	Metal
Q	2, 4	4	Non-metal
R	2, 8, 7	7	Non-metal
S	2, 8	8	Noble gas

Covalent bonds are formed between non-metals. 'P' element is metal and 'S' is a noble gas.



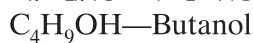
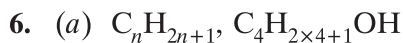
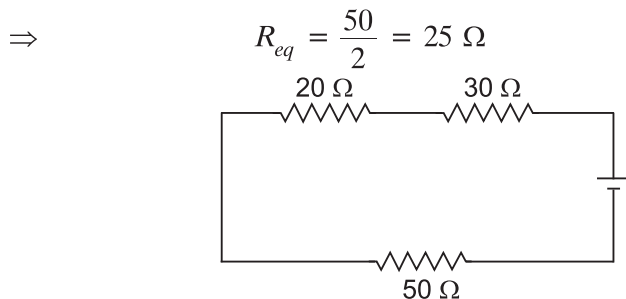
4. (b) two

5. (b) Resistors in series

$$\begin{aligned} R_S &= R_1 + R_2 \\ &= 20 + 30 = 50 \Omega \end{aligned}$$

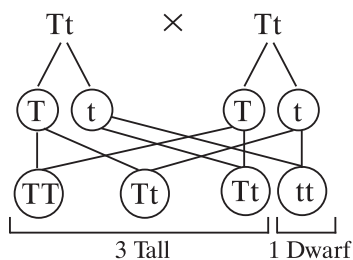
Now placed in parallel with a 50Ω resistor

$$\frac{1}{R_{eq}} = \frac{1}{R_S} + \frac{1}{50} = \frac{1}{50} + \frac{1}{50} = \frac{2}{50}$$



as functional group is $-OH$ (alcohol) which is represented by $-ol$

7. (a)



Out of 160, 120 would be tall and 40 would be dwarf.

8. (d) Apply right-hand thumb rule. It is from East to West.

9. (c) (iii) and (iv)

10. (d) (i) and (vi)

11. (d) Both spinal and cranial nerves

12. (a)

$$P_1 = \frac{1}{f_1}$$

$$P_1 = +4D = \frac{1}{f_1}$$

⇒

$$f_1 = \frac{1}{4} \text{ m} = 25 \text{ cm (convex lens)}$$

$$P_2 = -5D$$

$$P_2 = \frac{1}{f_2} \text{ or } f_2 = \frac{1}{P_2}$$

⇒

$$f_2 = \frac{1}{-5} \text{ m} = -20 \text{ cm}$$

$$f_1 : f_2 = 25 : 20 = 5 : 4$$

13. (b)

14. (b) The inner lining of the uterus slowly breaks and comes out.
15. (c) (i) and (iv)
16. (d) $(\text{Ca}^{2+}) \left[\underset{\times}{\underset{\times}{\text{O}}} \underset{\times}{\times}^{2-} \right]$
17. (a) Both A and R are true and R is the correct explanation of A.
18. (b) Both A and R are true and R is not the correct explanation of A.
19. (c) A is true but R is false.
20. (b) Both A and R are true and R is not the correct explanation of A.
21. (a) The type of reaction is electrolytic decomposition reaction.
- (b) This is considered an endothermic reaction as energy in the form of electrical energy is absorbed during the decomposition of water.
- (c) The amount of gas collected in one of the test tubes is double than the other and the hydrogen gas collected is double to that of oxygen as water undergoes electrolysis and produces H_2 and O_2 gases in the ratio of 2 : 1 by volume.
- (d) $2\text{H}_2\text{O}(l) \xrightarrow{\text{Electrolysis}} 2\text{H}_2(g) + \text{O}_2(g)$

OR

- (a) Colour changes:
- Iron nail becomes brownish in colour.
 - Blue colour of copper sulphate solution fades and changes to light green.
- (b) Iron being more reactive displaces the copper from its solution. As a result blue colour of copper sulphate solution fades. Iron sulphate formed has light green colour. The displaced copper is deposited on the iron nail giving it a brownish colour.
- (c) The type of reaction is single displacement reaction.
- (d) $\text{Fe}(s) + \text{CuSO}_4(aq) \longrightarrow \text{FeSO}_4(aq) + \text{Cu}(s)$
22. (a) Chromosomes are thread like structures which are made up of proteins and DNA. 23 pairs of chromosomes are present in human beings.
- (b) Trait 'B' which exists in 85% of the population is likely to have arisen earlier because in asexual reproduction identical copies of DNA are produced and variations do not arise. 85% of the population with trait 'B' must have been replicating that trait for a longer period of time than 10% of the population with trait 'A'.

23. SI unit of electrical resistivity is ohm meter. We know

ρ –Resistivity

R –Resistance (Ω)

l –Length (m)

A –Area (m^2)

$$R \propto l$$

$$R \propto \frac{1}{A}$$

$$R \propto \frac{l}{A}$$

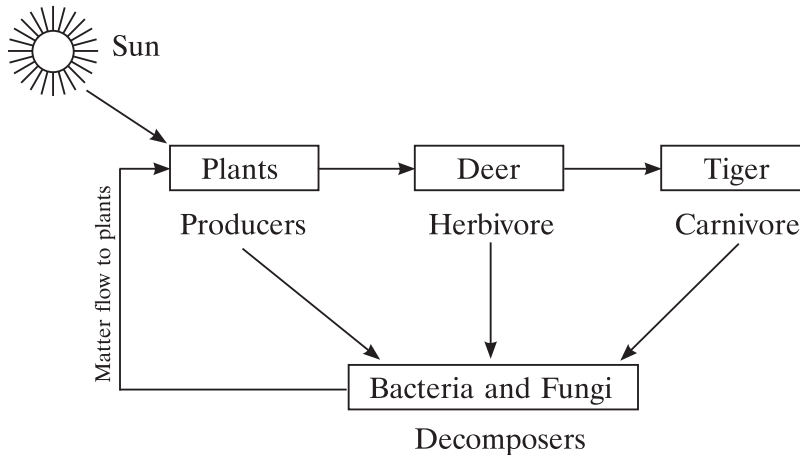
$$R = \rho \frac{l}{A}$$

$$\rho = \frac{RA}{l}$$

$$\text{Unit of } \rho = \frac{\text{ohm} \times \text{meter}^2}{\text{meter}} = \text{ohm meter or } \Omega\text{m}$$

Resistivity of a material of wire will not change as it is a characteristic property of the material. If the length of the wire is doubled, resistance will also double as resistance is directly proportional to the length of the wire $R \propto l$.

24. (a)



(b) Methods of waste disposal practiced at home

- Segregation
- Recycling
- Composting

(Any two)

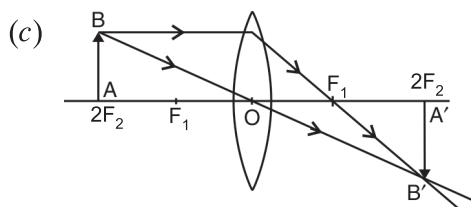
25. (a) 'X' — Lead nitrate, $\text{Pb}(\text{NO}_3)_2$
 'Y' — Nitrogen dioxide, NO_2
 'Z' — Oxygen, O_2

(b) The type of reaction is thermal decomposition reaction.



26. (a) Convex lens.

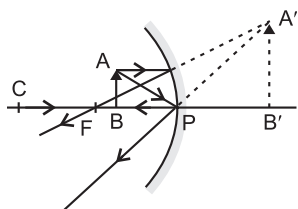
(b) Object should be placed at centre of curvature or $2F_1$ of convex lens, i.e. $u = 2f$ to obtain, real and equal size inverted image at $2F_2$, i.e. $v = 2f$ on the other side of the lens.



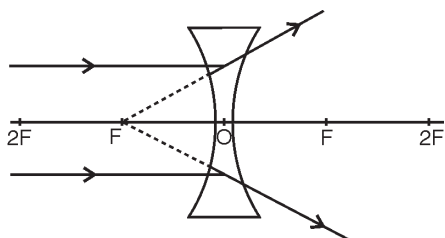
OR

(a) **Principal focus:** It is a point on the principal axis at which all the incident rays parallel to the principal axis meet after reflection from a concave mirror or appear to meet in case of convex mirror.

(b) (i)



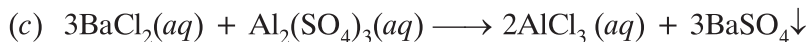
(ii)



27. (a) Substance oxidised — CO .
 CO has been oxidised to CO_2 .
 Substance reduced — Fe_2O_3 .
 Fe_2O_3 has been reduced to Fe .

(b) Effects of oxidation reactions in everyday life

- Corrosion
- Rancidity



28. (a) A — Liver

B — Pancreas

(b) Part A (Liver) secretes bile juice and bile salts which is stored in gall bladder.

- Bile juice makes the acidic food alkaline to facilitate the action of enzymes on it.
- Bile salts breakdown fats present in food into small globules which is also called emulsification.

Part B (Pancreas) secretes pancreatic juice which contain enzymes. Enzymes are trypsin and lipase.

- Trypsin helps to digest proteins into amino acids.
- Lipase breaks down emulsified fats into smaller globules.

OR

(a) (i) – Capillaries in body organs

(ii) – Vena cava from body

(iii) – Aorta

(iv) – Pulmonary vein from lungs

(v) – Pulmonary artery to lungs

(b) Pulmonary artery takes deoxygenated (impure) blood from right atrium to lungs for purification.

29. (a) Each step or level of the food chain forms a trophic level. Producers are considered to be at the first trophic level of all food chains as they manufacture their own food by the process of photosynthesis using energy from the sun.

(b) The ways by which energy is lost from the trophic levels in an ecosystem are:

- as heat to the environment
- utilised in growth and reproduction
- in maintaining life process like nutrition.
- in doing work

(any two)

(c) The components of an ecosystem are:

- abiotic components (non-living components)
- biotic components (living components)

30. (a) Focal length of a mirror does not depend upon object or image distance. It cannot be changed by moving the object towards or away from the mirror. Focal length can only change if radius of curvature of the mirror is changed.

As focal length is half of the radius of curvature i.e. $f = \frac{R}{2}$

(b) $h_i = -6 \text{ cm}$ (Real image)

$$h_o = 2 \text{ cm}$$

$$u = -10 \text{ cm}$$

$$m = \frac{h_i}{h_o} = \frac{-v}{u}$$

$$\Rightarrow \frac{-6}{2} = \frac{-v}{-10}$$

$$\Rightarrow v = -\frac{60}{2} = -30 \text{ cm}$$

By applying mirror formula

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} = \frac{1}{-30} + \frac{1}{-10} = \frac{-1-3}{30} = \frac{-4}{30}$$

$$\Rightarrow f = \frac{-30}{4} = -7.5 \text{ cm}$$

Focal length of the mirror = 7.5 cm

Position of the image = Beyond centre of curvature 'C'

31. (a) Hormones are secreted in extremely less quantities. Excess or deficiency of such hormones can have harmful effects on our body. A feedback mechanism controls the timing and secretion of hormones released by various glands.

For example: On the rise of blood glucose level, information is sent to pancreas to release insulin.

When the appropriate amount of glucose level is obtained in the blood, the release of insulin is stopped.

- (b) Receptor is a cell or group of cells specialised to detect a particular stimulus and to initiate the transmission of impulses *via* the sensory nerves. They are present on sense organs in our body.

Gustatory receptors: They detect taste and are present on the tongue.

Olfactory receptors: They detect smell and are present in the nose.

32. (a) Unsaturated hydrocarbons burn with yellow smoky flame due to presence of higher percentage of carbon.



33. (a) Between the opposite corners P and R

Resistance in the path PSR(R_1) = 15 + 15 = 30 Ω

Resistance in the path PQR(R_2) = 15 + 15 = 30 Ω

We know the resistance in the paths PSR and PQR are in parallel,

Resistance between P and R(R_3) is parallel to $R_1 + R_2$

$$\begin{aligned}\frac{1}{R} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \\ &= \frac{1}{30} + \frac{1}{30} + \frac{1}{15} \\ &= \frac{1+1+2}{30} = \frac{4}{30}\end{aligned}$$

$$\Rightarrow \frac{1}{R} = \frac{4}{30}$$

$$\Rightarrow R = 7.5 \Omega$$

The resistance between the opposite corners P and R is 15 Ω .

- (b) Resistance of the conductor depends

(i) on its length.

(ii) on its area of cross-section.

(iii) on the nature of its material.

34. (a) When a bee stings a person, it leaves formic acid (methanoic acid) in the skin which causes pain and irritation. Use of a mild base like baking soda on the stung area gives relief as base neutralises the acid.

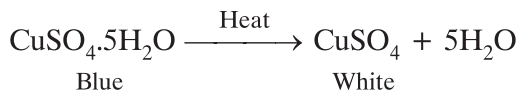
- (b) Tartaric acid is an ingredient of baking powder. It is used in making the cake soft, spongy and fluffy.

5–8% solution of acetic acid in water is called vinegar. It is used widely as a preservative in pickles.

- (c) A small amount of hydrochloric acid is produced in the stomach which is useful as it can kill the harmful bacteria that may enter into the stomach along with the food. If excess of acid is produced, there is irritation and burning sensation in the stomach. To get relief, we can take antacid like milk of magnesia [$\text{Mg}(\text{OH})_2$] which neutralises the excess of acid.

OR

- (a) Copper sulphate crystals contain water of crystallisation. Water of crystallisation is the fixed number of water molecules in one formula unit of copper sulphate. Chemical formula of salt is $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and colour is blue before heating. After heating, the colour of crystals changes to white and five molecules of water are removed.

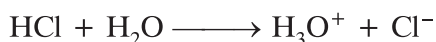


Example of salt having water of crystallisation

Iron sulphate – $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

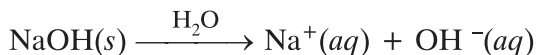
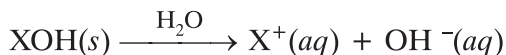
The colour changes occur from green to dull white due to loss of 7 molecules of water of crystallisation. Then it changes to brownish black due to the formation of Fe_2O_3 .

- (b) (i) Acids conduct electricity as the bulb glows in acid solution. Acids dissociate in the solution to produce $\text{H}^+(\text{aq})$ ions, these H^+ ions are responsible for the acidic properties and the electric current is carried through the ions.



- (ii) If in place of dilute HCl, glucose solution is taken as an electrolyte, the bulb does not glow. It means the glucose solution does not dissociate and forms H^+ as ions which are responsible for the conduction of electricity.
- (iii) When a base 'X' is dissolved in water, it forms alkali solution of base 'X'. When electricity is passed through solution of 'X', the bulb glows indicating the ions are formed in the solution due to the dissociation of alkali. When a base is dissolved in water, it generates (OH^-) ions in water and ions are responsible for conduction of electricity.

For example:



35. (a) A — Binary fission

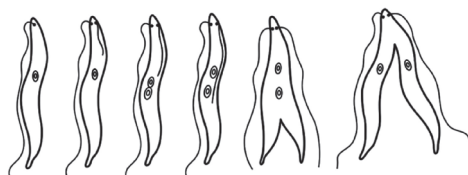
B — Multiple fission

- (b) *Amoeba* uses binary fission to reproduce. Examples of two more organisms which reproduce by binary fission are *Paramecium* and *Leishmania*.

(c) Differences between binary fission and multiple fission

Binary fission	Multiple fission
– It results in production of two individuals.	– It results in the production of several individuals.
– It occurs under favourable conditions.	– It occurs under both favourable and unfavourable conditions.
– Nucleus of the parent cell divides only once to form two nuclei.	– Nucleus of the parent cell undergoes repeated divisions to form a large number of nuclei.
– For example: <i>Amoeba</i>	– For example: <i>Plasmodium</i>

(d) Sleeping sickness is caused by *Leishmania*.



Binary fission in *Leishmania*

OR

(a) A — Pollen grain

B — Pollen tube

C — Male germ cell

D — Female germ cell

(b) Part B is pollen tube that helps in transportation of male gamete to ovary.

(c) Part A is pollen grain. When it falls on a suitable stigma, it starts germinating and forms a pollen tube. The pollen tube grows into the style and reaches the ovule. In the pollen tube the male nucleus divides into two male germ cells. The pollen tube then reaches the embryo sac into which it releases the two male gametes contained in it. One of the male gametes fuses with the female gamete.

(d) Part C is male germ cell and D is female germ cell. The male germ cell fuses with the female germ cell in the ovary and forms a zygote. The zygote divides several times to form an embryo within the ovule. The ovule develops a rough coat and is gradually converted into a seed. The ovary grows rapidly and ripens to form a fruit.

36. (a) (i) A — Direct current
B — Alternating current

(ii) Differences between Direct current (DC) and Alternating current (AC)

Direct Current (DC)	Alternating Current (AC)
– The current flows in one direction only.	– The current reverses its direction after equal intervals of time.
– The magnitude of current does not become zero after a certain time.	– The magnitude of current becomes zero after a regular time interval.

(iii) Source of direct current (DC) — Cell, battery, solar cell, DC generator
(any one)

Source of alternate current (AC) — AC generator

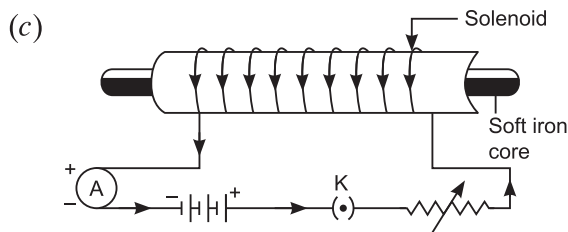
- (b) (i) **Magnetic field:** The space around a magnet in which the force of attraction and repulsion due to magnet can be detected is called the magnetic field.
- (ii) **Magnetic field lines:** The curved paths along which the iron filings arrange themselves due to forces acting on them in the magnetic field of the bar magnet are called magnetic field lines.
- (c) If two magnetic field lines intersect each other at a point, the point will have two directions which is not possible.

OR

- (a) A bar magnet is a permanent magnet and its polarity is fixed whereas a solenoid is a temporary magnet and its polarity is not fixed.
- (b) An electromagnet is a magnet consisting of a long coil of insulated copper wire wrapped around a soft iron core that is magnetised only when electric current is passed through the coil.

Uses of electromagnet

- (i) It is used to separate magnetic substance from non-magnetic substance.
- (ii) It is used in electric bells, telephone receivers, microphones, loudspeakers, television etc.
(any one)



- (d) (i) Soft iron core makes the magnetic field stronger because it becomes a magnet itself.
(ii) Soft iron loses its magnetism as soon as the current stops flowing. So, it is a temporary magnet.
- (e) The strength of the electromagnet can be increased by
- increasing the number of turns in the coil as the strength is directly proportional to the number of turns.
 - increasing the current in the coil as strength of electromagnet is directly proportional to the current flowing through it.

37. (a) A – Branch of renal artery

B – Glomerulus

C – Tubular part of nephron

D – Collecting duct

- (b) (i) Urea and uric acid are the two nitrogenous wastes which are removed from blood in the kidneys.
(ii) The amount of water reabsorbed depends on:
- how much excess water there is in the body.
 - how much of dissolved waste is to be removed.

OR

(b) Steps involved in urine formation:

- **Glomerular filtration:** Nitrogenous wastes, glucose, water, amino acid filter from the blood into Bowman's capsule of the nephron.
- **Tubular reabsorption:** Useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.
- **Secretion:** Urea, extra water and salts are secreted into the tubule which open up into the collecting duct and then into the ureter.

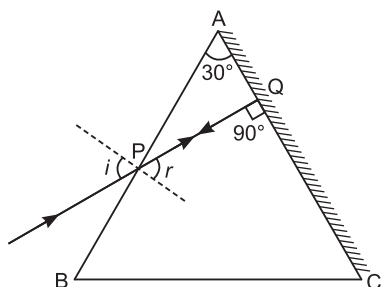
38. (a) Dispersion of light.

(b) Among the seven colour components of white light, the red light has a higher wavelength and violet has the smaller wavelength. Again, angle of minimum deviation (D) is directly proportional to the refractive index (n), which, in turn, inversely proportional to the wavelength (λ) of light, i.e.

$$D \propto n \propto \frac{1}{\lambda}$$

Accordingly deviation will decrease if the incident violet light is replaced by red light.

(c)



Here, $\angle A = 30^\circ$, $n = \sqrt{2}$, r

From Snell's law

$$\begin{aligned} \frac{\sin i}{\sin r} &= n_{21} \\ \Rightarrow \frac{\sin i}{\sin(90^\circ - 60^\circ)} &= \sqrt{2} && [\because \angle P = 180^\circ - (\angle P + \angle Q)] \\ \Rightarrow \sin i &= \sqrt{2} \times \sin 30^\circ \\ \Rightarrow \sin i &= \sqrt{2} \times \frac{1}{2} = \frac{1}{\sqrt{2}} = \sin 45^\circ \\ \therefore i &= 45^\circ \end{aligned}$$

OR

(c) The angle of emergence is almost equal to the angle of incidence.

39. (a) (i) **Anode:** Thick plate of impure metal 'X'.

Cathode: Thin plate of pure metal 'X'

Electrolyte: Water soluble salt of metal 'X'

(ii) The metals which can be refined electrolytically are copper, zinc, tin, nickel, silver, gold etc. (any two)

- (b) (i) Displacement reaction or exothermic reaction or aluminothermy.
(ii) Al is getting oxidised to Al_2O_3 , Fe_2O_3 is getting reduced to Fe.
(iii) Thermit reaction is used to join railway tracks or cracked machine parts.

OR

(b) The ore of mercury is cinnabar.

The steps to extract mercury from its ore:

- Enrichment of ore
- Conversion of ore to oxide
- Reduction of metal oxide
- Refining of metal