SAMPLE PAPER SOLUTIONS

SECTION-A

1. $Fe_2O_3 + 2Al \xrightarrow{\Delta} Al_2O_3 + 2Fe + Heat$

2. Freezing of water is a physical change as no new substance is formed in this only state of substance is changing.

3. Option (2)

Magnesium is a metal as it loses electrons to form positive ion.

4. Concave lens

OR

The fish will appear above its actual position.

5. For minimum resistance parallel combination is used

$$\frac{1}{R_P} = 5 + 5 + 5 + 5 + 5$$

$$R_p = \frac{1}{25}\Omega$$

6. Fleming's left hand rule.

7. Concave mirror

8. Atmospheric refraction

OR

Light is least scattered at noon, since it travels shorter distance through atmosphere.

9. Excretory product is uric acid and Excretory organ is Malpighian tubules.

10. Abiotic components include the non-living physico-chemical factors of the environment.

Ex. air, water.

11. The respiratory pigment in human beings is haemoglobin and this pigment found in RBC's.

12. Characters of garden pea plant studied by Mendel. (any four)

	Properties	**Dominant**	**Recessive**
1	Height	Tall	Dwarf
2	Colour of seed	Yellow	Green
3	Colour of pod	Green	Yellow
4	Colour of flower	Violet	White
5	Shape of seed	Round	Wrinkled
6	Shape of pod	Inflated	Constricted
7	Position of flower	Axial	Terminal

13. Option (3) - T_1

14. Option (1)

Explanation : Sodium carbonate reacts with excess hydrochloric acid to form sodium chloride, water and carbon dioxide. In this reaction, bubbles of carbon dioxide are observed.

15. Option (2)

If both assertion and reason are true but Reason is not the correct explanation of assertion.

OR

Option (1)

If both assertion and reason are true and Reason is the correct explanation of assertion.

16. Option (1)

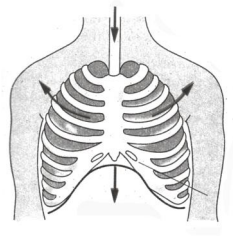
17. (a) Option (4)
both (2) and (3)

(b) Option (2)
From X to Y ribs move upward and outward whereas from Y to Z ribs move downward and inward.

(c) Option (1)
End of expiration and beginning of inspiration

(d) Option (1)
They are exhaled.

(e) Option (1)



16. Option (1)

18. (a) Option (4)
The atomic symbol of diamond is C.

(b) Option (2)
Graphite is mixed with clay or finely powdered sand and then moulded to form pencil leads.

(c) Option (2)
Diamond is not used as a dry lubricant

(d) Option (4)
Graphite is a good conductor of electricity. Also it does not react with acids or alkalis. Thus it is used for making electrodes for electrolytic cells.

(e) Option (1)
In diamond each carbon atom is covalently bonded to four other carbon atoms in a tetrahedral arrangement.

19. (a) Option (3)

(b) Option (2)

(c) Option (2)

(d) Option (2)

(e) Option (1)

20. (a) Option (2)

(b) Option (3)

(c) Option (3)

(d) Option (3)

(e) Option (4)

SECTION-B

21. (a) (i) Ants — Formic acid
(ii) Lemon — Citric acid
(iii) Milk — Lactic acid
(iv) Tomato — Oxalic acid

(b) Sodium sulphate
Sodium Nitrate

OR

(i) B is sodium hydroxide (NaOH).

(ii) Neutralisation rection occurs when B is treated with an acidic oxide.

(iii) $2NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$

(B) Carbon dioxide Sodium Water
Sodium (Acidic oxide) carbonate
hydroxide (Salt)

22. White silver chloride turns grey in sunlight

$2AgCl \xrightarrow{\text{sunlight}} 2Ag + Cl_2$

photolytic decomposition

23. Functions of lymph (any two)

(i) It takes up excess fluid that has diffused out from the blood capillaries and puts it into blood.

(ii) It has lymphocytes which fight against germs and bacteria and produce antibodies to fight against infections.

(iii) It absorbs and carries digested fats from the intestine. Serve as a middle man between blood and body.

OR

Functions of blood (any two)

(i) Transportation of oxygen from lungs to tissues.

(ii) Transportation of carbon dioxide from the tissues to the lungs.

(iii) Transportation of excretory materials from the tissues to the kidneys.

(iv) Transportation of digested food from the small intestine to the tissues.

(v) Distribution of hormones and enzymes.

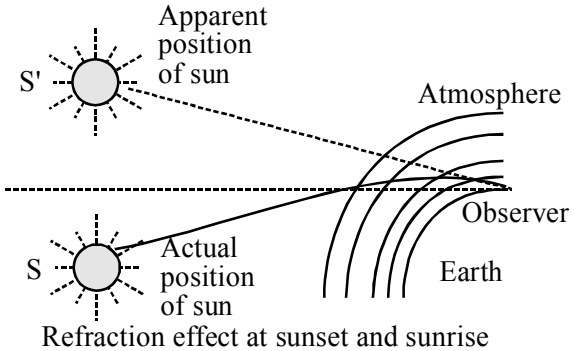
(vi) Formation of clots to prevent blood loss.

(vii) Distribution of heat and temperature control.

(viii) Prevention from infections and helps in wound healing.

24. Fertilization is the process of fusion of the male and female gametes to form a diploid zygote. Oviducts are the sites of fertilization of male and female gametes in a human female.

25. Advanced sunrise and delayed sunset The figure below shows the actual position of the sun S at the time of sunrise andS'the apparent position of sun. The advanced sunrise and delayed sunset is because of atmospheric refraction.



Refraction effect at sunset and sunrise

The light rays starting from the Sun travel from rarer to denser layers. They bend more and more towards the normal.

However, an observer on earth sees an object in the direction of the rays reaching his eyes. The Sun which is actually in a position S below the horizon, appears in the position S' above the horizon for him. Thus, the Sun appears to rise early by about 2 minutes and set late by about 2 minutes. This increases the length of the day by about 4 minutes.

26. (a) Slope $\frac{V}{I}$ = Resistance R

As larger resistance represents series combination and smaller resistance the parallel combination. Therefore, V-I graph of greater slope represents series combination and hence it is correctly labelled.

(b) Slope, $\frac{I}{V}=\frac{1}{R}$

As larger resistance represents series combination, so I-V graph of smaller slope represents series combination and hence it is also correctly labelled.

SECTION-C

27. (a) A series of organic compounds having similar structures and similar chemical properties in which the successive members differ in their molecular formula by – CH_2 group.

(b) Compounds having same molecular formula but different structural formulae are known as isomers and the phenomenon of existence of isomers is termed as isomerism.

There are three isomers of pentane _

(i) n - pentane

$(CH_3 - CH_2 - CH_2 - CH_2 - CH_3)$

(ii) iso-pentane

$$(CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_3)$$

(iii) neo-pentane

$$(CH_3 - \underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}} - CH_3)$$

(c) If two atoms form triple bond with each other each atom shares three electrons

$X \vdots Y$ or $X \equiv Y$

OR

Those reactions in which two different atoms or groups of atoms are exchanged are called double displacement reactions.

Two examples

(1) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$

(2) $CuSO_{4(aq)} + 2NH_4OH(aq) \rightarrow Cu(OH)_2 \downarrow + (NH_4)_2SO_4(aq)$

28. In the reaction

$2Cu_{(s)} + O_{2(g)} \longrightarrow 2CuO(s)$

(i) Cu is oxidised as it is gaining oxygen.

(ii) Oxygen is reduced as in product, copper is added to it.

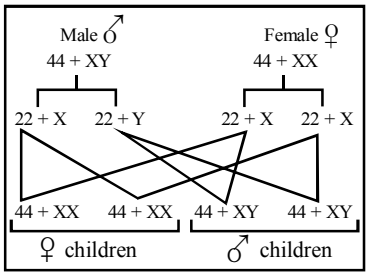
(iii) Oxygen is oxidant or oxidising agent as it oxidises copper.

29. (a) Alkali metals belong to first group of the periodic table.

(b) (i) Magnesium is a metal as it loses electron to form Mg^{2+} ion.

(ii) Its size decreases as we move from left to right in a period in periodic table.

30.



Sex determination

During gamete formation the male produce two types of gametes i.e. one having X chromosome and other having Y chromosome while both gametes produced by females are alike i.e. each having X chromosome.

When X chromosome of male fuses to X chromosome of female, girl child is born.

When Y chromosome of male fuses to X chromosome of female, boy child is born.

31. Methods to reduce the problem of waste disposal are :

(i) By minimizing the use of non-biodegradable substances.

(ii) By following the principle of 3R's-reducing, reusing and recycling.

(iii)By segregating and disposing biodegradable and non-biodegradable substances separately.

OR

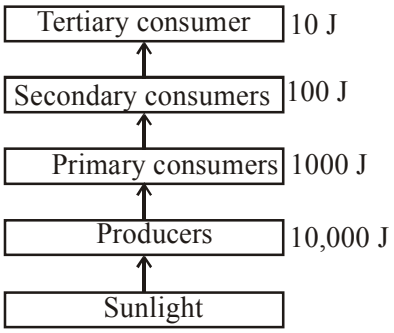
An ecosystem can be defined as a functional unit of nature, where living organisms interact among themselves and with the surrounding physical environment.

Diagram to show the flow of energy in an ecosystem : The ultimate source of entire energy, used by living organisms, is the Sun.

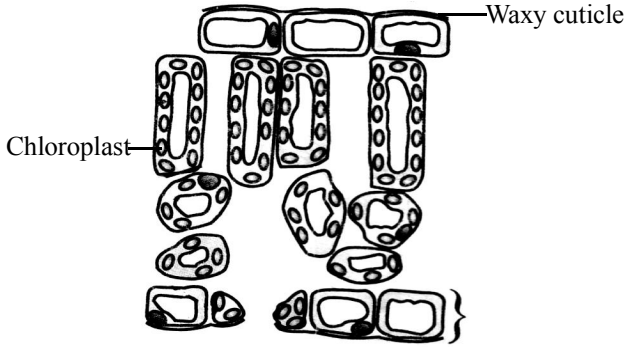
In a community, each food chain, in fact, represents stepwise transfer of food (energy).

Of the total solar radiations falling on the earth, only about 1% are captured by green plants in a terrestrial ecosystem and converted into food energy by photosynthesis. This energy is stored as chemical energy of food.

According to 10 percent law given by Lindeman if, 10,000 J of energy is available to the producers, then 1000 J will be available to the primary consumers, 100 J will be available to secondary consumers and 10 J will be available to tertiary consumers.



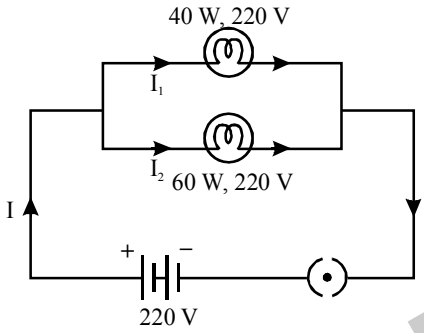
32. (a)



Cross section of leaf

(b) Desert plants take up CO2 at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day and form glucose.

33. (i)



(ii) Current drawn by 40 W bulb,

$$I_1 = \frac{P}{V} = \frac{40}{220} A = \frac{2}{11} A = 0.18 \text{ A}$$

Current drawn by 60 W bulb,

$$I_2 = \frac{P}{V} = \frac{60}{220} = \frac{3}{11} A = 0.27 \text{ A}$$

Total current drawn from circuit,

$I = I_1 + I_2 = 0.18 \text{ A} + 0.27 \text{ A} = 0.45 \text{ A}$

(iii) Energy consumed by 40 W bulb in 1 hour

$= P \times t = 40 \text{ W} \times 1 \text{ h} = 40 \text{ Wh}$

Energy consumed by 60 W bulb in 1 hour

$= 60 \text{ W} \times 1 \text{ h} = 60 \text{ Wh}$

$\therefore$ Total energy consumed = 40 Wh + 60 Wh

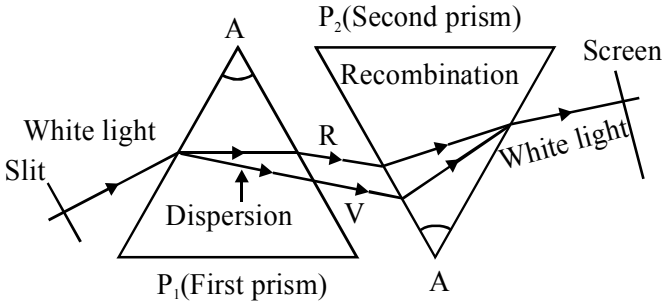
= 100 Wh = 0.1 kWh

OR

Light rays of different colours travel with the same speed in vacuum and air. But in any other medium, they travel with the different speeds and bend through the different angles, which leads to the dispersion of light.

Newton showed that the reverse of dispersion of light is also possible. He kept two prisms close to each other; one in erect position and the other in an inverted position. The light gets dispersed when it passes through the first prism. The second prism receives all the seven coloured rays from first prism and recombines them into the original white light. This observation shows that sunlight is made up of seven colours.

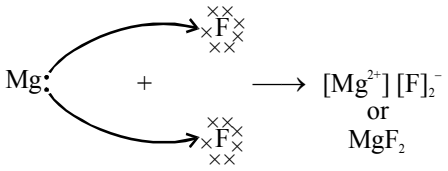
Any light that gives spectrum similar to that of sunlight is called white light.



Recombination of the spectrum of white light

SECTION-D

34. (a) The atomic number of magnesium is 12 and its electronic configuration is 2, 8, 2.
The atomic number of fluorine is 9 and its electronic configuration is 2, 7.



(b) (i) Ionic compounds are generally solids.
(ii) They impart a characteristic colour to the flame.
(iii) They are soluble in polar solvent like water and insoluble in non-polar solvents like kerosene, petrol etc.
(iv) Their molten or aqueous solution conduct electricity.

OR

(a) Chemically, bleaching powder is generally represented by the formula, $CaOCl_2$ (called, calcium oxychloride).
We know that chlorine is produced during the electrolysis of aqueous sodium chloride **(brine)**. This chlorine gas is used for the manufacture of bleaching powder. Bleaching powder is produced by the action of chlorine on dry slaked lime [$Ca(OH)_2$]. Bleaching powder is represented as $CaOCl_2$, though the actual composition is quite complex.

$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$
Slaked lime Bleaching powder

The solution is milky because some unreacted lime is still present. The plant generally used for the manufacture of bleaching powder is known as **'Hasenclever's plant'**.

(b) **Uses of bleaching powder**
(a) For bleaching cotton and linen in the textile industry, for bleaching wood pulp in paper factories and for bleaching washed clothes inlaundry.
(b) As an oxidising agent in many chemical industries.
(c) For disinfecting drinking water to make it free of germs.
(d) In rendering wool unshrinkable.
(e) In the manufacture of chloroform.
(f) In laundry for bleaching washed clothes.

35. (a) 1. Pollen grain 2. Stigma 3. Style
4. Pollen tube 5. Ovary 6. Egg cell

(b) Differences between pollination & fertilization

Differences between pollination and fertilization	
Pollination	Fertilization
Transfer of pollen grains from anther to stigma.	Fusion of male and female gametes.
It does not ensure formation of zygote.	It ensures formation of zygote and further development
It does not initiate fruit formation.	After fertilization ovary develops into fruits.
There are many agents of pollination.	Fertilization is always same in all plants.

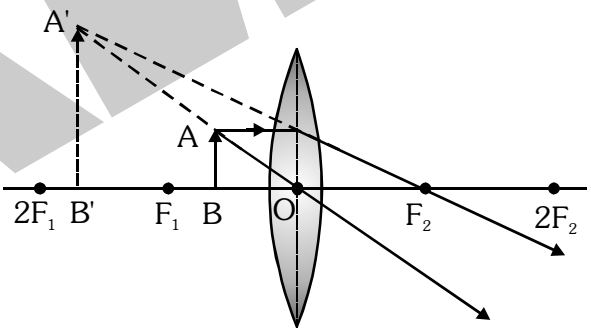
OR

(a) 1. Anther 2. Filament 3. Petal 4. Sepal 5. Stigma 6. Carpel.

(b) (i)

Characters	**Self pollination**	**Cross pollination**
Occurrence	Occurs within a flower or in between two flowers of the same plant.	Occurs between two flowers of two different plants of the same species.
Agent of pollination	Usually no external agent of pollination is required.	External agents such as wind, water, insects and birds are required.
Production of pollen	Produced in small numbers, thus no wastage of pollen grains occurs.	Produced in large numbers thus, wastage of pollen grains occurs.
Nature of offsprings produced	Offsprings produced have genetic makeup with little variation from the parent plant.	Offsprings produced differ more in genetic make-up and variations occur.

36. (i) The formation of image by a convex lens when an object is placed in front of the lens between its optical centre and principal focus.



(ii) Object distance u = BO (negative)
Image distance v = B'O (negative)
Focal length OF_2 (Positive)

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

(iii) As the magnification of is –1, the size of image of formed is equal to the size of the object. Thus, the object is placed at $2F_1$ in front of the convex lens.
According to the equation
$2F_1$ = 20 cm
Thus, focal length (f) = 10 cm = 0.1 m

Now, Power = $\frac{1}{f} = \frac{1}{0.1}$ = + 10 Diopter