Class- X Session - 2022-23

Subject - Science (086)

Sample Question Paper - 21

with Solution

Max. Marks: 80 **Time Allowed: 3 hours**

General Instructions:

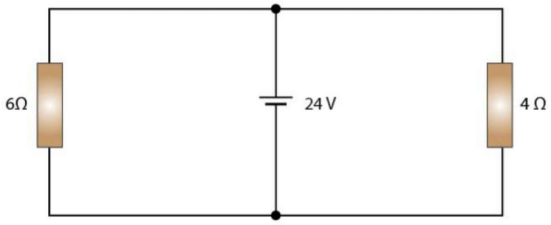
i. *This question paper consists of 39 questions in 5 sections.*
ii. *All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*
iii. ***Section A** consists of 20 objective type questions carrying 1 mark each.*
iv. ***Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.*
v. ***Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words*
vi. ***Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.*
vii. ***Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.*

Section A

1. In the slide of an epidermal peel, the parts which appear pink coloured after staining with safranin are **[1]**

a) nuclei only
b) all parts in the peel
c) cell membrane and cytoplasm
d) stomata only

2. Find the current in each resistor in the circuit shown below: **[1]**



a) 6 amp
b) 1 amp
c) 5 amp
d) None of these

3. A zygote which has an X-chromosome inherited from the father will develop into a **[1]**

a) either boy or girl
b) girl
c) X- chromosome does not determine the sex of a child
d) boy

4. Choose the incorrect statement **[1]**

a) The difference between the direct and alternating currents is that the direct current always flows in one direction, whereas the alternating current reverses its direction periodically

b) Fleming's right-hand rule is a simple rule to know the direction of induced current

c) The right-hand thumb rule is used to find the direction of magnetic fields due to current carrying conductors

d) In India, the AC changes direction after every $\frac{1}{50}$ second

5. The odour of ethanoic acid resembles which one of the following**:** **[1]**

a) Kerosene

b) Pungent

c) Rose

d) Vinegar

6. Which of the given statement is correct: **[1]**
Statement A: All metals form basic oxides.
Statement B: Few non-metals form neutral oxides.

a) Both the statements A and B are false.

b) Statement B is true. Statement A is false.

c) Statement A is true. Statement B is false.

d) Both the statements A and B are true.

7. When an organism breaks into a number of parts and each part develop into an individual, it is called: **[1]**

a) Regeneration

b) Budding

c) Binary fission

d) Spore formation

8. Given below are certain chemical properties of substances. **[1]**

A. It turns blue litmus red.

B. It turns red litmus blue.

C. It reacts with zinc and a gas evolves.

D. It reacts with solid sodium carbonate to give brisk effervescence.

Which out of these properties are shown by dilute hydrochloric acid?

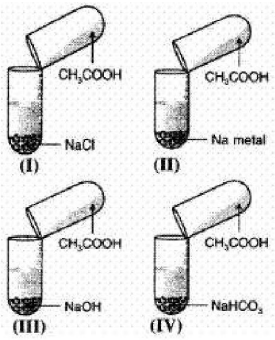
a) A, C and D only

b) A and C only

c) B, C and D only

d) A and B only

9. In which of the following gas evolved will burn explosively? **[1]**



a) I and II

b) I, III and IV

c) II only

d) I and III

10. Two pink colored flowers on crossing resulted in 1 red, 2 pink, and 1 white flower progeny. The nature of the cross will be **[1]**

a) self pollination

b) double fertilisation

c) no fertilisation

d) cross fertilisation

11. Pollen grains of wind-pollinated plants are: **[1]**

a) Heavy, sticky

b) Light, spongy

c) Light, sticky

d) Spongy, heavy

12. The speed of light in substance X is 1.25×10^8 m/s and that in air is 3×10^8 m/s. The refractive index of this substance will be: **[1]**

a) 3.75

b) 2.4

c) 0.4

d) 4.2

13. The unit for measuring potential difference is: **[1]**

a) kWh

b) Volt

c) Ohm

d) Watt

14. A well-stained leaf peel mount when observing under the high power of a microscope shows nuclei in **[1]**

a) only epidermal cells

b) guard cells and epidermal cells

c) guard cells, epidermal cells and stoma.

d) only guard cells

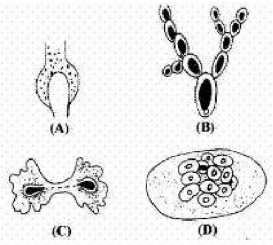
15. If copper is kept open in air, it slowly loses its shining brown surface and gains a green coating. It is due to the formation of **[1]**

a) $CuCO_3$

b) CuO

c) $CuSO_4$ d) $Cu(NO_3)_2$

16. In which of the following, binary fission observed: **[1]**



a) A b) D

c) C d) B

17. **Assertion (A):** Two bar magnets attract when they are brought near to each other with the same pole. **[1]**
Reason (R): Unlike poles will attract each other.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

18. **Assertion (A):** A person has lost most of its intelligence memory and judgment. **[1]**
Reason (R): A person has operated a tumour located in the cerebrum.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

19. **Assertion (A):** Phenolphthalein gives pink colour in basic solution. **[1]**
Reason (R): Phenolphthalein is a natural indicator.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

20. **Assertion (A):** Supersonic jets cause pollution as they thin out ozone. **[1]**
Reason (R): Depletion of ozone cause a greenhouse effect.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

Section B

21. i. Why does carbon form the largest number of compounds? Give two reasons. **[2]**
ii. Why are some of these called saturated and the other unsaturated compounds?
iii. Which one of these two is more reactive and why?

OR

Justify the nature of physical and chemical properties of compounds of homologous series.

22. Give an example of a food chain consisting of four organisms at different trophic levels. Give the scientific term used to indicate the first and third trophic level. **[2]**

23. Why do leaves drop off seasonally? **[2]**

24. Which of the following belong to the first trophic level? **[2]**

i. Grasshopper, mango tree, hawk, snake

ii. Sunflower plant, grasshopper, cockroach, banyan tree

25. Draw the structures of the following compounds**:** **[2]**

a. Ethanoic acid

b. Bromopentane

c. Butanone

26. Name a mirror which can give an erect and enlarged image of an object. **[2]**

OR

What is meant by power of a lens? What does its sign (+ve or - ve) indicate? State its SI unit. How is this unit related to focal length of a lens?

Section C

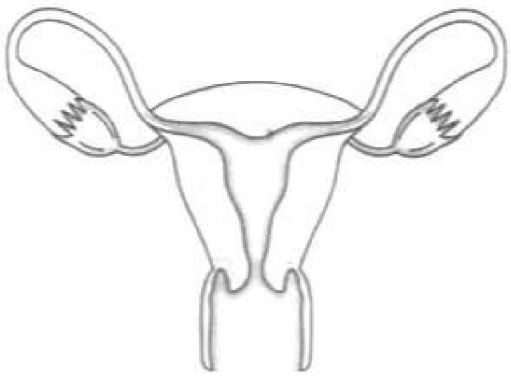
34. Give reason and name the type of chemical reaction taking place in each case: **[3]**

i. Dissolution of ammonium chloride in water leads to cooling of the glass apparatus used for dissolutions.

ii. Silver chloride powder which is white in colour, turns grey when kept in sunlight.

iii. Blue colour of copper sulphate solution fades when an iron nail is dipped inside the solution.

28. Answer the following by carefully studying the figure: **[3]**



i. Identify the image shown above.

ii. Label in the figure the ovary, oviduct, uterus, vagina.

iii. State the functions of the labeled parts in part b.

OR

Mention three important features of fossils which help in the study of evolution.

29. 1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. **[3]**

2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye.
A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact.
If you are asked to participate in this mission how would you contribute in this noble cause?

   1. State the objective of organising such campaigns.
   2. List two arguments which you would give to motivate the people to donate their eyes after death.
   3. List two values which are developed in the persons who actively participate and contribute in such programme.

30. One-half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations. **[3]**

31. i. Who provided the evidence of DNA as genetic material? **[3]**

ii. Why DNA is called polynucleotide?

iii. List three important features of double helical model of DNA.

OR

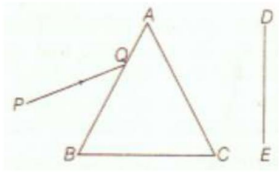
In Mendel's experiment of inheritance in which he took two contrasting characters, i.e. round green and wrinkled yellow seeds,

i. What was the phenotype of offsprings in F_1 - generation?

ii. What was the ratio of offsprings in F_2 - generation?

32. Justify with the help of an example that displacement reaction is also a redox reaction. **[3]**

33. A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram. **[3]**



Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE.

i. Write the name and cause of the phenomenon observed.

ii. Where else in nature is this phenomenon observed?

iii. Based on this observation, state the conclusion which can be draw about the constituents of white light.

Section D

27. i. An ore, on heating in air, give sulphur dioxide gas. Name the method in each metallurgical step, that will be required to extract this metal from its ore. **[5]**

ii. State which of the following reactions will take place or which will not, giving suitable reason for each?

a. $Zn(s) + CuSo_4\ (aq) \rightarrow ZnSO_4\ (aq) + Cu(s)$

b. $Fe(s) + ZnSO_4(aq) \rightarrow FeSO_4(aq) + Zn(s)$

OR

Two ores A and B were taken. On heating, ore A gives CO_2, whereas, ore B gives SO_2. What steps will you take to convert them into metals?

35. Describe the activity that shows that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field. How does Fleming's left-hand rule help us to find the direction of the force acting on the current-carrying conductor? **[5]**

36. Explain the importance of soil for plant growth **[5]**

OR

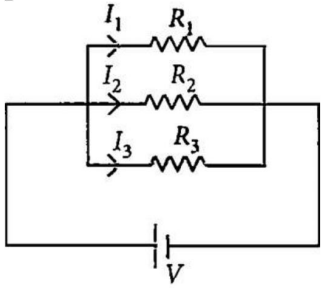
a. Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

b. Draw a diagram of human respiratory system and label - pharynx, trachea, lungs, diaphragm and alveolar sac on it.

Section E

37. **Read the text carefully and answer the questions:** **[4]**

If two or more resistances are connected in such a way that the same potential difference gets applied to each of them, then they are said to be connected in parallel.



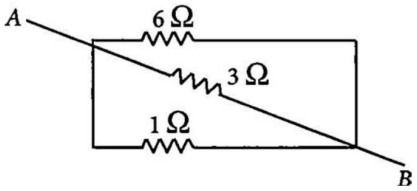
The current flowing through the two resistances in parallel is, however, not the same. When we have two or more resistances joined in parallel to one another, then the same current gets additional paths to flow and the overall resistance decreases.

(i) Three resistances, 2 Ω, 6 Ω and 8 Ω are connected in parallel, then what will be the equivalent resistance?

(ii) A wire of resistance 12Ω is cut into three equal pieces and then twisted their ends together, then what will be the equivalent resistance?

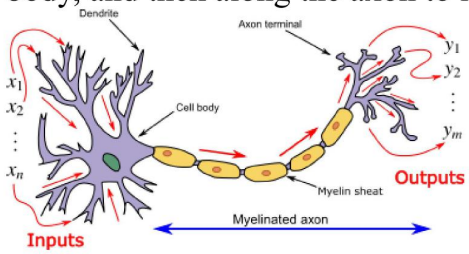
OR

Three resistances are connected as shown. Calculate the equivalent resistance between A and B?



38. **Read the text carefully and answer the questions:** **[4]**

In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell, see figure, sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end.



(i) Name the largest cell present in the body.

(ii) What is an axon ?

(iii) Name one gustatory receptor and one olfactory receptor present in a human beings.

OR

Name the following parts of a neuron:

a. Where information is acquired.

b. Through which information travels as an electrical impulse.

39. **Read the text carefully and answer the questions:** **[4]**

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

(i) If given acids are phosphoric acid, carbonic acid, hydrochloric acid and sulphuric acid, then which acid does not form an acidic salt?

(ii) What is the formula of baking soda?

(iii) Name the substance which on treatment with chlorine to obtain bleaching powder.

OR

Which salt is used for removing the permanent hardness of water?

SOLUTION

Section A

1. **(b)** all parts in the peel
   Explanation: Safranin stains epidermal cells of the onion peel.
2. **(a)** 6 amp
   Explanation: Given,
   $R_1 = 6\ \Omega$
   $R_2 = 4\ \Omega$
   $V = 24V$
   From the given circuit diagram we know that the two resistances are connected in parallel
   Therefore,
   Current across $R_1 = I_1 = \frac{V}{R1} = \frac{24}{6} = 4$ amp
   Current across $R_2 = I_2 = \frac{V}{R2} = \frac{24}{4} = 6$ amp
3. **(b)** girl
   Explanation: A zygote which has an X-chromosome inherited from the father will develop into a girl child.
4. **(d)** In India, the AC changes direction after every $\frac{1}{50}$ second
   Explanation: The frequency of Alternating current in India = 50 cycles/second
   Therefore, the time period of the alternating current $\frac{1}{50}$ second
   Since AC changes the direction of current after every half time period. Therefore AC will change current in $\frac{1}{100}$ seconds.
5. **(d)** Vinegar
   Explanation: The odour of ethanoic acid (CH_3COOH) resembles vinegar. A dilute solution of ethanoic acid in water is called vinegar. Vinegar contains about 5 to 8% ethanoic acid.
6. **(b)** Statement B is true. Statement A is false.
   Explanation: Most metals form basic oxides. However, some metals like aluminium and zinc, are amphoteric and form basic as well as acidic oxides. Non-metals react with oxygen to form acidic oxides or neutral oxides. E.g. Hydrogen forms a neutral oxide - H_2O.
7. **(a)** Regeneration
   Explanation: In this type of reproduction, all the parts regenerate into an individual.
8. **(a)** A, C and D only
   Explanation:
   - Dilute hydrochloric acid will turn blue litmus red.
   - It evolves H_2 gas with Zn metal.
     $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
   - Brisk effervescence will be due to CO_2 (g).
     $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$

9. **(c)** II only
Explanation: In I, no gas is evolved.
In II, H_2 gas will be evolved which burns explosively.
In III, No gas is evolved.
In IV, CO_2 gas will be evolved.
10. **(d)** cross fertilisation
Explanation: Two pink colored flowers on crossing resulted in 1 red, 2 pink, and 1 white flower progeny. The nature of the cross will be cross-fertilization. Cross-fertilization is the transfer of pollen grains from one plant to the stigma of the flower borne of a different plant of the same species.
11. **(b)** Light, spongy
Explanation: The pollen grains which are wind-pollinated are light weighted and spongy so that they are easily picked up by the blowing wind.
12. **(b)** 2.4
Explanation: 2.4
13. **(b)** Volt
Explanation: Volt is the unit used for measuring the potential difference.
14. **(b)** guard cells and epidermal cells
Explanation: The nucleus is present in both guard cells and epidermal cells.
15. **(a)** $CuCO_3$
Explanation: Copper gets green coating due to the basic copper carbonate formation and is a mixture of copper carbonate and copper hydroxide when it reacts with carbon dioxide gas and moisture present in the air. This is called tarnishing of copper.
The reaction is as follows:
$2Cu + H_2O + CO_2 + O_2 \rightarrow Cu(OH)_2 + CuCO_3$
16. **(c)** C
Explanation: It is Amoeba which undergoes binary fission. Most of the unicellular animals prefer binary fission method for reproduction.
17. **(d)** A is false but R is true.
Explanation: A is false but R is true.
18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Both A and R are true and R is the correct explanation of A.
19. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Because H_2SO_4 is a strong acid, it readily forms hydronium ions when dissolved in water which are responsible for its corrosive action.
20. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Both A and R are true and R is the correct explanation of A.

Section B

21. i. Carbon forms large no. of compounds due to the following reasons:
Catenation: The property of an element to combine with itself to form long chain is called catenation. Atoms of same element combine through covalent bonds and form long chains and structures. Carbon exhibit this property of catenation. Due to which we see such a large variety of organic compounds in nature.
Tetravalency: Carbon has a valency of four. So, it is capable of bonding with four

other atoms of carbon or atoms of some other element. Compounds of carbon are formed with oxygen, nitrogen, hydrogen, sulphur, chlorine and many other elements, which may act as functional groups with specific properties which depend on the elements other than the carbon present in the molecule.

ii. Some compounds are called saturated because they contain single bond only between two carbon atoms but some are unsaturated because in these hydrocarbons, valence of carbon is satisfied by double or triple bond.

iii. Unsaturated hydrocarbons are more reactive because of the presence of double and triple bonds between them, which are weaker compared to single bond.

OR

Compounds in a homologous series have different molecular masses, so a gradation in their physical properties like boiling points, melting points, solubility etc., can be seen with increasing molecular masses. But, the chemical properties, which are decided exclusively by the functional group, remain similar in a homologous series.

22. Grass→grasshopper→frog→snake.
Producer is the term used to indicate the first trophic level. They are able to manufacture their own food. **Secondary consumers** form the third trophic level.

23. The leaves drop off seasonally as they stop producing auxins, which normally prevent formation of abscission zone which cuts off nutrients and water supply to leaves.

24. The first trophic level is always the position for Producers thus, in above two cases the first trophic level is captured by,
i. Mango tree
ii. Sunflower plant, banyan tree.

25.

i. Structure of ethanoic acid (CH_3COOH)	$H-\overset{H}{\underset{H}{C}}-\overset{O}{\overset{\|}{C}}-OH$
ii. Structure of bromopentane ($C_5H_{11}Br$)	$CH_3-CH_2-CH_2-CH_2-CH_2-Br$
iii. Structure of butanone ($CH_3COC_2H_5$)	$H_3C-\overset{O}{\overset{\|}{C}}-CH_2-CH_3$

34. i. Dissolution of ammonium chloride (NH_4Cl) in water is an endothermic reaction where heat is absorbed from the surroundings hence making the glass apparatus cooler than before:

$$\underset{\text{Ammonium chloride}}{NH_4Cl(s)} + H_2O(l) \longrightarrow \underset{\text{Ammonium hydroxide}}{NH_4OH(aq)} + \underset{\text{Hydrochloric acid}}{HCl(aq)}$$

ii. Silver chloride (AgCl) undergoes a decomposition reaction in sunlight to give silver metal and chlorine gas:

$$\underset{\substack{\text{Silver chloride}\\\text{(White)}}}{2AgCl(s)} \xrightarrow{\text{Sunlight}} \underset{\substack{\text{Silver metal}\\\text{(Grey)}}}{2Ag(s)} + Cl_2(g)$$

iii. Iron(Fe) displaces copper from its solution, hence the colour of copper sulphate solution becomes less blue or fades. This is an example of a displacement reaction:

$$Fe(s) + \underset{\substack{\text{Copper sulphate}\\\text{(Blue)}}}{CuSO_4(aq)} \longrightarrow \underset{\text{Ferrous sulphate}}{FeSO_4(aq)} + Cu(s)$$

Section C

27. i) The ore is Cinnabar (Hg_2S)

Cinnabar is the ore of mercury (Hg) which has low reactivity and can be reduced to mercury by heating alone. So to obtain mercury from cinnabar the only step required is heating strongly in the presence of oxygen called "Roasting". In the first step, cinnabar gets converted to mercuric oxide which on further heating is reduced to mercury.

$2HgS\ (s) + 3\ O_{2\ (g)} + Heat \rightarrow 2\ HgO(s) + 2\ SO_{2}\ (g)$

$2\ HgO + Heat \rightarrow 2\ Hg\ (l) + O_{2}\ (g)$

ii) a. This reaction will take place as Zn is more reactive than Cu, so Zn will displace Cu from its salt $CuSO_4$ and will form colourless $ZnSO_4$ solution and reddish brown particles Cu.

b. This reaction will not occur as Fe is less reactive than Zn, so it will not be able to displace Zn from $ZnSO_4$.

OR

i. Ore A is a carbonate ore.

The steps involved in the extraction of metal M form ore A are as follows:

a. The carbonate ore is heated strongly in the limited supply of air to produce a metal oxide. **[calcination]**

$$MCO_3\ (s) \xrightarrow{\Delta} MO(s) + CO_2(g)$$

b. The oxide ore is reduced with carbon(coke).

$$MO\ (s) + C\ (s) \rightarrow M(s) + CO\ (g)$$

ii. Ore B is a sulphide ore.

The steps involved in the extraction of metal M from ore B are as follows:

a. The sulphide ore is heated strongly in the presence of the excess of air to produce a metal oxide.**[roasting]**

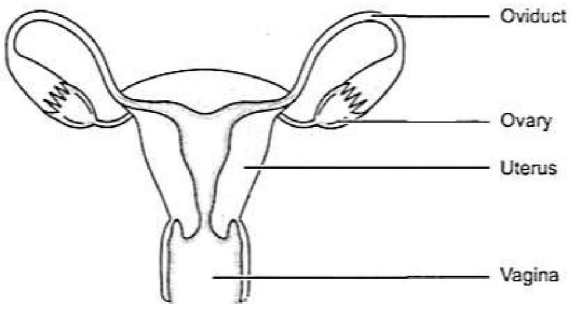
$$2MS(s) + 3O_2(g) \xrightarrow{\Delta} 2MO(s) + 2SO_2(g)$$

b. The oxide of metal B is reduced by carbon to obtain the corresponding metal.

$$MO(s) + \underset{Carbon}{C(s)} + \rightarrow \underset{Metal}{M(s)} + CO_2/CO(g)$$

28. i. The figure represents the female reproductive system.

ii. The figure with labelled part is as shown.



iii. The ovary is the female primary sex organ that produces ova or eggs. They secrete female hormones oestrogen and progesterone. The oviduct receives the egg released from the ovum and it is the site of fertilisation. The uterus is a muscular organ where implantation of zygote occurs and it takes care of the developing embryo. The vagina is a muscular tube-like structure which receives the sperms and through which the baby is delivered.

OR

i. Fossils represent modes of preservation of ancient species.

ii. Fossils help in establishing evolutionary traits among organisms and their ancestors that is their phylogeny.

iii. The age of the fossil helps in determining the time period in which that species lived and how old are the fossils.

29. 1. Functions of following parts of human eye are given below :

1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.
2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
3. Crystalline lens - It helps to focus light on retina for image formation.
4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.

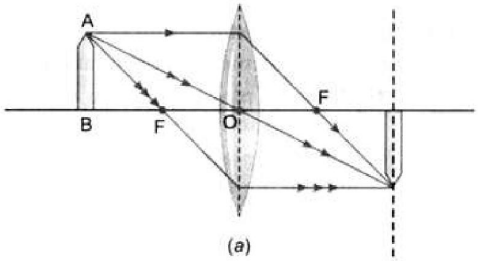
2. 1. The objective of organising such compaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.

2. 1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.

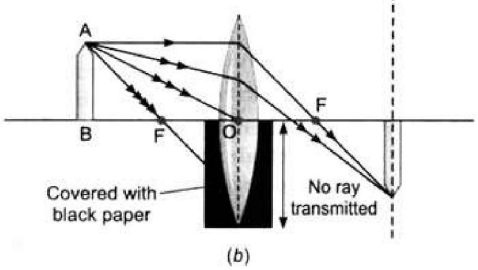
2. As eye is one of the most valuable sense organs through which an individual can achieve so many things in his/her life, so try to realise the situation that these people are sufferinng from.

3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.

30.



(a)



(b)

Yes, even when one-half of a convex lens is covered with a black paper, the lens will

produce a complete image.

Take a live candle, keep it in front of a convex lens mounted on an optical bench. Move the candle along the axis of bench and take its full image on a screen. Now cover the lower half of lens with a black paper without changing the positions of candle, lens and screen.

You will observe that full image of candle is still seen on the screen, but the intensity of image is reduced. The reason is that a large number of rays incident on the lens are blocked. In the case of covered lower half of lens with black paper, the rays that are emerging from candle and incident on lens are refracted from upper part only and form the full image.

31. a. Mendel.

b. DNA is made up many units of nucleotides.

c. Important features-

i. Both the chains in helix runs anti-parallel.

ii. There are two types of nitrogenous bases Purine (A, G) and pyrimidine (T, C).

iii. A always pairs with T and C always pairs with G.

OR

i. All offsprings were round yellow in F_1 - generation

ii. Round yellow - 9

Round green - 3

Wrinkled yellow - 3

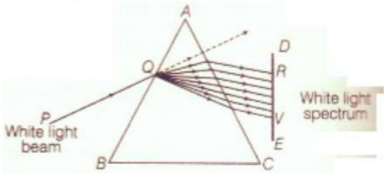
Wrinkled green - 1

Therefore, the ratio of offsprings in F_2-generation is 9 : 3 : 3 : 1.

32. Consider the following displacement reaction:

$$\underset{\substack{Iron\\Blue}}{Fe(s)} + \underset{\substack{Copper\ Sulphate\\Green}}{CuSO_4} \rightarrow \underset{(\text{Re ddish-brown})}{FeSO_4(aq)} + \underset{Copper}{Cu(s)}$$

In the above reaction, Fe is converted to Fe^{2+} by loss of electrons. Hence Fe is oxidised. Cu^{2+} is converted to Cu by gain of electrons. Hence Cu^{2+} is reduced. Thus, the above reaction is a displacement reaction as well as a redox reaction.

33. 

i. The phenomenon of splitting of white light into its constituent colours is called dipersion of light. It is caused due to difference in speed of constituent colours of light travel in the medium other than air/vacuum because of different speed they bend at different angles.

ii. In nature, this Phenomenon is observed in formation of rainbow where all the seven colours constituting white light is visible.

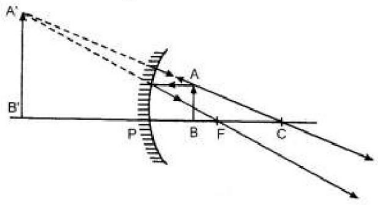
iii. Based on phenomenon of dispersion, we can conclude that

a. White light consists of seven colours. Violet, indigo, blue, green, yellow, orange and red.

b. Violet light suffers maximum deviation and red light suffers minimum deviation.

Section D

26. Concave mirror produces an erect and enlarged image when the object is placed between pole and focus as shown in the figure.



OR

The ability of a lens to converge or diverge light rays is called power of lens. It is denoted by letter P.

If the power is negative it means that the lens is concave and if power is positive then lens is convex.

The SI unit of power is dioptre (D).

$Power = \frac{1}{Focal\ length}$ or $P = \frac{1}{f}$

i.e. 1 dioptre = $\frac{1}{metre}$ or $1D = 1m^{-1}$

35. The activity to demonstrate that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field can be explained as follows:

Activity: To show the effect of magnetic field on a current-carrying conductor

Materials Required: For this, we need to take a small aluminum rod, a horseshoe magnet, battery, plug key, wires, and a stand.

i. Suspend an aluminum rod horizontally from the stand and two wires at the ends of it are tied. The wires are connected to a Rheostat, battery and a key so that a circuit is completed,

ii. Place a horseshoe magnet in such a manner that the aluminum rod is between the poles of a magnet.

Assume that the above the aluminum rod is South pole of the magnet and below, the north pole of the magnet. Insert the plug key and current is supplied to the rod.

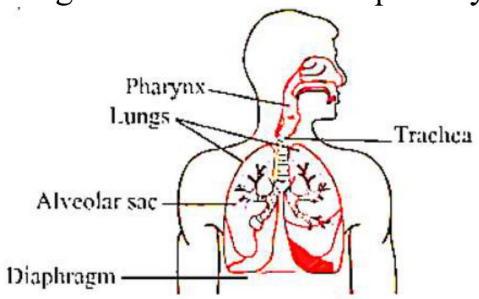
Observation: the aluminum rod is deflected towards the left direction
On changing the direction of the current, the rod is deflection in the right direction.
Hence, it demonstrates that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field
The direction of the magnetic field can find out with the help of Fleming's left-hand rule. Let current is moving in an anticlockwise direction, then the direction of the magnetic field will be in clockwise direction i.e. at the top of the loop whereas vice-versa in case of the clockwise direction of the current.

36. Soil is very important for the growth of the plant for the following reasons.
    i. Soil provides the base for the growth of the plants and provides a platform for the penetration of roots.
    ii. It acts as a reservoir of the water.
    iii. The soil has different minerals essential for the growth of the plant. Soil is the only medium from which soil obtains nutrients.
    iv. The soil has organic materials essential for the growth of the plants.
    v. The soil has microorganisms that have a symbiotic relationship with the plant and these microbes assist the plant in their growth and life processes.

OR

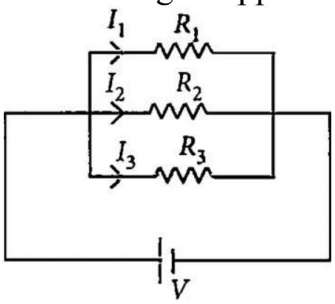
i. Aquatic animals take in the oxygen dissolved in water. The amount of dissolved oxygen in water is fairly low compared to the amount of oxygen in the air. Therefore, the rate of breathing in aquatic organisms is much faster than in terrestrial organisms because the amount of dissolved oxygen in the water is much less than the amount on land, So they have to breathe more in order to get more oxygen.

ii. Diagram of the human respiratory system



Section E

37. **Read the text carefully and answer the questions:**
If two or more resistances are connected in such a way that the same potential difference gets applied to each of them, then they are said to be connected in parallel.



The current flowing through the two resistances in parallel is, however, not the same. When we have two or more resistances joined in parallel to one another, then the same current gets additional paths to flow and the overall resistance decreases.

(i) The equivalent resistance in the parallel combination is lesser than the least value of the individual resistance.
The equivalent resistance of parallel combinations
$\frac{1}{Rp} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$
$\Rightarrow$ Rp = $\frac{8}{7}\Omega$
Thus equivalent resistance is less than 2Ω.

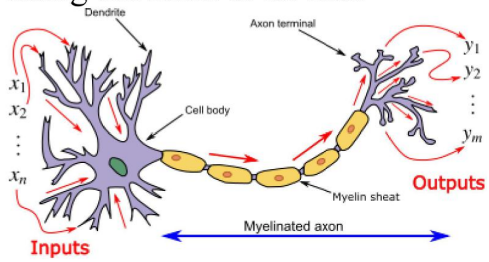
(ii) Resistance of each piece $= \frac{12}{3} = 4\Omega$
$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} \Rightarrow R_p = \frac{4}{3}\Omega$

OR

All the three resistors are in paralle.
$\therefore \frac{1}{R_p} = \frac{1}{6} + \frac{1}{3} + \frac{1}{1} = \frac{1+2+6}{6} = \frac{9}{6} R_P = \frac{6}{9} = \frac{2}{3}\Omega$

38. **Read the text carefully and answer the questions:**
In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve

cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell, see figure, sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end.



(i) Nerve cell is the largest cell present in the body.

(ii) Axon is a large, single, unbranched nerve fibre arising from the cyton. It carries impulses from cyton located in CNS to the effectors.

(iii) **Gustatory receptor:** Taste buds on the tongue. The receptors for gustation are located in the oral cavity, which brings food and fluids from outside the body into the gastrointestinal tract.

Olfactory receptor: Receptor in the nose. These receptors are common to arthropods, terrestrial vertebrates, fish, and other animals.

OR

a. Dendrites.

b. Axon.

39. **Read the text carefully and answer the questions:**

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

(i) Carbonic acid does not form an acidic salt.

(ii) Sodium bicarbonate, commonly known as baking soda or bicarbonate of soda, is a chemical compound with the formula $NaHCO_3$.

(iii) $Ca(OH)_2$ treatment with chlorine to obtain bleaching powder.

$$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$$

OR

Washing soda is used for removing the permanent hardness of the water.