Class X Session 2023-24
Subject - Science
Sample Question Paper - 7

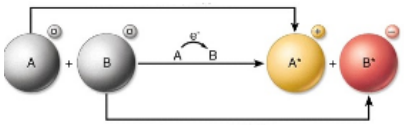
Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

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

Section A

1. Which type of chemical reaction is shown in the given image? **[1]**



a) Redox reaction
b) Combination reaction
c) Decomposition reaction
d) Displacement reaction

2. A white precipitate formed by the reaction of barium chloride with sodium sulphate solution is due to **[1]**

a) $BaSO_3$
b) $BaSO_4$
c) BaO
d) BaS

3. Which of the following is not a mineral acid? **[1]**

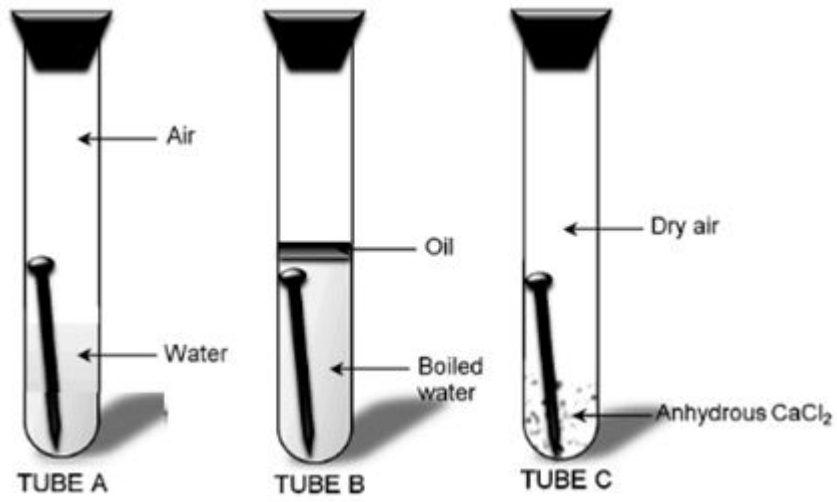
a) Nitric acid
b) Sulphuric acid
c) Hydrochloric acid
d) Citric acid

4. Substance **X** is formed by the reaction of carboxylic acid and alcohol. It is used in making ice creams, cold drinks, perfumes and in flavouring agent. Name **X**. **[1]**

a) Aldehyde
b) Alkyne
c) Ester
d) Ketone

5. Take three boiling tubes A, B and C. Pour some water in test tube A Put iron nails in it and cork it. Pour boiled distilled water in another test tube B and put iron nails in it. Add 1 ml of oil over it such that oil floats over it and prevents the air from entering. Take some iron nails in test tube C and put some anhydrous calcium chloride in it and cork it. **[1]**

Leave all the three test tubes for one day and then observe.



In which test tube nail is rusted?

a) Tube B and C
b) Tube B
c) Tube A
d) Tube A and C

6. The ratio of HCl and HNO_3 in Aqua Regia is: **[1]**

a) 3 : 2
b) 3 : 1
c) 1 : 3
d) 2 : 3

7. The correct electron dot structure of a water molecule is **[1]**

a) $H:\ddot{\underset{\cdot\cdot}{O}}\cdot H$
b) H:O:H
c) $H:\ddot{\underset{\cdot\cdot}{O}}:H$
d) $H\cdot\ddot{\underset{\cdot\cdot}{O}}\cdot H$

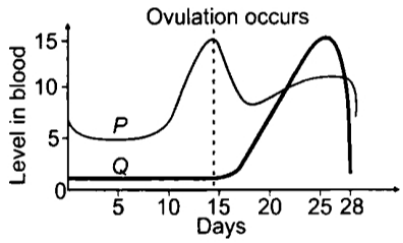
8. A student covered a leaf from a de-starched plant with a black paper strip and kept it in the garden outside his house in fresh air. In the evening, he tested the covered portion of the leaf for the presence of starch. By doing so the student was trying to show that: **[1]**

a) Chlorophyll is necessary for photosynthesis.
b) Carbon dioxide is necessary for photosynthesis.
c) Carbon dioxide is given out during respiration.
d) Light is necessary for photosynthesis.

9. 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

10. The given graph shows the hormonal changes during a normal menstrual cycle. What would be a likely consequence if the hormone represented by Q in the given graph is lacking in an adult female? **[1]**



a) Levels of the hormone represented by graph P would be higher than normal.

b) Fertilisation of ovum would fail to occur.

c) There would be no significant effect since the functions of the hormones overlap.

d) The uterine lining might not be sufficiently stable for implantation of fertilised ovum.

11. Name the chromosomes that possess the gene for maleness and femaleness in humans. **[1]**

a) Sex chromosomes

b) None of these

c) Somatic ctromosomes

d) Autosomes

12. Choose the correct path of urine in our body **[1]**

a) Kidney → Ureter → Urethra → Urinary bladder

b) Urinary bladder → Kidney → Ureter → Urethra

c) kidney → Urinary bladder → Urethra → Ureter

d) Kidney → Ureters → Urinary bladder → Urethra

13. Which of the following property of a proton can change while it moves freely in a magnetic field? **[1]**

a) momentum

b) speed

c) acceleration

d) mass

14. Which of the following instruments does not have plus (+) or minus (-) sign marked on it while representing in a circuit diagram? **[1]**

a) Galvanometer

b) Ammeter

c) Cell

d) Rheostat

15. The decomposers in an ecosystem**:** **[1]**

a) Do not breakdown organic compounds

b) Convert inorganic material to simpler forms

c) Convert organic material to inorganic forms

d) Convert inorganic materials into organic compounds

16. An agriculture / crop land is: **[1]**

a) A community of plants and animals only

b) A natural ecosystem

c) An artificial ecosystem

d) A biomes

17. **Assertion (A):** A lead nitrate on thermal decomposition gives lead oxide, brown coloured nitrogen dioxide and oxygen gas. **[1]**

Reason (R): Lead nitrate reacts with potassium iodide to form yellow ppt. of lead iodide and the reaction is double displacement as well as precipitation reaction.

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):** Copper -T can be used as a contraceptive method. **[1]**

Reason (R): It prevents from sexually transmitted disease.

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):** On freely suspending a current-carrying solenoid, it comes to rest in NS direction just like a bar magnet. **[1]**

Reason (R): One end of current-carrying straight solenoid behave as a north pole and the other end as a south pole.

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):** Herbivores are called first-order consumers. **[1]**

Reason (R): Tiger is a top carnivore.

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. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved. **[2]**

22. Why is vegetative propagation practised for growing some types of plants? **[2]**

23. Name the chief organs of excretion in man. Mention the waste products that they excrete. **[2]**

OR

Differentiate between Stomata and Lenticels.

24. A concave lens has focal length of 20 cm. At what distance from the lens a 5cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed? **[2]**

25. Which of the following belong to the second trophic level? **[2]**

i. Frog, butterfly, spider, rice weevil

ii. Parrot, frog, butterfly, spider.

OR

Consider the following food chains-

a. Plants $\rightarrow$ Mice $\rightarrow$ Snakes $\rightarrow$ Hawks

b. Plants $\rightarrow$ Mice $\rightarrow$ Hawks

If energy available at the producer level in both the food chains is 100J. In which case will hawks get more energy and how much & Why?

26. A student needs spectacles of power -0.5 D for the correction of his vision. **[2]**

a. Name the defect in vision the student is suffering from.

b. Find the nature and focal length of the corrective lens.

c. List two causes of this defect.

Section C

27. A group of a students looked at different metals and metal sulphate solutions given is a tabular form. From the data, answer the following: **[3]**

Metal	Metal sulphate solution	Colour
Chromium	Chromium sulphate	Green
Cobalt	Cobalt sulphate	Pink
Copper	Copper sulphate	Blue
Magnesium	Magnesium sulphate	Colourless

i. Which metal reacts with all other sulphate solutions?

ii. Which metal did not react with any other metal sulphate solution?

iii. Arrange the metals in decreasing order of reactivity.

28. (i) Name the metal which does not stick to glass? **[3]**

(ii) Name the non-metal which is a good conductor of electricity?

(iii) Name the metal which is commonly used in thermit welding?

(iv) What gets deposited at the cathode, a pure or impure metal?

(v) What is the nature of Zinc oxide?

OR

What chemical process is used for obtaining a metal from its oxide.

29. Describe internal structure of a human heart. **[3]**

30. Give the respective scientific terms used for studying **[3]**

i. The mechanism by which variations are created and inherited.

ii. the development of new types of organisms from the existing ones.

31. i. Name the spherical mirror used as: **[3]**

a. shaving mirror

b. Rear view mirror in vehicles

c. Reflection in search-light.

ii. Write any three difference between a real and a virtual image.

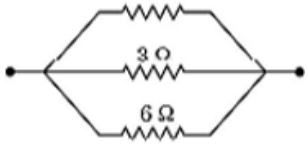
32. Show how you would connect three resistors, each of resistance 6Ω, so that the combination has a resistance of **[3]**

a. 9Ω

b. 4Ω

33. Find the equivalent resistance of the following combinations of resistors: **[3]**

a. 

b. 

Section D

34. a. Explain the process of preparation of soap in laboratory. **[5]**

b. Why is common salt (sodium chloride) added during the preparation of soap?

c. Why is soap not suitable for washing clothes when the water is hard?

OR

What are alcohols? What is its general formula? Give the names and molecular formula of first three members of the homologous series of alcohols.

35. Explain various steps of budding in yeast. **[5]**

OR

Compare nervous and hormonal mechanism for control.

36. An object 2 cm high is placed at a distance of 16 cm from a concave mirror which produce a real image 3 cm high. **[5]**

(i) What is the focal length of the mirror ?

(ii) Find the position of the image.

OR

A student wants to project the image of a candle flame on the walls of school laboratory by using a lens.

i. Which type of lens should he use and why?

ii. At what distance in terms of focal length F of the lens should he place the candle flame, so as to get

a. a magnified and

b. a diminished image respectively, on the wall?

iii. Draw ray diagrams to show the formation of the image in each case.

Section E

37. **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?

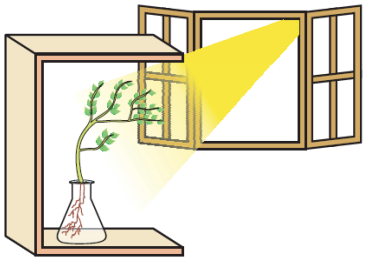
OR

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

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

Fill a conical flask with water. Cover the neck of the flask with a wire mesh. keep two or three freshly germinated bean seeds on the wire mesh. Take a cardboard box which is open from one side. Keep the flask a wire mesh. Kin the box in such a manner that the open side of the box faces light coming from a window as shown in the given figure. After two or three days, you will notice that the shoots bend towards light and roots away from light. Now turn the flask so that the shoots are away from light and the roots towards the light. Leave it undisturbed in this condition for a few days. Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity, is

obviously, geotropism.



(i) What has represented by the given activities?

(ii) Do old parts of the shoot and root change direction? Is there any difference in the direction of the new growth?

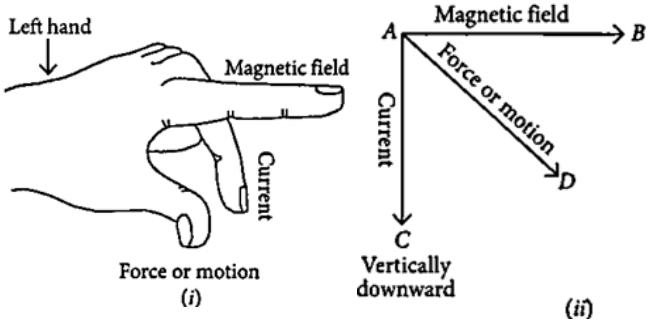
(iii) What can we conclude from this activity?

OR

What is geotropism?

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

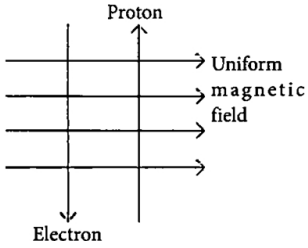
Andre Marie Ampere suggested that a magnet must exert an equal and opposite force on a current-carrying conductor, which was experimentally found to be true. But we know that current is due to charges in motion. Thus, it is clear that a charge moving in a magnetic field experience a force, except when it is moving in a direction parallel to it. If the direction of motion is perpendicular to the direction of magnetic field, the magnitude of force experienced depends on the charge, velocity (v), strength of magnetic field (B), and sine of the angle between v and B. Direction of magnetic force is given by Fleming's left-hand rule.



(i) If an electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along which direction?

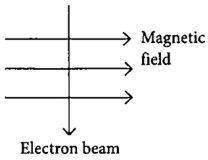
(ii) A charged particle is moving with velocity v in a magnetic field of induction B. The force on the particle will be maximum when

(iii) A uniform magnetic field exists in the plane of paper pointing from left to right as shown in figure. In the field, an electron and a proton move as shown. Where do the electron and the proton experience the force?



OR

An electron beam enters a magnetic field at right angles to it as shown in the figure. What would be the direction of force acting on the electron beam?

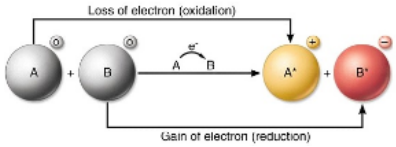

Magnetic
field
Electron beam

Solution

Section A

1. **(a)** Redox reaction

   Explanation: The chemical reaction in which the oxidation and reduction take place simultaneously is called a redox reaction.



2. **(b)** $BaSO_4$

   Explanation: On mixing a solution of barium chloride with sodium sulphate, a white precipitate of barium sulphate is immediately formed. These reactions are ionic in nature.

   $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

3. **(d)** Citric acid

   Explanation: Citric acid is not a mineral acid but an organic compound and it is found in citrus fruits. It is a natural preservative and a weak organic acid. It is mostly used as an anticoagulant and has a chelating property. All others are acidic in nature which in their aqueous solution dissociate into their respective ions.

4. **(c)** Ester

   Explanation: Substance X is an ester. The reaction in which a carboxylic acid combines with an alcohol to form an ester is called esterification. Some volatile esters with characteristic odours are used in synthetic flavours, perfumes, and cosmetics. Certain volatile esters are used as solvents for lacquers, paints, and varnishes; large quantities of ethyl acetate and butyl acetate are commercially produced for this purpose.

5. **(c)** Tube A

   Explanation: Iron nails get rusted in test tube A because both air and water are present in it. Iron nails do not get rusted in B because there is water but no air. In C, rusting will not take place because there is neither air nor water.

6. **(b)** 3 **:** 1

   Explanation: The ratio of HCl and HNO_3 in Aqua Regia is 3:1. Aqua regia is a yellow-orange fuming liquid, so named by alchemists because it can dissolve the noble metals - gold and platinum.

7. **(c)** $H:\ddot{\underset{\cdot\cdot}{O}}:H$

   Explanation: This dot structure shows a complete octet after oxygen shared two electrons with two univalent atoms of hydrogen.

8. **(d)** Light is necessary for photosynthesis.

   Explanation: Light is necessary for photosynthesis.

9. **(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.

10. **(d)** The uterine lining might not be sufficiently stable for implantation of fertilised ovum.

Explanation: In the given graph, P represents changes in estrogen level and graph Q represents changes in progesterone level during a normal menstrual cycle. Progesterone is required for the maintenance of uterine lining which is needed to implant the fertilised ovum. Thus, if progesterone is lacking in an adult female, her uterine lining might not be stable to support an implanted embryo.

11. **(a)** Sex chromosomes
Explanation: Sex chromosomes possess the gene for maleness and femaleness in humans.
In humans, the sex chromosomes comprise one pair of a total of 23 pairs of chromosomes. The other 22 pairs of chromosomes are called autosomes.
Individuals having two X chromosomes (XX) are females; individuals having one X chromosome and one Y chromosome (XY) are males.

12. **(d)** Kidney $\rightarrow$ Ureters $\rightarrow$ Urinary bladder $\rightarrow$ Urethra
Explanation: Urine from nephron is brought to the collecting duct of kidneys where the urine enters the ureters. There are 2 ureters, each opening from one kidney into the urinary bladder. The urinary bladder stores urine and its size increases as the amount of urine collected increases.
When the CNS gives a voluntary message the muscles of the bladder contract and the bladder sphincter relax thus excreting urine out through the urethra.

13. **(a)** momentum
Explanation: We know when a proton moves in a magnetic field its velocity changes. Momentum is the product of mass and velocity, therefore momentum also changes. Velocity and momentum are the properties which change when a proton moves freely in a magnetic field.

14. **(d)** Rheostat
Explanation: Rheostat

15. **(c)** Convert organic material to inorganic forms
Explanation:
The decomposers in an ecosystem are microorganisms, comprising bacteria and fungi. They break down the complex organic substances (dead remains and waste products of organisms) into simple inorganic substances, which go into the soil and are used up once more by the plants.

16. **(c)** An artificial ecosystem
Explanation: An ecosystem may be natural or man-made (artificial). Forests, ponds and lakes are natural ecosystems while gardens and crop-fields are human-made (artificial) ecosystems.

17. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: A decomposition reaction is a reaction in which a compound breaks down into two or more simpler substances.
$2Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2$

18. **(c)** A is true but R is false.
Explanation: Copper-T is a contraceptive method, which is inserted inside the uterus, it prevents implantation. It does not prevent sexually transmitted disease. Thus assertion is true, but reason is false.

19. **(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.

20. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: Herbivores obtain their food from plants. Hence, are known as first-order carnivores. The carnivores like tiger cannot be preyed upon further, lie at the top of food chain and hence termed as top carnivores.

Section B

21. The gas evolved is hydrogen.

The reaction is :

$$\underset{Ethanol}{2CH_3CH_2OH} + \underset{Sodium}{2Na} \rightarrow \underset{Sodium\ ethoxide}{2CH_3CH_2ONa} + \underset{Hydrogen\ gas}{H_2\uparrow}$$

22. Vegetative propagation is practised for growing some types of plants because:

(i) Characters of the plants can be preserved through successive generations.

(ii) Seedless plants can be grown through vegetative reproduction.

(iii) By cutting and grafting methods flowers and fruits can be grown in a shorter time duration.

(iv) It is a cheaper, easier and more rapid method of plant propagation.

23. The chief excretory organs and the waste products removed by them are:

1) Kidneys - Urea in the form of urine

2) Lungs - Carbon dioxide

3) Skin - Water and salts as sweat

OR

Stomata	Lenticels
1) Stomata are minute openings formed in the epidermal layer of green leaves.	1) Lenticels are aerating pores formed in the bark.
2) Through stomata exchange of gases and maximum transpiration takes place.	2) Through lenticels exchange of gases and a little transpiration takes place.
3) Stomata opening and closing can be regulated.	3) Lenticels are always open.
4) Guard cells of stomata contain chlorophylls hence they can photosynthesize.	4) Lenticels are unable to photosynthesize.
5) Stomata are active during the daytime.	5) Lenticels are active during the night.

24. Let Focal length, f = 20cm

Object height, h = 5cm

image distance,v = -15cm

image height,h' = ?

object distance, u = ?

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

$\frac{1}{-20} = \frac{1}{-15} - \frac{1}{u}$

$\frac{1}{u} = \frac{-1}{15} + \frac{1}{20}$

$\frac{1}{u} = \frac{-4+3}{60} = \frac{-1}{60}$

u = -60cm

$\frac{h'}{h} = \frac{v}{u}$

$\frac{h'}{5} = \frac{-15}{-60}$

$h' = \frac{15 \times 5}{60}$

$h' = \frac{5}{4} = +1.25cm$

25. The second trophic level is marked by the organisms which feed directly on the producers, thus, folowing organisms lie at the second tropic level.

i. Butterfly, rice weevil.

ii. Butterfly, parrot.

OR

Hawk gets more energy in food chain having three trophic levels.

Plants→	Mice→	Hawks
100j	10j	1j

Plants → Mice → Snakes → Hawks

100 J → 10 J → 1 J → 0.1 J

Energy available to hawk is 1J in the food chain with three trophic levels, but it is 0.1 J in the food chain with four trophic levels. This is due to 10% energy law which states that only 10% energy is available at the next trophic level from the previous level.

26. a. Myopia.

b. Concave lens with the focal length of 200 cm

Given, P = - 0.5 D

We have

$P = \frac{1}{f}m$

$f = \frac{1}{P} = \frac{1}{(-0.5)}$

f = -2m

f = -200 cm

c. Two causes of Myopia are:

i. Elongation of eyeball.

ii. High converging power of eye lens.

Section C

27. i. Magnesium (Mg) is the most reactive of all the metals.

ii. Copper (Cu) is the least reactive of all the metals.

iii. Decreasing order of reactivity : Mg>Cr>Co>Cu.

28. (i) Mercury

(ii) Graphite

(iii) Aluminum

(iv) A pure metal is always deposited at the cathode

(v) Zinc oxide (ZnO) is an amphoteric oxide.

OR

The metals are obtained from its oxides by reduction with suitable reducing agents.

Metals low in reactivity series are very unreactive. The oxides of these metals can be reduced to metals by heating alone.

For example,

$2Hg(O)\ (s) \rightarrow 2Hg(l) + O_2(g)$

The metals in the middle of the reactivity series (e.g. iron, lead, copper etc.) are reduced to metals by heating with carbon.

$ZnO\ (s) + C\ (s) \rightarrow Zn\ (s) + CO\ (g)$

The metal high up in the reactivity series are obtained by electrolytic reduction. For example, aluminium is obtained by the electrolytic reduction of aluminium oxide.

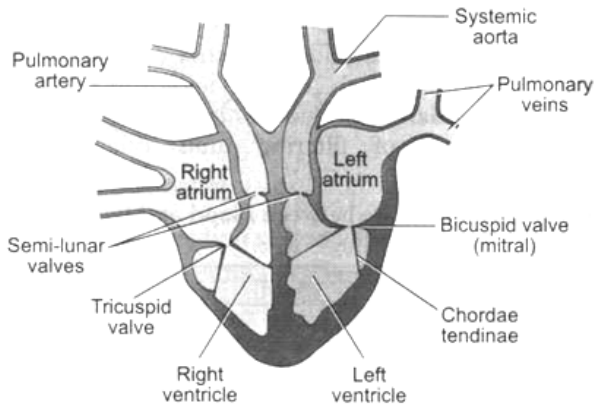
29. The heart lies in the thoracic cavity between the lungs. The heart is also protected within the thorax by the double-layered pericardium, which is fluid filled to prevent friction inside the chest cavity.

The human heart consists of 4 chambers- 2 upper chambers called atria and 2 lower chambers called ventricles.

The two auricles or atria are thin-walled and are separated from each other by a thin inter-atrial septum.

The right atrium receives venous blood (deoxygenated blood having very little O_2) from the entire body through a superior and inferior vena cava. The left smaller atrium receives oxygenated blood from the lungs through pulmonary veins.

The two auricles (atria) are separated from the ventricles by the auriculo-ventricular septum guarded by membranous valves. The valve separating right atrium from right ventricle is called right atrio-ventricular valve or tricuspid valve made up of three flaps. The valve separating left atrium from left ventricle is called left atrio-ventricular valve or mitral valve, formed of two flaps. These valves are attached with fine cords with the papillary muscles of the ventricular wall. These valves only allow blood flow from auricles into ventricles and not in opposite direction.



Internal structure of human heart

Both the ventricles are separated from each other by a thick inter-ventricular septum. The wall of left ventricle is much thicker than that of right ventricle. The left ventricle pushes blood into aorta which supplies blood to entire body. The opening of aorta is also guarded by a valve formed of 3 semilunar flaps. The right ventricle pumps venous blood into lungs by a pulmonary aorta. Its

opening is also guarded by a valve, having 3 semilunar flaps. These valves allow the flow of blood from ventricles into the aorta and not back. Heart is formed of cardiac muscle fibres, which rhythmically contract the heart without feeling fatigue.

30. i. Genetics is the study of mechanism by which variations are created and inherited. These variations are far more in sexual reproduction due to crossing over in meiosis and also new diploid recombination.

ii. Evolution is used for studying the development of new species of organisms from the existing ones through accumalation of variation.

31. i. a) Shaving mirror- Concave mirror

b) Rear view mirror - Convex mirror

c) Reflection in search-lights - Concave mirror.

ii. The three differences are:

a) Real image can be obtained on screen but a virtual image cannot be obtained.

b) Reflected/Refracted rays actually meet where the real image is formed while for virtual they only appear to meet.

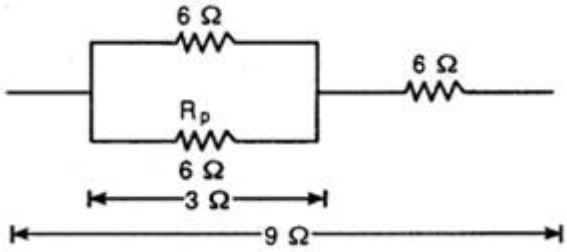
c) A Real image is always inverted while the virtual image is always erect.

32. a. When two resistors each of 6Ω are connected in parallel give Rp:

$\frac{1}{Rp} = \frac{1}{6} + \frac{1}{6} = \frac{1+1}{6} = \frac{2}{6} = \frac{1}{3}$

$R_p = 3\Omega$

When this combination is connected in series with third resistor of 6Ω, it gives a total of 6 + 3 = 9Ω



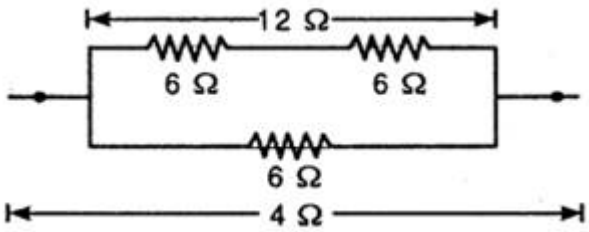
Connected in parallel

b. When two resistors each of 6Ω are connected in series it gives rise to 6 + 6 = 12Ω

This 12Ω in parallel with 6Ω given R'_p

$\frac{1}{R'p} = \frac{1}{12} + \frac{1}{6} = \frac{2+1}{12} = \frac{3}{12} = \frac{1}{4}$

$R'_p = 4\Omega$



Connected in series

33. a. Here, 2Ω, 3Ω and 6Ω resistance are connected in series.

$R_{eq} = R_1 + R_2 + R_3$

$= 2 + 3 + 6$

$= 11$

b. $\frac{1}{R_{eq}} = \frac{1}{2} + \frac{1}{3} + \frac{1}{6}$

$\frac{1}{R_{eq}} = \frac{3+2+1}{6}$

$\frac{1}{R_{eg}} = \frac{6}{6}$

$R_{eq} = 1\Omega$

Section D

34. a. Soap can be prepared in the laboratory as follows:

i. Take about 20 ml of castor oil in a beaker.

ii. Add 30 ml of 20 % sodium hydroxide (NaOH) solution to it.

iii. Heat the mixture with constant stirring till a paste of soap is formed.

iv. Then add 5 to 10 grams of common salt (NaCl).

v. Stir the mixture well and allow it to cool. On cooling the solution, solid soap separates out.

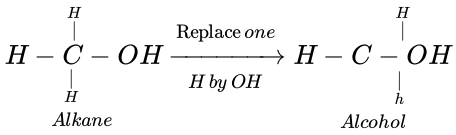
vi. When the soap sets, it can be cut into pieces called 'soap bars'.

b. Common salt(NaCl) is added to the mixture to make the soap come out of the solution. Though most of the soap separates out on its own, some of it remains in the solution. Common salt is added to precipitate out all the soap from the aqueous solution.

c. When soap is used for washing clothes with hard water, a large amount of soap in water reacts with the calcium(Ca) and magnesium(Mg) ions of hard water to form an insoluble precipitate called scum, before it can be used for the real purpose of washing.

OR

The organic compounds containing the hydroxyl or alcoholic group (–OH) as the functional group are called alcohols. These are obtained by replacing one hydrogen atom of an alkane by –OH group. For example,

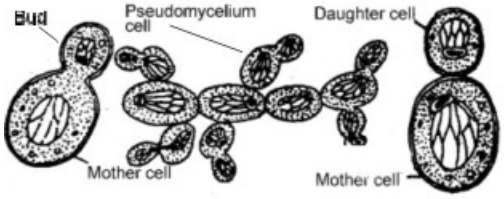


They are represented by the general formula C_nH_{2n+1}-OH or ROH, where R stands for alkyl group (C_nH_{2n+1} -)

First three members of the series are:

Formula	Common name	IUPAC name
CH_3OH	Methyl alcohol	Methanol
CH_3CH_2OH	Ethyl alcohol	Ethanol
$CH_3CH_2CH_2OH$	Propyl alcohol	Propanol

35. **Budding in yeast:** Most of the common yeasts reproduce by budding. The process of budding occurs under normal conditions when the yeast cells are growing in sugar solution. Saccharomyces usually reproduce by budding.



In the process, each cell gives rise to one of more tiny outgrowths which gradually increase in size as large as the mother cell itself. Ultimately, it is cut off from the mother cells by a constriction at the base and can lead a separate existence. The nucleus divides amitotically during budding and one daughter nucleus passes in the bud and the other remains in the mother cell. The nuclear membrane persists throughout the nuclear division. The budding may be repeated by the daughter cell while still attached to the parent cell, resulting in the formation of one or more chains and even subchains, called pseudomycelium. The cells ultimately become separated from one another and lead independent life.

OR

Nervous System	**Hormonal System**
Made of neuron	Made of Hormone
Messages transmitted in the form of electrical impulses	Message transmitted in the form of chemicals called hormones.
Messages transmitted along nerve fibres.	Messages transmitted through blood stream.
Messages travel very quickly.	Messages travel very slowly.
Effect of message usually lasts for a very short while	Effect of message usually lasts longer
Sense organs are receptors as nerve cells located in them receive information.	Glands are effectors which secrete hormones when the brain commands.

36. Since the image formed is real, hence an inverted image is formed.

size of image, h_2 = - 3 cm, size of object h_1 = + 2 cm.

Magnification $m = \frac{h_2}{h_1} = \frac{-3}{2} = -1.5$. Also $m = \frac{-v}{u}$ or $v = -mu$ ..... (i)

Here v = - 16 cm (u is always negative)

Substituting in (i), we have v = - (-1.5) (-16) = - 24 cm. or v = - 24 cm.

Image is formed 24 cm to the left of the mirror (Negative sign – Image is towards left of mirror)

To calculate focal length. Here u = = 16 cm, v = - 24 cm, f = ?

Using $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ or $\frac{1}{f} = -\frac{1}{24} - \frac{1}{16} = \frac{-2-3}{48} = -\frac{5}{48} or\ f = -\frac{48}{5} = -9.6\ cm$

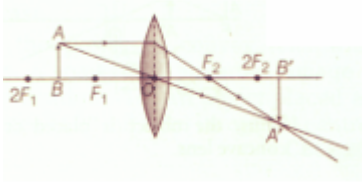
Negative focal length indicates that the mirror is concave.

OR

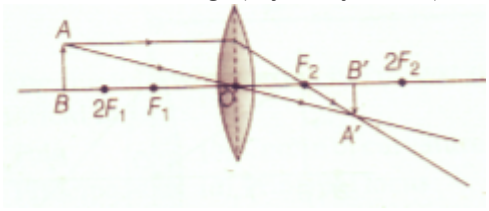
i. He should use a convex lens as real images are formed by a convex lens, when objects are placed between the focus and infinity .

ii. a. For magnified image candle should be placed between focus (F) and centre of curvature (2F) of lens.
b. To get diminished image candle should be placed beyond centre of curvature (2F) of lens.

iii. a. For magnified image,(object between F and 2F).



b. For diminished image,(object beyond 2F).



Section E

37. **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 $NaHCO_3$.

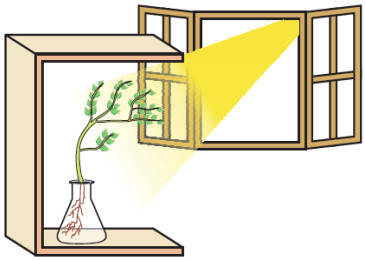
OR

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

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

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

Fill a conical flask with water. Cover the neck of the flask with a wire mesh. keep two or three freshly germinated bean seeds on the wire mesh. Take a cardboard box which is open from one side. Keep the flask a wire mesh. Kin the box in such a manner that the open side of the box faces light coming from a window as shown in the given figure. After two or three days, you will notice that the shoots bend towards light and roots away from light. Now turn the flask so that the shoots are away from light and the roots towards the light. Leave it undisturbed in this condition for a few days. Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity, is obviously, geotropism.



(i) These activities show tropic movements in plants due to their growth.

(ii) Yes, old parts of the shoot and root change direction and there is a difference in the direction of new growth.

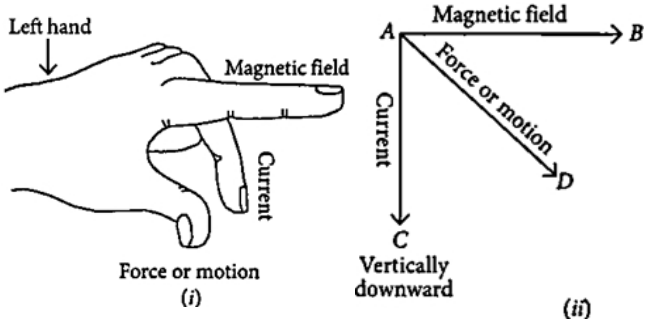
(iii) Movement is related to stimulus i.e. plant organs either move towards the source of stimulus or away from it. Stimuli that cause movements in plants are gravity, light, touch, water, and chemical substances.

OR

Movements in the organs of a plant due to gravity are known as geotropism. This causes the roots to bend down towards the soil.

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

Andre Marie Ampere suggested that a magnet must exert an equal and opposite force on a current-carrying conductor, which was experimentally found to be true. But we know that current is due to charges in motion. Thus, it is clear that a charge moving in a magnetic field experience a force, except when it is moving in a direction parallel to it. If the direction of motion is perpendicular to the direction of magnetic field, the magnitude of force experienced depends on the charge, velocity (v), strength of magnetic field (B), and sine of the angle between v and B. Direction of magnetic force is given by Fleming's left-hand rule.



(i) Fleming's left-hand rule is used to determine the direction of force on electron i.e., in south direction.

(ii) Force = q (V $\times$ B) = qVB sin0

Where, 0 is angle between velocity and magnetic field.

So, sin0 is maximum when 0 is 90^0

or velocity is perpendicular to magnetic field.

(iii) As the direction of current is taken opposite to the direction of motion of electrons, therefore, current from the motion of electron and proton is in the same direction, i.e., from bottom to top. Now, according to Fleming's left-hand rule, the electron and the proton experience forces both pointing into the plane of paper.

OR

We know that both the directions are perpendicular, thus for force direction = ?

Using Fleming's left-hand rule,

Direction of force is perpendicular to the direction of magnetic field and current.

Thus direction of force is opposite to electron motion into the page at 90°