Class X Session 2026-27
Subject - Science
Sample Question Paper - **2**

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

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
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.

Section A

1. An organism which breaks down the food material outside the body and then absorbs it is **[1]**

   a) a bacteria, Rhizobium
   b) a plant parasite, Cuscuta
   c) an animal parasite, Tapeworm
   d) a fungi, Rhizopus

2. The unit of heredity is: **[1]**

   a) Chromatin
   b) DNA
   c) Gene
   d) Chromosome

3. Human activities that are affecting the environment are: **[1]**

   a) excessive use of disposable cups and plates.
   b) segregating the wastes into biodegradable and non-biodegradable before disposal.
   c) maximising the use of reusable utensils for eating food and drinking fluids.
   d) minimising the use of chloroflurocarbons.

4. Match the following with correct response. **[1]**

Column A	Column B
(i) The response of a plant to light	(a) Phototropism
(ii) The response of a plant to gravity	(b) Hydrotropism
(iii) The response of a plant to water	(c) Geotropism
(iv) The response of a plant to chemicals	(d) Chemotropism

   a) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
   b) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

c) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c) d) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

5. A system of inter-dependent food chains represents **[1]**

a) Food web b) Ecosystem

c) Trophic levels d) Community

6. In human respiratory system, when a person breathes in, the position of ribs and diaphragm will be: **[1]**

a) relaxed ribs and curve/dome shaped diaphragm. b) relaxed ribs and flattened diaphragm.

c) lifted ribs and flattened diaphragm. d) lifted ribs and curve/dome shaped diaphragm.

7. Which of the following statements is/are true about a neuron? **[1]**

I. Dendrites of neuron pass the impulse to the axon.
II. Axon of neuron carries the impulse from the cell body.
III. Sensory neuron carries the impulse to the specific effectors.
IV. Transmission of impulse from a neuron to a muscle fibre occurs through neuro-muscular junction.

a) I only b) I and III

c) II and III d) II and IV

8. **Assertion (A):** Sexual reproduction involves two parents of different sexes, a male and a female, which produce male and female gametes respectively. **[1]**
Reason (R): The male and female gametes fuse to form a zygote in sexual reproduction, which develops into a new individual.

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.

9. **Assertion (A):** Accumulation of harmful chemicals is maximum in the organisms at the highest trophic level of a food chain. **[1]**
Reason (R): Harmful chemicals are sprayed on the crops to protect them from diseases and pests.

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.

10. What are sexually transmitted diseases? Name one sexually transmitted disease each, caused by a virus and a bacterium. List two benefits of using mechanical barriers during the sexual act. **[2]**

11. a. Create a food chain of the following organisms: **[2]**
Insect, Hawk, Grass, Snake, Frog
b. Name the organism at the third trophic level of the created food chain.

c. Which organism of this food chain will have the highest concentration of non-biodegradable chemicals?

d. Name the phenomenon associated with it.

e. If 10,000 joules of energy is available to frogs, how much energy will be available to snakes in this food chain?

OR

How is ozone formed in the upper atmosphere? State its importance. What is responsible for its depletion? Write one harmful effect of ozone depletion.

12. How is an electric impulse created in human nervous system? Identify the parts of a neuron which helps the nerve impulse to travel **[2]**

i. towards the cell body

ii. away from the cell body

13. A red-eyed individual is crossed with a white-eyed individual to produce F_1 progeny with red eyes. When F_1 individuals are intercrossed, F_2 progeny is formed with both red as well as white-eyed individuals. **[3]**

a. How is the dominant trait identified?

b. What are recessive traits?

c. If 12 individuals are produced in F_2 generation, then how many white-eyed individuals would be obtained? Calculate the ratio of red-eyed individuals to white-eyed individuals.

14. i. Describe the structure and function of the basic filtering unit of kidney. **[3]**

ii. List two factors on which reabsorption of water from urine depends?

15. **Read the following text carefully and answer the questions that follow:** **[4]**

The mechanism by which the sex of an individual is determined is called sex-determination. In human beings, sex of a newborn is genetically determined, whereas in some others it is not. There are 46 (23 pairs) chromosomes in human beings. Out of these, 44 (22 pairs) control the body characters and 2 (one pair) are known as sex chromosomes. The sex chromosomes are of two types- X chromosome and Y chromosome. At the time of fertilisation, depending upon which type of male gamete fuses with the female gamete, the sex of the newborn child is decided.

i. If the gametes always have half the number of chromosomes, then how is the original number of chromosomes restored in the organism? (1)

ii. Why is a pair of sex chromosomes in human beings called a mismatched pair in terms of type and size? (1)

iii. Name two animals whose sex is not genetically determined. Explain the process of their sex determination. (2)

OR

With the help of a flowchart only, show how sex is genetically determined in human beings. (2)

16. a. Define vegetative propagation. List its two methods. **[5]**

b. Why is this mode practised for growing some types of plants?

c. Explain the process of budding in Hydra with the help of labelled diagrams.

OR

i. What are tropic movements? Give an example of a plant hormone which (1) inhibits growth and (2) promotes cell division.

ii. Explain directional movement of a tendril in pea plant in response to touch. Name the hormone responsible for this movement.

Section B

17. Select the incorrect statement. **[1]**

a. The formula of the compound is calcium sulphate dihydrate.

b. When mixed with water and left for half an hour, this compound sets into a hard mass.

c. If heated at higher temperature, the compound becomes dehydrated and is called dead burnt plaster.

d. Both (a) and (b)

a) Statement (d) is incorrect.

b) Statement (a) is incorrect.

c) Statement (b) is incorrect.

d) Statement (c) is incorrect.

18. Which of the given statement is correct or wrong: **[1]**

Statement A: Detergent with less branching in the molecule is degraded more easily than branched-chain detergents.

Statement B: Soaps are 100% biodegradable.

a) Both the statements A and B are true.

b) Neither statement A nor statement B is true.

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

d) Statement A is true; Statement B is false.

19. Among the following, the metal with lowest density is: **[1]**

a) Aluminium

b) Magnesium

c) Lithium

d) Lead

20. Match the following with the correct response: **[1]**

Column A	Column B
(i) Catenation	(a) Butene
(ii) Alkane	(b) Carbon compounds
(iii) Alkene	(c) Ethyne
(iv) Alkyne	(d) Ethane

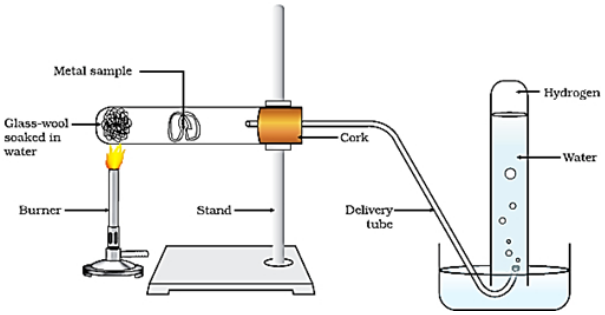
a) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

c) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

d) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)

21. What is shown in the experiment given below: **[1]**



a) Action of steam on a metal

b) Reaction of metals with salt solutions

c) Heating a salt sample on a spatula

d) Testing the conductivity of a salt solution

22. Consider the following statements about homologous series of carbon compounds: **[1]**

a. All succeeding members differ by -CH_2 unit.

b. Melting point and boiling point increases with increasing molecular mass.

c. The difference in molecular masses between two successive members is 16 u.

d. C_2H_2 and C_3H_4 are **NOT** the successive members of alkyne series.

The correct statements are -

a) (b) and (c)

b) (a) and (c)

c) (c) and (d)

d) (a) and (b)

23. Sodium hydroxide is termed an alkali while Ferric hydroxide is not because: **[1]**

a. Sodium hydroxide is a strong base, while Ferric hydroxide is a weak base.

b. Sodium hydroxide is a base which is soluble in water while Ferric hydroxide is also a base but it is not soluble in water.

c. Sodium hydroxide is a strong base while Ferric hydroxide is a strong acid.

d. Sodium hydroxide and Ferric hydroxide both are strong base but the solubility of Sodium hydroxide in water is comparatively higher than that of Ferric hydroxide.

a) Option (a)

b) Option (b)

c) Option (c)

d) Option (d)

24. **Assertion (A):** H_3PO_4 and H_2SO_4 are known as polybasic acids. **[1]**

Reason (R): They have two or more than two protons per molecule of the acid.

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.

25. State the observations you would make on adding ammonium hydroxide to aqueous solution of (i) Ferrous sulphate (ii) Aluminium chloride? **[2]**

26. When electricity is passed through an aqueous solution of common salt, three products are obtained. Name them, specifying the electrode at which each of these products is obtained. Also give one use of each product. **[3]**

OR

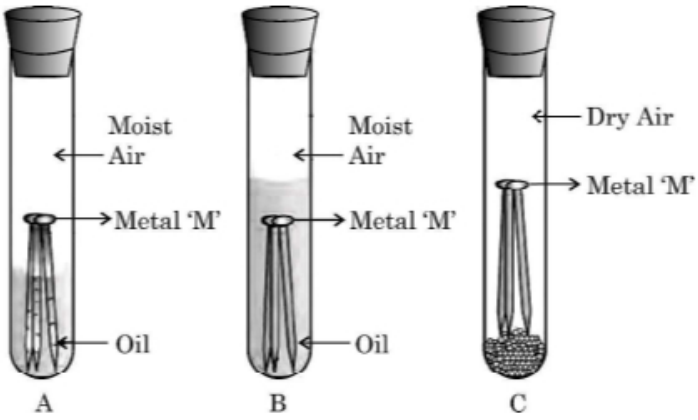
Write balanced chemical equation for the reactions that occur when

a. steam is passed over red hot iron.

b. natural gas is burnt in air.

c. glucose reacts with oxygen in the cells of our body and provides energy.

27. Observe the following diagram showing an experiment to determine the conditions under which a metal 'M' corrodes. **[3]**



List your observations in each of the three cases A, B and C with reason, if the metal 'M' is generally protected against corrosion by the method of galvanisation.

28. **Read the following text carefully and answer the questions that follow:** **[4]**

In a redox reaction, both oxidation, as well as reduction, takes place together, oxidation involves loss of electrons while reduction involves the gain of electrons. The redox- reaction may involve a combination of atoms and molecules, displacement of metals, or non-metals.

Example: $CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu$

displacement of Cu metal from its compound.

i. In the below equation, which gets reduced? (1)

$CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu$

ii. The oxidising agent generally loses or gains an electron. (1)

iii. Identify the oxidising agent and reducing agent in the above reaction. (2)

$CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu$

OR

Identify the type of given reaction. (2)

$CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu$

29. i. What happens when a small piece of sodium is dropped in ethanol? Write the equation for this reaction. **[5]**

ii. Why is glacial acetic acid called so?

iii. What happens when ethanol is heated at 443 K in the presence of conc. H_2SO_4? Write the role of conc. H_2SO_4 in this case.

iv. Write an equation showing saponification.

OR

Name an alcohol and a carboxylic acid having two carbon atoms in their structures. Draw their structures and state how this alcohol can be converted into a carboxylic

acid. What happens when these two compounds react in the presence of an acid? Write chemical equations for the reactions involved in the two cases mentioned above.

Section C

30. Find the incorrect statement: **[1]**

A. Convex mirrors are used by the dentist to see the large images of teeth of patients.

B. Convex mirrors are used as rear-view mirrors in cars, motorcycles, scooters, etc

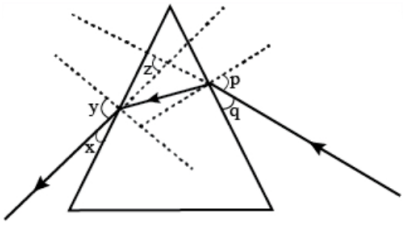
C. Concave mirrors are used for shaving purpose.

D. Concave mirrors are used by doctors to focus light inside the ear or inside the mouth for medical examination.

a) (B) b) (C)

c) (A) d) (D)

31. Study the following ray diagram **[1]**



In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by:

a) p, y, z b) y, p, z

c) x, q, z d) p, z, y

32. **Assertion (A):** The magnitude of the magnetic field at a point on the axis of a current-carrying solenoid is inversely proportional to the current flowing through the solenoid. **[1]**

Reason (R): The magnitude of the magnetic field at a point on the axis of a current-carrying solenoid is directly proportional to the number of turns per unit length of a solenoid.

a) Both A and R are true and R is the correct explanation of A.

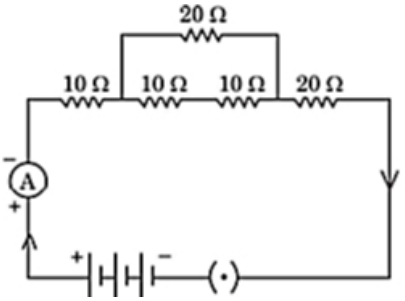
b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

33. How are we able to see distant and nearby objects clearly? Which part of eye helps in changing curvature of lens? Why no image is formed at blind spot? **[2]**

34. Calculate the equivalent resistance of the following electric circuit: **[2]**

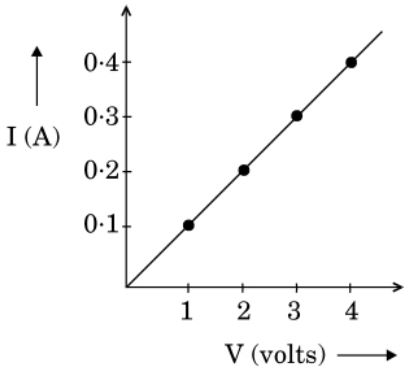


OR

In the experiment to study the dependence of current (I) on the potential difference (V) across a resistor, a student obtained a graph as shown.

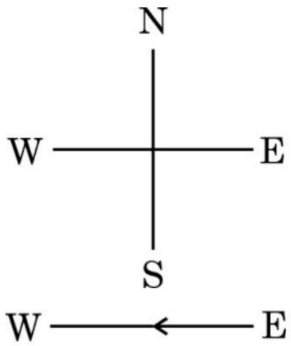
i. What does the graph depict about the dependence of current on the potential difference?

ii. Find the current that flows through the resistor when the potential difference across it is 2.5 V.

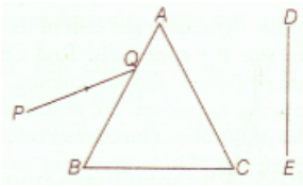


35. a. State the Right-hand thumb rule. **[3]**

b. A steady current flows through a horizontal power line from east to west direction as shown in the figure. Apply right-hand thumb rule to determine the direction of magnetic field (i) at a point directly below it, and (ii) at a point directly above it.



36. 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.

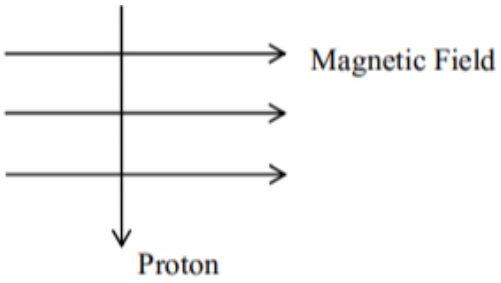
ii. Where else in nature is this phenomenon observed?

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

37. a. State (i) right-hand thumb rule, and (ii) Fleming's left-hand rule. **[3]**

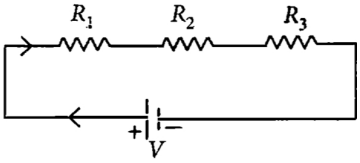
b. Using Fleming's left-hand rule determine the direction of force experienced by a proton, which enters vertically downwards in a uniform magnetic field acting

horizontally from west to east as shown in the diagram.



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

Two or more resistances are connected in series or in parallel or both, depending upon whether we want to increase or decrease the circuit resistance.

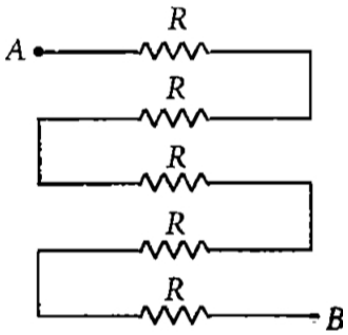


The two or more resistances are said to be connected in series if the current flowing through each resistor is the same.

i. When the three resistors each of resistance R ohm are connected in series then what will be the equivalent resistance? (1)

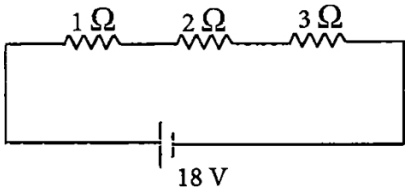
ii. There is a wire of length 20 cm and having resistance 20 Ω cut into 4 equal pieces and then joined in series. What is equivalent resistance? (1)

iii. In the following circuit, find the equivalent resistance between A and B (R = 2Ω) (2)



OR

In the given circuit, what is the current in each resistor? (2)



39. i. Draw a ray diagram to show the path of the refracted ray in each of the following cases: **[5]**

A ray of light incident on a concave lens

1. parallel to its principal axis, and
2. is directed towards its principal focus.

ii. A 4 cm tall object is placed perpendicular to the principal axis of convex lens of focal length 24 cm. The distance of object from the lens is 16 cm. Find the position and size of image formed.

OR

a. List four characteristics of the image formed by a concave lens of focal length 20 cm when the object is placed at a distance of 40 cm from its optical centre.

b. The size of image of an object by a convex lens of focal length 20 cm is observed to be reduced to $\frac{1}{3}^{rd}$ of its size. Find the distance of the object from the optical centre of the lens.

Solution

Section A

1. **(d)** a fungi, Rhizopus
   Explanation:
   a fungi, Rhizopus breakdown food outside body.

2. **(c)** Gene
   Explanation:
   Gene

3. **(a)** excessive use of disposable cups and plates.
   Explanation:
   Excessive use of disposable cups and plates

4. **(a)** (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
   Explanation:
   - Phototropism refers to the movement of a plant toward a light source.
   - Geotropism the growth of the parts of plants in response to the force of gravity.
   - Hydrotropism the growth or turning of plant roots towards or away from moisture.
   - Chemotropism may be defined as the movement or the growth of the organism in response to a chemical stimulus.

5. **(a)** Food web
   Explanation:
   Food web

6. **(c)** lifted ribs and flattened diaphragm.
   Explanation:
   lifted ribs and flattened diaphragm.

7. **(d)** II and IV
   Explanation:
   II and IV

8. **(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.

9. **(b)** Both A and R are true but R is not the correct explanation of A.
   Explanation:
   Both A and R are true but R is not the correct explanation of A.
   As these chemicals are not degradable, these get accumulated progressively at each trophic level. As human beings occupy the top level in any food chain, the maximum concentration of these chemicals gets accumulated in their bodies.

10. - Sexually transmitted diseases are those, which spread by sexual contact from an infected person.

- Bacterial: Gonorrhoea / Syphilis
- Virus: One sexually transmitted disease caused by a virus is HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome). HIV attacks the immune system, specifically targeting CD4 cells, and can lead to AIDS if left untreated.
- i. To avoid pregnancy
  ii. To prevent STD (Sexually Transmitted Diseases)

11. a. Grass → Insect → Frog → Snake → Hawk
    b. Third trophic level - Frog
    c. Hawk
    d. Biomagnification
    e. 1000J

OR

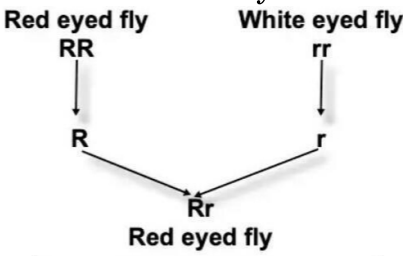
- The higher energy UV radiations split apart some molecular oxygen into free oxygen atoms. These atoms then combine with molecular oxygen to form ozone.

$$O2 \xrightarrow{UV} O + O$$

$$O_2 + O \longrightarrow O_3$$

- It prevents harmful UV radiation to reach the earth.
- CFC/chlorofluoro carbon/aerosol.
- Skin cancer

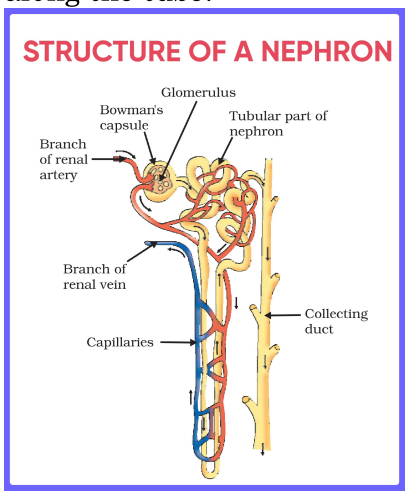
12. A neuron is stimulated when it receives a signal at dendrites which are passed through the cell body towards the axon of one cell that transfers this signal to the dendrite of another neuron cell and finally the response is generated.
    i. The electrical impulses are received by the dendrites of the neurons. The dendrites transfer these impulses to the cell body from which they emerge.
    ii. The axon receives the impulses from the cell body and transfers them to the axonal end.
13. a. The **dominant trait** is identified by observing its expression in the F1 generation.
    b. The **recessive trait** is the one that is masked in the presence of the dominant trait and only expressed in the homozygous recessive state.
    c. The **ratio** of red-eyed to white-eyed individuals is 3:1



	R	r
R	RR Red eyed fly	Rr Red eyed fly
r	Rr Red eyed fly	rr White eyed fly

14. i. Basic filtration in the kidney is like in the lungs, is a cluster of very thin-walled blood capillaries. Each capillary cluster in the kidney is associated with the cup-shaped end of a tube that collects the filtered urine. Each kidney has large numbers of these filtration units called nephrons packed close together. Some substances in the initial filtrate, such as glucose, amino acids, salts and a major amount of water, are selectively re-absorbed as the urine flows

along the tube.



ii. The amount of water reabsorbed by nephron depends on two major factors: (i) The amount of excess water present in the body. (ii) The amount of dissolved waste to be excreted out of the body.

15. i. Gametes have half the number of chromosome. When they fuse, the original number is restored. At the time of fertilization male and female germ cells are fused to form a zygote.

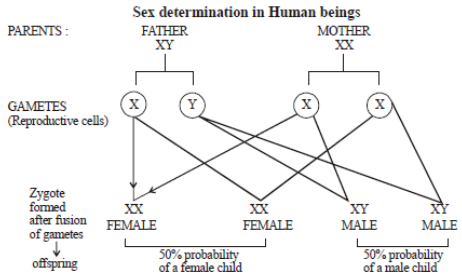
ii. As female have XX chromosomes and male hav XY chromosomes so males have mismatched pair of chromosomes in terms of type. Also in terms of size X is bigger than Y so it is mismatched.

iii. Examples of organisms in which sex is not genetically determined are crocodiles, alligators, turtle, Bonellia Viridis.

For example, in crocodiles, if the egg is incubated at around 30 °C, it leads to the development of female whereas if the egg is incubated at around 34 °C, it results in the development of the male.

Another example may include Bonellia Viridis in which sex is determined by the location of larvae. If larvae make physical contact with a female, it becomes male. If it is located on the bare sea floor, it becomes female.

OR



16. a. Vegetative propagation is a type of asexual reproduction in plants where new plants are grown from vegetative parts of the parent plant, such as the stems, roots, or leaves.

Two method are-

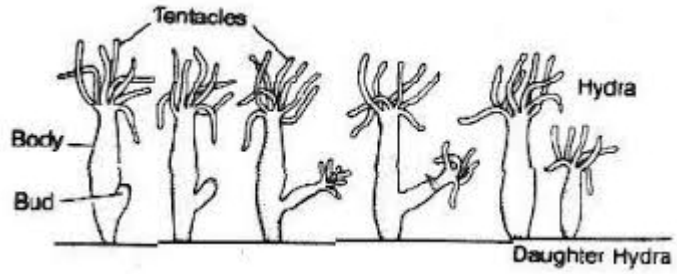
Cutting

Grafting

b. Vegetative propagation is performed in the plants which do not have viable seeds or seeds which are dormant. Plants which have desirable superior traits are also vegetatively propagated because it results in producing identical plants.

c. Organisms such as hydra use regenerative cells for reproduction in the process of budding. In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and, when fully mature, detach from the parent body and

become new independent individuals.



OR

i. Plant growth movements in response to stimuli in a particular direction/directional movements due to light, gravity etc. Is known as tropic movement.
   - Plant growth inhibitor: Abscisic Acid
   - Promotes cell division - Cytokinins

ii. When the tendrils come in contact with any support, auxins move away from the point of contact of the support. More growth occurs on the side away from the support. As a result, unequal growth occurs on its two sides and thus tendrils coil/ circle around the support.
Hormone - Auxins

Section B

17.

(c) Statement (b) is incorrect.
Explanation:
Atmosphere of Venus is made up of thick white and yellowish clouds of sulphuric acid.

18. **(a)** Both the statements A and B are true.
Explanation:
All soaps are biodegradable i.e. they can be decomposed by micro-organisms like the bacteria. Branched-chain synthetic detergents are far less degradable than unbranched detergents.

19.

(c) Lithium
Explanation:
Lithium has lowest density.

20.

(b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
Explanation:
- Carbon forms a large number of compounds due to the property of catenation. Catenation is the linkage of atoms of the same element into longer chains. Catenation occurs most readily in carbon.
- Ethane is an alkane (saturated hydrocarbon with single bonds between the two carbon atoms).
- Butene is an alkene (unsaturated hydrocarbon with double bonds between two carbon atoms).
- Ethyne is an alkyne (unsaturated hydrocarbon with triple bonds between the two carbon atoms).

21. **(a)** Action of steam on a metal
Explanation:
Action of steam on a metal.

22.

(d) (a) and (b)
Explanation:

(a) and (b)

23. **(b)** Option (b)
Explanation:
The bases that dissolve in water are known as alkalis. While $Fe(OH)_3$ is not soluble in water, NaOH is only weakly so. NaOH is therefore an alkali, whereas $Fe(OH)_3$ is not. All bases are alkalis, but not all alkalis are bases.

24. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
$H_3PO_4 \rightleftharpoons H_2PO_4^- + H^+$
$H_2PO_4^- \rightleftharpoons H^+ + HPO_4^{2-}$
$HPO_4^{2-} \rightleftharpoons H^+ + PO_4^{3-}$
Similarly, bases that give two or more two hydroxyl ions per molecule are known as poly acidic bases.

25. i. When Ammonium Hydroxide is added to the Ferrous Sulphate solution then a dirty green ppt. of Ferrous Hydroxide is formed with Ammonium Sulphate by Double Displacement reaction.
$2NH_4OH$ (aq) + $FeSO_4$ (aq) → $Fe(OH)_2$ (ppt) + $(NH_4)_2$ SO_4 (aq)

ii. When Ammonium Hydroxide is added to Aluminium Cholride then a white ppt. of Aluminium Hydroxide is formed with Ammonium Choride by Double Displacement Reaction.
$3NH_4OH$ (aq) + $AlCl_3$ (aq) → $Al(OH)_3$ (ppt.) + $3NH_4Cl$ (aq)

26.
- Sodium Hydroxide/ $NaOH/$ caustic soda - near cathode
- Chlorine $/Cl_2$ - at anode
- Hydrogen/ H_2 - at cathode

Use:
- NaOH: Degreasing metal/soaps and detergents/ paper making/ artificial fibres.

OR

a. $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$
b. $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$
c. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O +$ Energy

27. A: Metal M will get corroded partly
The part of metal M outside oil will get corroded whereas the part of the metal M inside the oil will not corrode, as it cannot react with moist air.
B: Metal M will not undergo corrosion.
It is inside the oil and not exposed to moist air.
C: Metal M will not undergo corrosion as moisture is absent in test tube C.

28. i. $CuSO_4$ gets reduced.

ii. The oxidising agent generally gains the electron.

iii. Oxidizing agent - Copper,
Reducing agent - Zinc
OR
Displacement reaction

29. i. When a small piece of sodium is dropped in ethanol
Alcohols react with sodium leading to the evolution of hydrogen.
$2Na + 2CH_3CH_2OH \longrightarrow 2CH_3CH_2O^-Na^+ + H_2 \uparrow$
(Sodium ethoxide)

ii. The melting point of pure ethanoic acid is 290 K and hence it often freezes during winter in cold climates. Therefore its name as glacial acetic acid.

iii. Reaction to give unsaturated hydrocarbon: Heating ethanol at 443 K with excess concentrated sulphuric acid results in the dehydration of ethanol to give ethene -

$$CH_3 - CH_2OH \xrightarrow[443\ K\ H_2SO_4]{\text{Hot Conc.}} CH_2 = CH_2 + H_2O$$

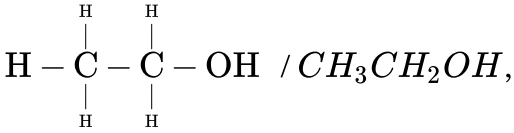
Role of sulphuric acid - The concentrated sulphuric acid can be regarded as a dehydrating agent which removes water from ethanol.

iv. On treating with sodium hydroxide, which is an alkali, the ester is converted back to alcohol and sodium salt of carboxylic acid. This reaction is known as saponification because it is used in the preparation of soap. Soaps are sodium or potassium salts of long chain carboxylic acid.

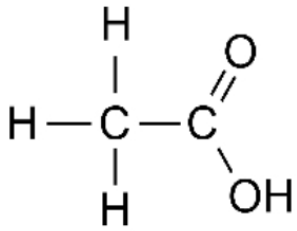
$$CH_3COOC_2H_5 \xrightarrow{NaOH} C_2H_5OH + CH_3COONa$$

OR

- Ethanol and Ethanoic acid



$/CH_3CH_2OH,$



$/CH_3COOH$

- On adding alkaline $KMnO_4$ /acidified $K_2Cr_2O_7$ to alcohol, it gets oxidised to Carboxylic acid.
- An Ester is formed

$$C_2H_5OH \xrightarrow[\text{heat}]{\text{Alkaline } KMnO_4} CH_3COOH$$

$$C_2H_5OH + CH_3COOH \xrightarrow[\text{Catalyst}]{\text{Acid}} CH_3COOC_2H_5 + H_2O$$

Section C

30.

(c) (A)

Explanation:

Concave mirrors are used by the dentist to see the large images of teeth of patients since concave mirrors form enlarged images. Concave mirrors are also used for shaving purpose. Convex mirrors form diminished images. They are used as rear-view mirrors in cars, motorcycles, scooters, etc since they give a wide field of view.

31. **(a)** p, y, z

Explanation:

p, y, z

32.

(d) A is false but R is true.

Explanation:

A is false but R is true.

33. We can see distant and near objects clearly because of the power of accommodation of the eye. Accommodation is the name given to the ability of the lens of the eye to change its focal length and produce focused images of both distant and near objects on the retina.
Ciliary muscle helps in changing the curvature of the lens. They are attached to the lens and contract or release to change the lens shape and curvature.
Blind spot is an area where a person's view is obstructed. It is the small, circular, optically insensitive region in the retina where fibres of the optic nerve emerge from the eyeball. It has no rods or cones.No image is formed at the blind spot because there are no light sensitive cells called photoreceptors, i.e., cones and rods to detect the light and send it to the brain.

34. $R_S = R_3 + R_4 = 10 + 10 = 20\ \Omega$

$\frac{1}{R_P} = \frac{1}{R_2} + \frac{1}{R_S}$

$= \frac{1}{20} + \frac{1}{20} = \frac{1}{10}\Omega$

$R_p = 10\ \Omega$

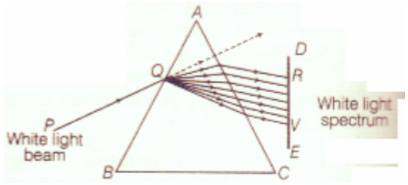
Total equivalent resistance = $R = R_1 + R_P + R_5$

$= R = 20 + 10 + 10 = 40\ \Omega$

OR

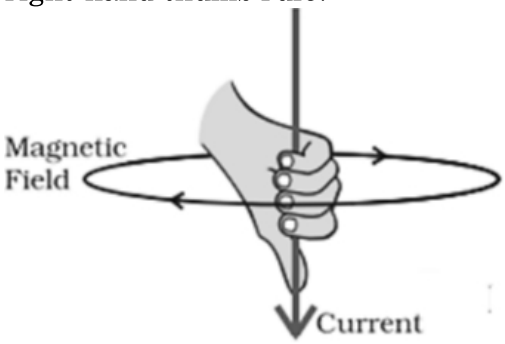
i. $V \propto I$ i.e current is directly proportional to applied voltage.
ii. at 2.5 V current will be 0.25 A

35. a. Imagine that you are holding a current carrying straight conductor in your right hand such that the thumb points towards the direction of current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field.
b. In both (i) and (ii), magnetic field turns clockwise in plane perpendicular to the wire when viewed from the east end & anti-clockwise when viewed from the west end.

36. 

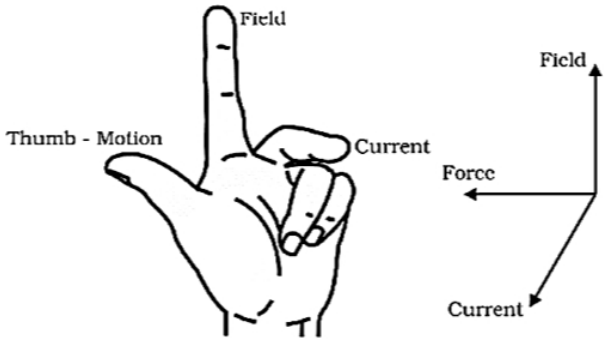
i. The phenomenon of splitting of white light into its constituent colours is called dipersion of light. It is caused due to difference in speed of constituent colours of light travel in the medium other than air/vacuum because of different speed they bend at different angles.
ii. In nature, this Phenomenon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

37. a. i. Imagine that you are holding a current-carrying straight conductor in your right hand such that the thumb points towards the direction of current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field. This is known as the right-hand thumb rule.



Note : Award full marks if explained diagrammatically.

ii. Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.



b. Out of plane of the paper

38. i. In series combination, Rs = $R_1 + R_2 + R_3$ = R + R + R = 3R.

ii. The equivalent resistance is where the total resistance is connected either in parallel or in series.

Resistance of each wire = $\frac{20}{4}$ = 5 Ω

Equivalent resistance in series

R_s = 5 + 5 + 5 + 5 = 20Ω

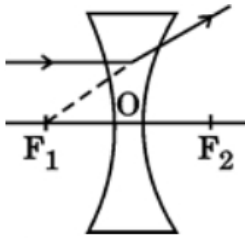
iii. All are in series, R_s = 5R = 5 × 2 = 10Ω

OR

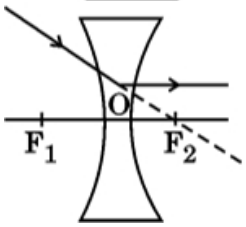
R_s = 1 + 2 + 3 = 6 Ω

$I = \frac{18}{6} = 3$ A

39. i. 1.



2.



ii. Given u = -16 cm, f = +24 cm, h = 4 cm

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

$\therefore \frac{1}{v} - \frac{1}{(-16)} = \frac{1}{+24}$

$\frac{1}{v} = \frac{-1}{48}$

v = -48 cm

Image is formed on the same side as the object

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

$\frac{h'}{4} = \frac{-48}{-16}$

h' = 12 cm

OR

i.
- Virtual
- Erect

- Diminished
- On the same side of the object

ii. Focal Length = 20cm.

u = -x cm

v = $\frac{x}{3}$

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

x = 80 cm

Hence, the distance of the object from the optical centre of the lens is 80 cm.