Class X Session 2026-27
Subject - Science
Sample Question Paper - **5**

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. Cramps are caused by heavy exercise resulting in the accumulation of **[1]**

   a) Lactic acid b) Ethanol

   c) Carbon dioxide d) Heat

2. The number of pair (s) of sex chromosomes in the zygote of humans is **[1]**

   a) one b) three

   c) four d) two

3. An example of a man-made ecosystem is: **[1]**

   a) Grassland b) Garden

   c) Desert d) River

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

Column A	Column B
(i) Junction between neuron	(a) Thermoreceptors
(ii) The largest cell in the human body	(b) Neuron
(iii) Sense organs for smell	(c) Synapse
(iv) Sense organs for touch	(d) Olfactory receptors

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

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

5. Steps of a food chain are called: **[1]**

   a) Food steps b) Trophic levels

   c) Food levels d) Trophic steps

6. Which of the following is an incorrect statement? **[1]**

a) Movement of molecules does not take place among cells
b) Organisms grow with time
c) Organisms must repair and maintain their structure
d) Energy is essential for life processes

7. Junctions of two neurons in called: **[1]**

a) neuro muscular junction
b) neural joint
c) synapse
d) cell junction

8. **Assertion (A):** Characteristics of parental plants can be preserved through asexual reproduction. **[1]**
Reason (R): Vegetative reproduction involves only mitosis.

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):** Ozone layer protects the surface of the Earth from harmful UV radiations. **[1]**
Reason (R): Chlorofluorocarbons (CFCs) are responsible for depletion of ozone layer.

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. How will an organism be benefited if it reproduces through spores? **[2]**

11. **The maximum concentration of harmful chemicals accumulates in human beings.** State the phenomenon involved and justify this statement. **[2]**

OR

Carnivores cannot be self-dependent and have to depend on herbivores. Explain.

12. Compare and contrast nervous and hormonal mechanisms for control and coordination in animals. **[2]**

13. Show how man has been able to produce crop plants by selective breeding. **[3]**

14. Name the following **[3]**

i. The process in plants that links light energy with chemical energy.
ii. Organisms that can prepare their own food.
iii. The cell organelle where photosynthesis occurs.
iv. Cells that surround a stomatal pore.
v. Organisms that cannot prepare their own food.
vi. An enzyme secreted from gastric glands in the stomach that act on proteins.

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

A student crossed pea plants having round and yellow seeds with pea plants having wrinkled and green seeds. He found that only one type of seeds were produced in the F_1 generation. When these F_1 generation pea plants were self-pollinated with each

other, then in addition to the seed type of F_1 generation, some new types of seed combinations were also obtained in the F_2 generation.

i. Mention the dominant traits observed in F_1 generation. (1)

ii. What are the new possible combinations of seeds likely to be observed in F_2 generation? (1)

iii. Give reason why the traits which were not visible in the seeds of F_1 generation reappeared in the seeds of F_2 generation. Write the ratio of different types of seeds obtained in F_2 generation in this case. (2)

OR

What is meant by the terms (I) dominant, and (II) recessive traits? Explain. (2)

16. i. Draw a diagram showing the germination of pollen on the stigma of a flower and mark on it the following organs/parts: **[5]**

a. Pollen Grain
b. Pollen tube
c. Stigma
d. Female germ cell

ii. State the significance of the pollen tube.

iii. Name the parts of a flower that develop after fertilization into

a. Seed
b. Fruit

OR

List some functions of the human brain.

Section B

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

A. The pH of the stomach is approximately 4.5
B. Plants grow well in natural soil
C. The pH of acid rain is nearly 5.6
D. The pH of rainwater is nearly 7

a) Statement (B) b) Statement (D)
c) Statement (C) d) Statement (A)

18. Soap doesn't work well with woollen garments because: **[1]**

A. It is basic in nature and woollen garments have acidic dyes.
B. It is acidic in nature and woollen garments have basic dyes.

a) (A) b) (B)
c) None of these d) Both (A) and (B)

19. Electrical wires have a coating of an insulting material. The material, generally used is **[1]**

a) PVC b) All can be used

c) Sulphur d) Graphite

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

(1) Soap	(A) Sodium salts of long-chain of sulphonic acids
(2) Detergents	(B) Esterification
(3) The reaction of CH_3COOH with metal hydroxides	(C) Neutralization
(4) The reaction of CH_3COOH with alcohols	(D) Sodium salts of long-chain fatty acids

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

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

21. The slag obtained during the extraction of copper pyrites is composed mainly of: **[1]**



a) $CuSiO_3$ b) SiO_2

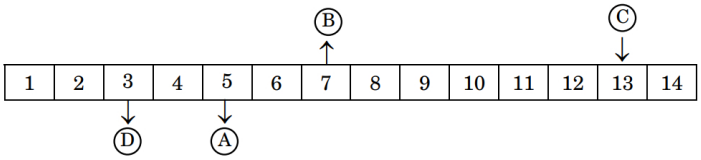
c) Cu_2S d) $FeSiO_3$

22. The formula of washing soda is **[1]**

a) $Na_2CO_3 \cdot 6H_2O$ b) $NaHCO_3 \cdot 6H_2O$

c) $NaHCO_3 \cdot 10H_2O$ d) $Na_2CO_3 \cdot 10H_2O$

23. The following table shows the pH values of four solutions A, B, C and D on a pH scale: **[1]**



The solutions A, B, C and D respectively are of a

a) Weak acid, neutral, strong base, strong acid b) Weak acid, neutral, weak base, strong base

c) Strong acid, weak acid, neutral, strong base d) Weak acid, neutral, strong base, weak base

24. **Assertion (A):** To dilute concentrated sulphuric acid water is added to the acid slowly. **[1]**

Reason: A lot of heat energy will be given out in the dilution of concentrated sulphuric 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. Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride. **[2]**

26. When solutions of silver nitrate and sodium chloride are mixed, white precipitate forms. The ionic equation for the reaction is **[3]**

$Ag^{+}(ag) + Cl^{-} \longrightarrow AgCl(s)$

i. a. What is the name of the white precipitate?

b. Is it a soluble or insoluble compound?

ii. Is the precipitation of silver chloride a redox reaction?

OR

Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

a. Zinc reacts with silver nitrate to produce zinc nitrate and silver.

b. Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

27. A, B and C are 3 elements which undergo chemical reactions according to following equations: **[3]**

a) $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$

b) $3CSO_4 + 2B \rightarrow B_2(SO_4)_3 + 3C$

c) $3CO + 2A \rightarrow A_2SO_3 + 3C$

Answer of the following:

i) Which element is most reactive?

ii) Which element is least reactive?

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

When the fats and oil present in the food material get oxidized by the oxygen (of air), their oxidation products have unpleasant smells and tastes. Due to this taste of food material containing fats and oil change and become very unpleasant. The condition produced by aerial oxidation of fats and oils in food marked by unpleasant smell and taste is called rancidity. Rancidity spoils the food material prepared in the fats and oils which have been kept for a considerable time and makes them unfit for eating.

The development of rancidity in food can be prevented in the following ways-

I. Rancidity can be prevented by adding an antioxidant to foods containing fats and oils.

II. Rancidity can be prevented by packaging fat and oil-containing food in Nitrogen gas.

III. Rancidity can be prevented by keeping food in a refrigerator.

i. What do you understand by oxidation? (1)

ii. How does the food become rancid? (1)

iii. How can we prevent the rancidity of food? (2)

OR

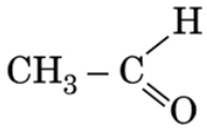
Which type of food material gets spoiled by the phenomenon of rancidity? (2)

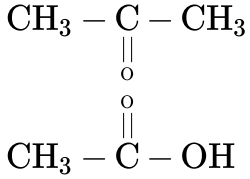
29. a. What is a hydrocarbon? Give its one example. **[5]**

b. Give the structural difference between saturated and unsaturated hydrocarbons with two examples each.

c. Name the following compounds:

i. CH_3-OH

ii. 

iii. 

iv.

OR

A carbon compound 'A' is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound 'B'.

i. Identify the compound 'A' and write its structure.

ii. Write the chemical equation for the reaction of 'A' with ethanol to form compound 'B'. State the role of presence of an acid in the reaction.

iii. How can we get compound 'A' back from 'B'?

iv. How can 'A' be obtained from ethanol?

v. Name the gas produced when compound 'A' reacts with washing soda.

Section C

30. Which of the following statement is incorrect? **[1]**

A. A ray of light passing from an optically rarer medium to an optically denser medium bends away from the normal.

B. A ray of light passing from an optically denser medium to an optically rarer medium bends away from the normal.

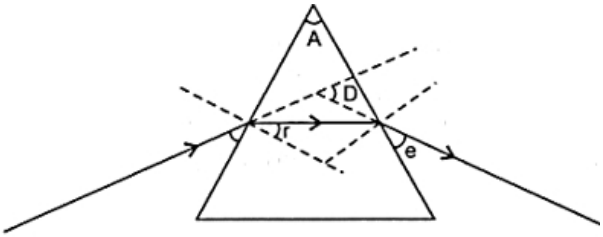
C. A ray of light passing from an optically rarer medium to an optically denser medium bends toward the normal.

D. A ray light passing from an optically denser medium to an optically rarer medium bends towards the normal.

a) A, B and D b) B and C

c) A and C d) A and D

31. In the following ray diagram the correctly marked angles are: **[1]**



a) ∠A and ∠D
b) ∠r, ∠A and ∠D
c) ∠i and ∠e
d) ∠i, ∠e and ∠D

32. **Assertion (A):** A current-carrying rod is suspended between U-shaped magnet, the rod deflects. **[1]**

Reason (R): A force is exerted on the rod due to magnetic field.

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. Student sitting at the back bench in a class is not able to see what is written on the blackboard. He, however, sees it clearly when sitting on the front seat at an approximate distance of 1.5 m from the blackboard. Draw ray diagrams to illustrate the image formation of the blackboard when he is seated at the **[2]**

i. back seat
ii. front seat.

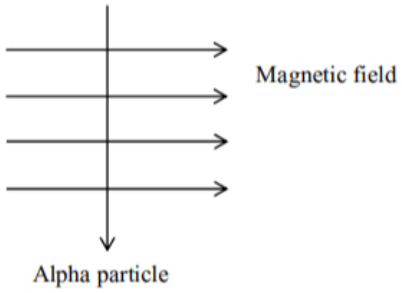
34. Compute the heat generated while transferring 96,000 coulomb of charge in one hour through a potential difference of 50V. **[2]**

OR

Calculate the resistance of an electric bulb which allows a 10A current when connected to a 220V power source?

35. a. Draw the pattern of magnetic field lines around a current carrying straight conductor through which current is flowing vertically upward. Mark the direction of the field lines corresponding to the direction of current in the conductor. **[3]**

b. An alpha particle enters a uniform magnetic field at right angles to it as shown in the diagram.

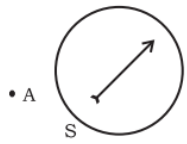


i. Name the rule which can help in determining the direction of force acting on the alpha particle in this case.
ii. Apply this rule and find the direction of force on the alpha particle.

36. i. State two main causes of a person developing near-sightedness. With the help of a ray diagram, suggest how he can be helped to overcome his disability? **[3]**

ii. The far point of myopic person is 100 cm in front of the eye. Calculate the focal length and power of a lens required to enable him to see distant objects clearly.

37. A magnetic compass needle is placed in the plane of paper near point A as shown in the figure. **[3]**

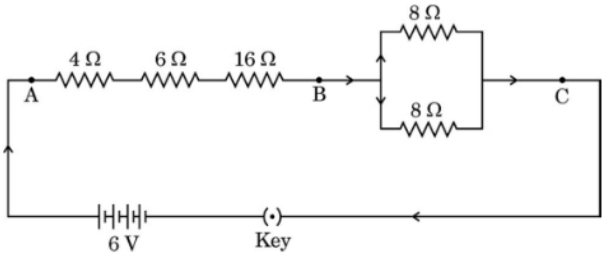


i. In which plane should a straight current-carrying conductor be placed so that it passes through A and there is no change in the deflection of the compass?

ii. Under what condition is the deflection maximum and why?

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

Study the following circuit:



On the basis of this circuit, answer the following questions:

a. Find the value of total resistance between the points A and B. **(1)**

b. Find the resistance between the points B and C. **(1)**

c. Calculate the current drawn from the battery, when the key is closed. **(2)**

OR

In the above circuit, the 16Ω resistor or the parallel combination of two resistors of 8Ω, which one of the two will have more potential difference across its two ends? Justify your answer. **(2)**

39. An object 5 cm high is placed at a distance of 10 cm from a convex mirror of radius of curvature 30 cm. Find the nature, position and size of the image. **[5]**

OR

a. List four characteristics of the image formed by a convex lens when an object is placed between its optical centre and principal focus.

b. Size of the image of an object by a concave 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 lens.

Solution

Section A

1. **(a)** Lactic acid
   Explanation:
   Muscle cramping is a common problem encountered by athletes and nonathletes alike. They typically affect the large muscles of the legs during or immediately after exercise and last for seconds to a few minutes. Traditionally, such cramping was believed to arise from dehydration, electrolyte imbalances (including magnesium, potassium, and sodium), accumulation of lactic acid, or low cellular energy levels.
2. **(a)** one
   Explanation:
   A zygote has 23 pairs of chromosomes i.e., 46. Out of them, one pair is the sex chromosome.
3. **(b)** Garden
   Explanation:
   An ecosystem may be classified as a natural ecosystem or a man-made ecosystem. A garden is an example of a man-made ecosystem. Deserts, rivers and grasslands are examples of natural ecosystems.
4. **(d)** (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)
   Explanation:
   - In the nervous system, a synapse is a structure which serves as Junction between neuron that permits a neuron to pass an electrical or chemical signal to another neuron.
   - A neuron is an electrically excitable cell that processes and transmits information through electrical and chemical signals that is why it is the largest cell in the human body.
   - Olfactory receptors are responsible for the detection of odorants which give rise to the sense of smell.
   - Thermoreceptors are able to detect heat and cold and are found throughout the skin in order to allow sensory reception throughout the body.
5. **(b)** Trophic levels
   Explanation:
   A food chain is a chain or series of organisms that are arranged in order of who eats whom. Each step or level of the food chain forms a trophic level.
6. **(a)** Movement of molecules does not take place among cells
   Explanation:
   The movement of molecules is a vital process. Movement of molecules in cells takes place in active and passive modes such as diffusion, osmosis, facilitated diffusion, etc.
7. **(c)** synapse
   Explanation:
   Synapse is the point where two neuron join with each other. The electrical impulses change into chemical impulse here to cross the gap.

8. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Asexual reproduction involves a single individual, which gives rise to the new individual that is genetically identical to parents. It is because, when organisms reproduce asexually, only mitotic divisions are involved and the chromosome number remains the same.

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.

10. The spores are covered by thick walls that protect them until they come into contact with suitable moist surface and can begin to grow.
11. Human beings are always placed at the top of a food chain. The harmful chemicals concentration [non-biodegradable substance] goes on increasing at every trophic level as a result as human beings are placed at the apex of every food chain so maximum concentration of harmful chemicals get accumulated in their body. This phenomenon is called biomagnification.

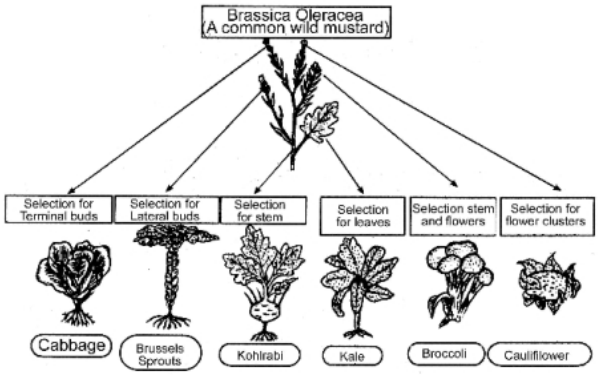
OR

Food chain starts with producers i.e. autotrophs. Carnivores cannot prepare their food by themselves, they are dependent on herbivores which in turn are dependent on producers who can photosynthesise and prepare their food with the help of sunlight.

12. Difference between nervous control and hormonal control:

Nervous control	Hormonal control
(i) Consists of nerve impulses conducted by neurons from one organ to another organ.	(i) It consists of endocrine system which secretes chemical messenger's hormones secreted directly in blood.
(ii) Nervous impulses produce rapid short lasting responses.	(ii) Hormones produce longer lasting responses.
(iii) Nervous impulses are not specific in their action.	(iii) Action of hormones is highly specific.

13. Crop plants produced by selective breeding



14. i. Photosynthesis is a process by which green plants having chlorophyll can synthesize simple sugar (glucose) from water and CO_2 using the energy of sunlight. The light energy is used in a splitting of water molecules into hydrogen and oxygen (i.e. chemical energy).
ii. **Autotrophs:** The organisms which can synthesize their own food from inorganic substances present in the environment are called autotrophs. An *autotroph* or primary producer, is an organism that produces complex organic compounds , e.g. green plants, autotrophic bacteria etc.
iii. **Chloroplast:** Chlorophyll is the green pigment capable of trapping light energy required during photosynthesis. This pigment is present in the chloroplast of leaves of all green plants.

iv. Guard cells are present in the stomata under the leaves rim. Each stomatal pore is surrounded by a pair of guard cells, that control their opening and closing by the inflow and outflow of water.

v. **Heterotrophs:** The organisms which cannot make their own food from inorganic substances and depend on other organisms for their food are called heterotrophs, e.g. all animals, yeast, most bacteria, etc.

vi. **Pepsin:** It is a protein-digesting enzyme secreted from gastric glands present in the walls of the stomach, an enzyme in the stomach that begins the digestion of proteins by splitting them into peptones (see peptidase). It is **produced** by the action of hydrochloric acid on pepsinogen, which is **secreted** by the gastric glands.

15. i. Round and Yellow traits are dominant.

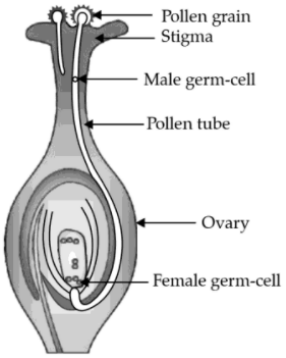
ii. New possibilities can be
Round Yellow
Round Green
Wrinkled Yellow
Wrinkled Green

iii. It is because of segregation of alleles in F_1 generation which states that During the formation of gamete, each gene separates from each other so that each gamete carries only one allele for each gene**.**

OR

The trait that first appears or is visibly expressed in the organism is called the dominant trait.The trait that is present at the gene level but is masked and does not show itself in the organism is called the recessive trait.

16. i.



ii. Pollen tubes act as conduits to transport the male gamete cells from the pollen grain-either from the stigma to the ovules at the base of the pistil or directly through ovule tissue in some gymnosperms.

iii. After fertilization

a. Ovules develop into Seed
b. The ovary develops into a Fruit

OR

Major functions of the human brain are:

i. The cerebral cortex is greatly enlarged in human brains and is considered the seat of complex thought.It coordinates activities of the body so that mechanism and hormonal reactions of the body work together.

ii. Visual processing takes place in the occipital lobe, near the back of the skull

iii. The temporal lobe is located behind our ears and extends to both sides of the brain involved in vision, memory, sensory input, language, emotion.

iv. The parietal lobe integrates input from different senses and is important for spatial orientation and navigation. It receives information carrying nerve impulses from all the sensory organs of the body.

v. The primary functions of the brain stem include relaying information between the brain and the body; supplying some of the cranial nerves to the face and head; and performing critical

functions in controlling the heart, breathing and consciousness.

vi. The thalamus relays sensory and motor signals to the cortex and is involved in regulating consciousness, sleep and alertness. The hypothalamus connects the nervous system to the endocrine system where hormones are produced via the pituitary gland.

vii. The cerebellum lies beneath the cerebrum and has important functions in motor control. It plays a role in coordination and balance and may also have some cognitive functions.

Section B

17. **(d)** Statement (A)
Explanation:
The human stomach produces gastric juices which contain hydrochloric acid in them resulting in a pH of 1.4.

18. **(a)** (A)
Explanation:
Soap is basic in nature. Acid dyes are used to dye protein fibres such as silk, wool, angora, mohair, feathers, etc. Hence, soap doesn't work well with woolen garments. The soap gets neutralized by the acidic dyes.

19. **(a)** PVC
Explanation:
An insulating substance is required to coat the electrical wire such as PVC as it does not allow an electric current to pass through it.

20. **(a)** (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
Explanation:
- Soaps are sodium or potassium salts of long-chain fatty acids.
- Detergents are sodium salts of a long chain of sulphonic acids.
- The reaction of acetic acid with metal hydroxides is a neutralization reaction.
  $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$
- The reaction in which a carboxylic acid combines with an alcohol to form an ester is called esterification. When acetic acid CH_3COOH reacts with alcohol, an ester is formed along with water.
  $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

21. **(d)** $FeSiO_3$
Explanation:
The sulphide ore of copper-containing iron is mixed with silica before heating in a reverberatory furnace. Iron oxide forms a slag of iron silicate ($FeSiO_3$).
The reaction is: $FeO + SiO_2 \rightarrow FeSiO_3$

22. **(d)** $Na_2CO_3 \cdot 10H_2O$
Explanation:
$Na_2CO_3 \cdot 10H_2O$

23. **(a)** Weak acid, neutral, strong base, strong acid
Explanation:
Weak acid, neutral, strong base, strong acid

24. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:

Water is never added to concentrated sulphuric acid as it is an exothermic reaction and releases a large amount of heat energy. It also results in the spurting of the acid, which can burn your skin. Concentrated sulphuric acid is added to water in small amounts and that too with constant stirring and cooling.

25. **Carbon dioxide** is the gas that extinguishes a burning candle. It is produced with effervescence when dilute hydrochloric acid act either on a metal carbonate or a metal hydrogen carbonate.
Since one of the compounds formed is calcium chloride, the given metal compound 'A' is **calcium carbonate**. It cannot be calcium hydrogen carbonate because calcium hydrogen carbonate is found in solution and does not exist as a solid. Thus, the metal compound 'A' is calcium carbonate ($caco_3$).

The balanced chemical equation for the reaction between **calcium carbonate** and dilute hydrochloric acid is as follows. Products of the reaction are calcium chloride, carbon dioxide and water.

$$CaCO_3\,(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$$

26. i. a. White precipitate formed is AgCl (Silver chloride) .
b. It is an insoluble compound.

ii. It is not a redox reaction.

$$\underset{\text{Sodium chloride}}{NaCl(aq)} + \underset{\text{Silver nitrate}}{AgNO_3(aq)} \longrightarrow \underset{\text{Silver chloride}}{AgCl(s)} + \underset{\text{Sodium nitrate}}{NaNO_3(aq)}$$

In this reaction, cations Ag^+ and Na^+ have exchanged their anions NO_3 and Cl^- and a precipitate of AgCl has been formed. It is an example of double displacement and precipitation reactions.

OR

a. It is a displacement reaction.
$Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$

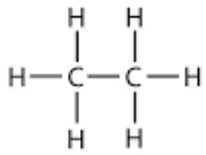
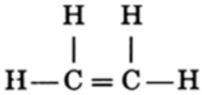
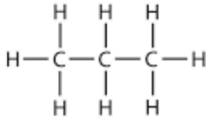
b. It is a double displacement reaction.
$2Kl + Pb(NO_3)_2 \rightarrow 2KNO_3 + Pbl_2$

27. (i) Most reactive element is B as it has replaced both A and C from their compounds.
(ii) Element C is least reactive as it has been replaced both by A and B.

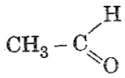
28. i. The process in which the addition of Oxygen and removal of hydrogen to a substance take place is called oxidation.
ii. Food becomes rancid when fat and oils present in the food are oxidised.
iii. Rancidity can be prevented by packaging fat and oil-containing food in Nitrogen gas.
OR
Rancidity spoils those food materials that are prepared in the fats and oils which have been kept for a considerable time and make them unfit for eating.

29. a.
- Carbon compounds containing only carbon and hydrogen ore called hydrocarbons
Example: Alkane / Alkene / Alkyne / any other

b.

Saturated Hydrocarbons	Unsaturated Hydrocarbons
Consists of Only Single Bonds	Consists of Double and Triple bonds
 Ethane	 Ethene
 Propane	$H-C\equiv C-H$ Ethyne

c. i. $CH3 - OH$
Methanol / Methyl alcohol

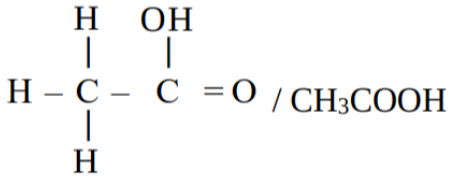
ii. 
Ethanal / Acetaldehyde

iii. $CH_3 - \underset{\underset{O}{\|}}{C} - CH_3$
Propanone / acetone

iv. $CH_3 - \overset{\overset{O}{\|}}{C} - OH$
Ethanoic Acid / Acetic acid

OR

i. A - Ethanoic acid;



ii. $CH_3\underset{'A'}{COOH} + C_2H_5OH \xrightarrow{aCld} CH_3\underset{'B'}{COOC_2H_5}$
Role of acid - As a catalyst

iii. By adding dil. NaOH to B (ester)/saponification/by adding water with acid or base/ on addition of NaOH , sodium salt of acid is produced which is further hydrolysed to form 'A'.

iv. By adding solution of alkaline potassium permanganate or acidified potassium dichromate in warm ethanol./

$$CH_3 - CH_2OH \xrightarrow[\text{Or acidified K }_2Cr_2O_7+\text{Heat}]{\text{Alkaline } KMnO_4+\text{Heat}} \underset{(A)}{CH_3COOH}$$

v. Carbon dioxide/CO_2

Section C

30.

(b) B and C
Explanation:
A ray of light passing from an optically denser medium to an optically rarer medium bends away from the normal, and a ray of light passing from an optically rarer medium to an optically denser medium bends toward the normal.

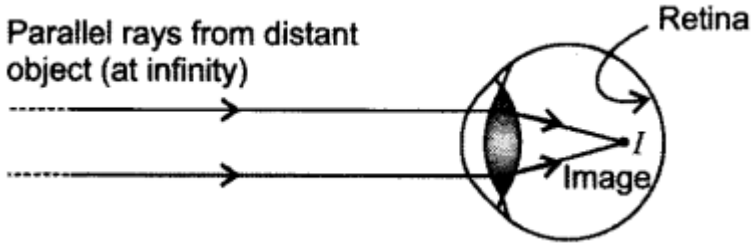
31.

(b) ∠r, ∠A and ∠D
Explanation:
∠r, ∠A and ∠D

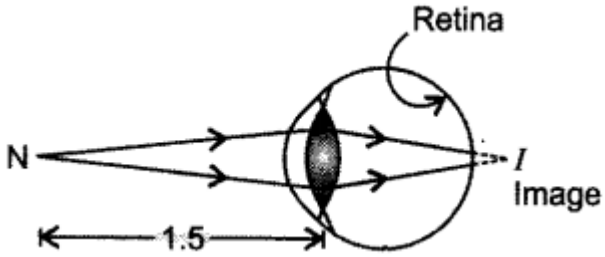
32. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
A force is always exerted due to magnetic field in the same way electric current flowing through any conductor produces magnetic field. And in this case, Fleming's left-hand rule is used to predict directions of the magnetic field, current and displacement.
So, assertion and reason both are true and reason is the correct explanation of assertion.

33. i. **When student is seated at the back seat:** Since a student at the back bench in a class is not able to see what is written on blackboard , Therefore, student is suffering from myopia eye defect. Myopia or Short-sightedness is caused due to

1. excessive curvature in cornea.
2. elongation of eyeball. Ray diagram is shown below.



ii. **When student is seated at front seat**: The ray diagram is shown below:



34. Work done to transfer Q coulomb of charge through potential difference Ω = VQ joule.

$\Omega = 50 \times 96,000$ = 48,00,000 J

$\Omega = 4.8 \times 10^6$K

Which is equal to heat generated.

OR

I=10 A, V=220 V

$R = \frac{V}{I}$

$= \frac{220}{10}$

$= 22\ \Omega$

35. a.

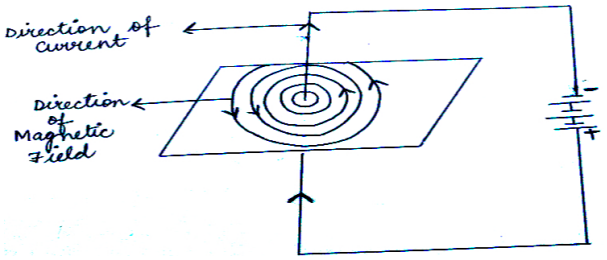


Diagram Labelling of direction of current and corresponding field lines

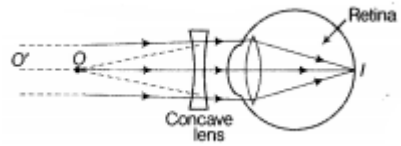
b. i. Fleming's Left Hand Rule

ii. Out of the plane of paper

36. i. Near sightedness (myopia) defect arises either because of :

(a) decrease in focal length of eye lens.(b) elongation of the eye ball

ii. To correct this defect of vision, he must use a concave lens of suitable focal length. The concave lens of suitable focal length will bring the image back to the retina as shown in the given figure.



iii. Given, v = -100 cm , u = ∞

Using lens formula,

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{-100} - \frac{1}{\infty} = \frac{1}{f}$

f = -100 cm = -1 m.

∴ Power of lens,

P = $\frac{1}{f(m)} = \frac{1}{-1}$ = -1D.

37. When the magnetic field and direction of electric current are in the same plane, there would be deflection in the compass. For maximum deflection, magnatic field and direction of current should be in mutually perpendicular plane. So, for no deflection, conductors should be kept parallel to the magnetic compass. For maximum deflection, it should be placed perpendicular to the compass.

38. a. $R_s = 4\Omega + 6\Omega + 16\Omega = 26\Omega$

    b. $\frac{1}{R_P} = \frac{1}{8\Omega} + \frac{1}{8\Omega} = \frac{1}{4}\Omega$

    $R_P = 4\Omega$

    c. Total resistance = $26\Omega + 4\Omega = 30\Omega$

    Potential difference = V = 6V

    Current $I = \frac{V}{R}$

    $\frac{6}{30} = \frac{1}{5}$ A or 0.2 A.

    OR

    16Ω

    Justification: According to Ohm's law when same current flows, the potential difference across a higher resistance is always higher.

    Potential difference across $16\Omega = V = IR = 0.2 \times 16 = 3.2$ V

    Potential difference across $8\Omega = V = IR_{(total)} = 0.2 \times 4 = 0.8$ V

39. Here u = - 10 cm (u is always negative), v = ?

    $f = \frac{r}{2} = \frac{+30}{2}$ *or* $f = +15cm$

    f and r for convex mirror are always positive.

    Using the formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ we have $\frac{1}{15} = \frac{1}{v} - \frac{1}{10}$ or

    $\frac{1}{v} = \frac{1}{15} + \frac{1}{10} = \frac{5}{30}v$

    v = +6 cm

    or ∴ Image is 6 cm behind the mirror (right or mirror).

    It is virtual and errect.

    Magnification $m = -\frac{v}{u} = \frac{-(+6)}{-10} = 0.6$

    Hence image is 0.6 times the size of the object.

    Again $m = \frac{h_2}{h_1}$ where h_2 is the size of the image and h_1 the size of the object.

    ∴ $h_2 = mh_1 = 0.6(5) = 3$ cm.

    Hence image is 3 cm. high.

    OR

    a. Four characteristics:

        i. Image is formed on the same side of the lens as the object.

        ii. The image is enlarged / magnified, virtual and erect.

    b. $h' = \frac{h}{3}$

    Focal length = -20cm

    As per the lens formula

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

    u = -40cm

    Hence, the distance of the object from the lens is 40cm.