Class X Session 2024-25
Subject - Science
Sample Question Paper - 12

Time: 3 Hours. **Total Marks: 80**

General Instructions:

i. *All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.*

ii. *Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.*

iii. *Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.*

iv. *Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.*

v. *Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.*

vi. *Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.*

SECTION - A

Select and write the most appropriate option out of the four options given for each of the questions 1-20. There is no negative mark for incorrect response.

1. Which of the options in the given table are correct. [1]

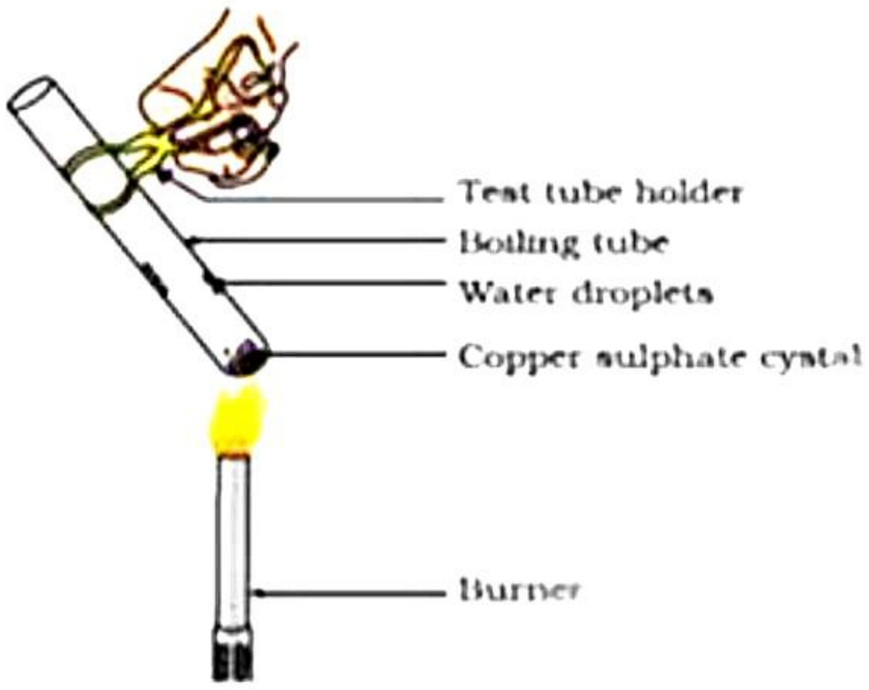
Option	Natural source	Acid Present
I	Orange	Oxalic acid
Ii	Sour milk	Lactic acid
Iii	Ant sting	Methanoic acid
Iv	Tamarind	Acetic acid

a) and (ii)
b) and (iv)
c) and (iii)
d) and (iv)

2. Metals like iron, copper, aluminium, and zinc are given to a student. The correct decreasing order of reactivity of these metals written by the student is: [1]

a) Zn > Fe > Al > Cu
b) Fe > Cu > Al > Zn
c) Al > Zn > Fe > Cu
d) Zn > Al > Fe > Cu

3. What happen when copper sulphate crystals are heated in a test tube: [1]



Statements:

i. It loses its water of crystallization.

ii. White coloured powder is formed.

Select the correct options for both statements.

a) Only (i) correct

b) Only (ii) correct

c) both (i) and (ii) correct

d) No Change

4. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ [1]

The above reaction is an example of:

a) Displacement reaction

b) Endothermic reaction

c) Exothermic reaction

d) Neutralisation reaction

5. Visualise the below reaction and predict 'X'. [1]

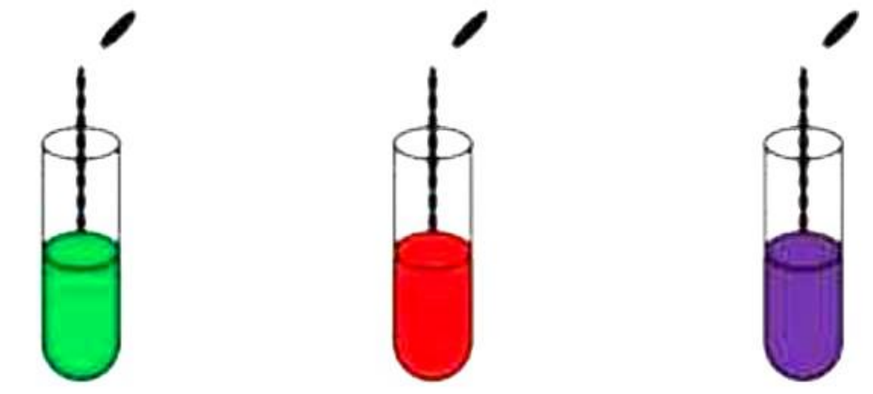
a) Acetic acid

b) Sodium hydroxide

c) Hydrochloric acid

d) Ethanol

6. On adding a few drops of universal indicator to three colourless solutions taken separately in three test tubes labeled P, Q, R respectively, the colours developed in the solutions are marked in the following figures. [1]



What is the correct decreasing order of pH values of the solutions?

a) P > Q > R
b) Q > P > R
c) R > Q > P
d) R > P > Q

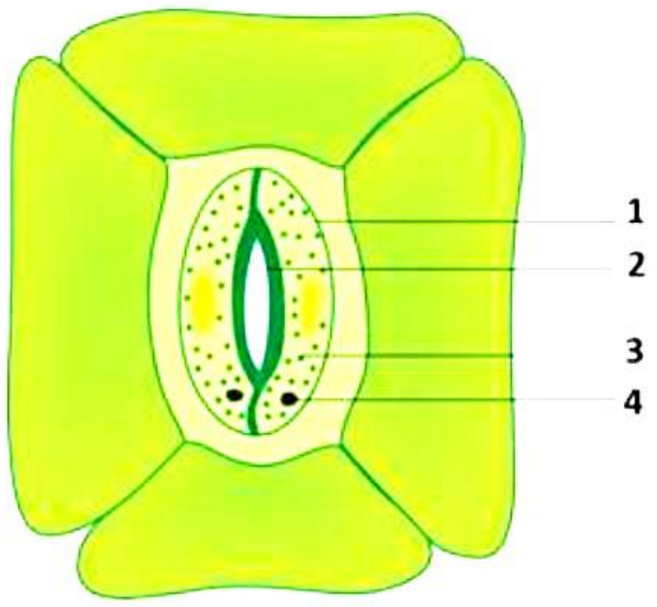
7. $2NaOH + CO_2 \rightarrow A + H_2O$ [1]

a) $NaHCO_2$
b) Na_2CO_3
c) H_2CO_3
d) $NaHCO_3$

8. What happens in chamber C of the heart in the given figure? [1]

a) Deoxygenated blood enters the heart and is supplied to body parts.
b) Oxygenated blood enters the heart and is supplied to body parts.
c) Oxygenated blood returns from the lungs and enters the aorta.
d) Deoxygenated blood returns from the lungs and enters the aorta.

9. Kriya draws the following sketch of the stomatal apparatus and labels its parts. The function of part 1 is [1]

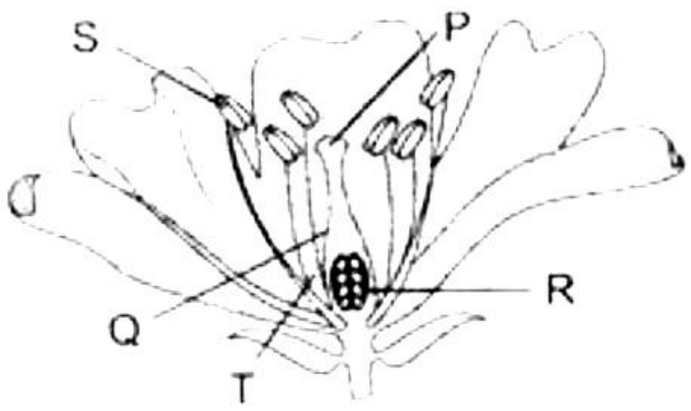


a) Opening and closing of stomata
b) Protection of inner cells
c) Exchange of gases
d) Exchange of water

10. Which of the following is NOT a direct conclusion to be drawn from Mendel's experiments? [1]

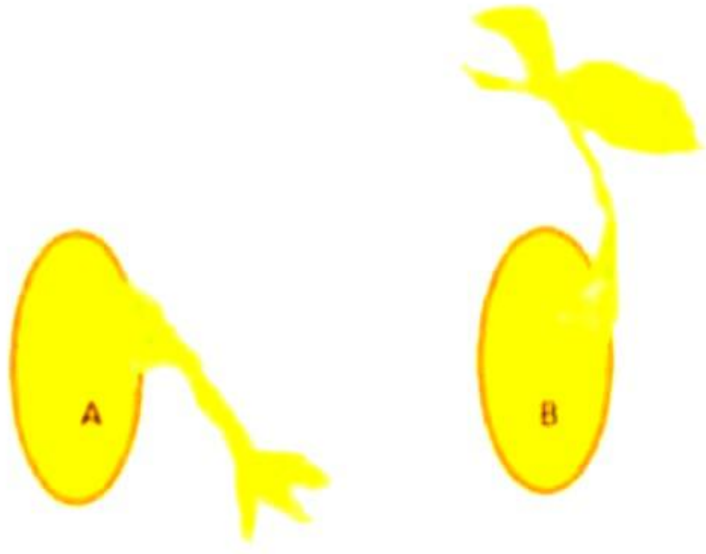
a) Only one parental trait is expressed.
b) Two copies of each trait are inherited in sexually reproducing organisms.
c) For recessive trait to be expressed, both copies should be identical.
d) Natural selection can alter the frequencies of an inherited trait.

11. Which of these labelled parts constitute the carpel of a flower? [1]



a) P and Q
b) S and T
c) P, Q and T
d) P, Q and R

12. How do movements in plants A and B differ from the movement of *Mimosa*? [1]



a) They are in response to stimuli.
b) They help the plant to adapt to the environment and adverse conditions.
c) They are important for growth and development.
d) All of the above

13. If a magnification of -1 is to be obtained using a convex lens of focal length 6 cm, then the object must be placed [1]

a) within 12 cm
b) at 6 cm
c) at 12 cm
d) beyond 12 cm

14. Which of the following factors does not affect the strength of an electromagnet? [1]

a) Increasing the number of turns in the coil.
b) Increasing the magnitude of the current in the coil.
c) Reversing the direction of current
d) Reducing the air gap between the poles of the magnet.

15. Given below are some food chains operating in an ecosystem.

Algae → Fish → Man
Grains → Chicken → Man
Grass → Goat → Man

With regard to various food chains, man is a: [1]

a) Producer
b) Consumer
c) Producer and consumer
d) Consumer and decomposer

16. Which of the following represents a group of biodegradable items? [1]

a) Polythene bags, old clothes, wilted flowers
b) Wilted flowers, pencil shavings, vegetable peels
c) Glass bangles, bronze statue, polythene bags
d) Pencil shavings, glass bangles, vegetable peels

Question No. 17 to 20 consists of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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

(b) Both A and R are true, and R is not the correct explanation of A

(c) A is true but R is false

(d) A is False but R is true

17. **Assertion**: The colour of copper sulphate solution changes when iron nail is kept immersed in it. [1]
Reason: A displacement reaction takes place between iron and copper leading to formation of iron sulphate.

18. **Assertion**: All sepals together constitute the corolla. [1]
Reason: The function of sepals is to protect the flower in the bud stage.

19. **Assertion**: Using jute bags while shopping is more environment friendly than using polythene bags. [1]
Reason: Jute is biodegradable while polythene is non-biodegradable.

20. **Assertion**: The blind spot is a small area of the retina insensitive to light.
Reason: At the junction of the optic nerve and the retina in the eye, there are many light-sensitive cells [1]

SECTION - B

Question No. 21 to 26 are very short answer questions.

21. How is plaster of Paris prepared from gypsum? For what purpose is it used in hospitals? [2]

22. Protozoans reproduce by binary fission as well as multiple fission. Give one example. Which process is better and why? Give your opinion.

23. Why are glomeruli considered as dialysis bags? [2]

OR

How would it affect the digestion of proteins and carbohydrates in the duodenum if the pancreatic duct is blocked?

24. Copy the figure below which shows a plotting compass and a magnet. Label the North pole of the magnet and draw the field line on which the compass lies. [2]

25. What is the focal length of a concave mirror if the radius of curvature is 12 cm? What is the nature of the image formed by a concave mirror when an object is placed between its focus and pole? [2]

OR

Where will the image form if the object is placed at the centre of curvature in front of concave mirror? Also state the nature of the image.

26. Mention four eco-friendly activities which you practice in your daily life. [2]

SECTION - C

Question No. 27 to 33 are short answer questions.

27. [3]

(a) Acids and bases ionize in water. Name the ions produced by each in water.

(b) If we have hydrochloric acid and acetic acid of equal concentration, then which will be a stronger acid? Give reason for the same.

(c) How will the concentration of hydrogen ions be affected if an acid is diluted? Name the concept used to determine the hydrogen ion concentration in solution.

28. Write three uses of each: [3]

(a) Bleaching powder

(b) Baking soda

OR

During a chemistry laboratory experiment, Nayana mixed manganese dioxide with hydrochloric acid. She observed the formation of manganese chloride, water, and chlorine gas. [3]

(a) Express the above reaction in the form of a balanced chemical equation.

(b) Identify with the reason the (i) reducing agent and the (ii) oxidising agent.

29. Transmission of nerve impulses between two neurons takes place through synapse. [3]

(a) What happens at the synapse between two neurons?

(b) Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?

30. A farmer crosses two heterozygous yellow seeded plants and obtains 100 plants in the F_1 generation. Work out the cross and find the number of green and yellow seeds respectively in the F_1 generation? [3]

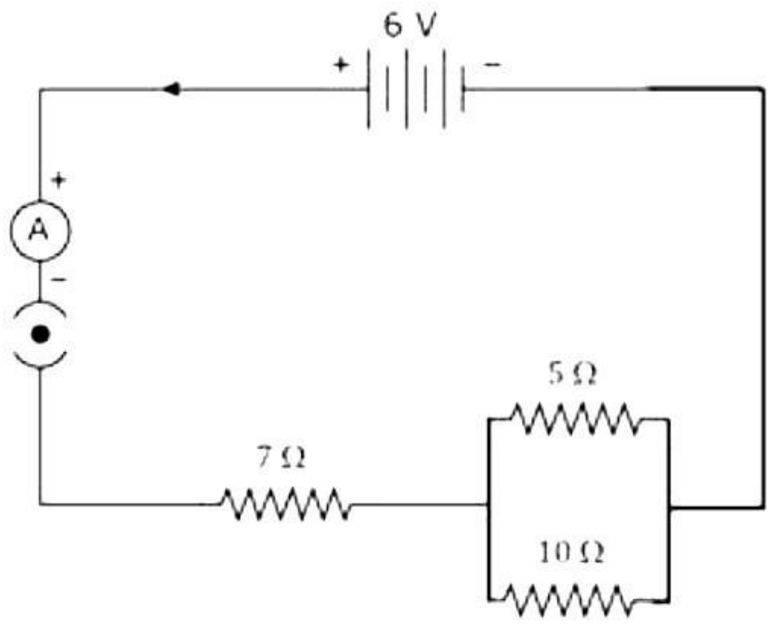
31.

(a) What type of lens should we use to get a diminished, virtual, and erect image?

(b) Explain the above case with the help of ray diagram.

(c) State the characteristics of images formed in case of convex mirror.

32. From the following electric circuit: [3]



Calculate:

(i) Resultant resistance and current

(ii) Heat energy evolved when the circuit is switched on for 30 minutes

33. An electric appliance of 1.5 kW power rating operates on a 220V main supply and has a current rating of 5 A. Is this fuse suitable for this electrical appliance? Explain.

SECTION - D

Question No. 34 to 36 are long answer questions.

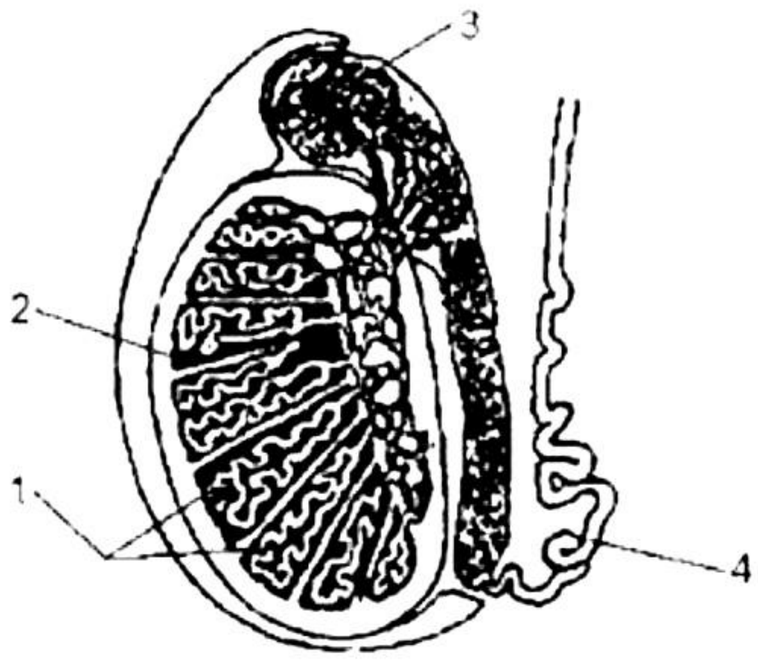
34. What are hydrocarbons? Distinguish alkanes from alkenes and each of them from alkynes giving one example of each. Also draw the structures of each compound cited as an example to justify your answer. [5]

OR

An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound. Compound A on treatment with an alcohol C in the presence of a little of concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$). Compound D on treatment with NaOH solution gives back B and C. Identify A, B, C and D and give the chemical reactions involved. [5]

35. [5]

(a) Given below is a diagram of the lateral section of the human testis. Study the same and answer the questions which follow:



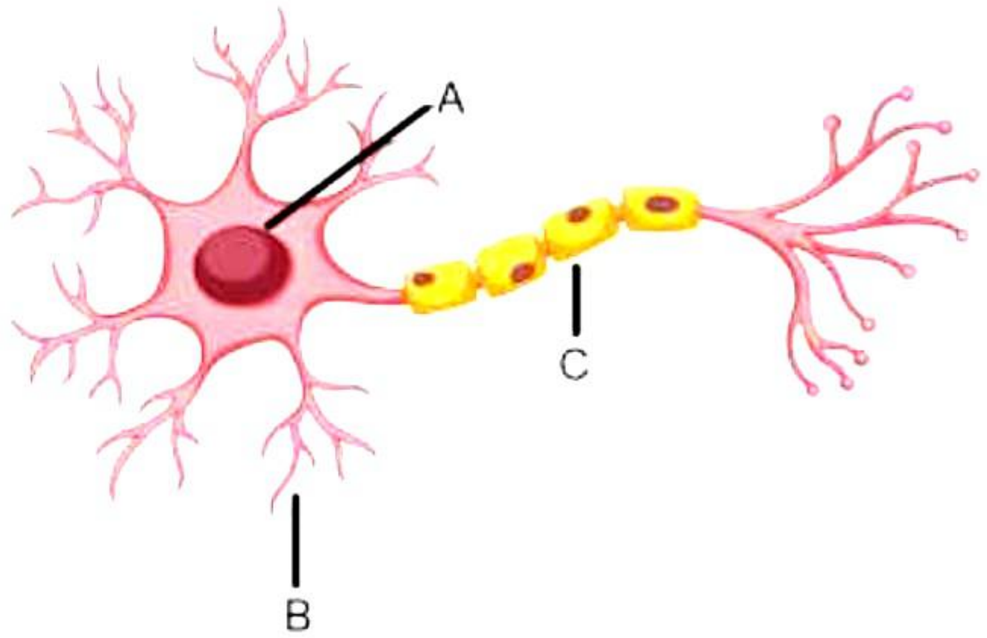
(i) State the functions of the parts labelled 2 and 3.

(ii) What is the significance of the testes being located in the scrotal sac outside the abdomen?

(b) A few tapioca plants remained in the farmland after harvest. Harvesting was done in summer. Then there was a summer rain. When these plants were harvested and the tubers eaten raw, they tasted sweet. Can you explain the reason for the sweet taste of the tubers?

OR

Given below is the structure of a neuron. A neuron helps in the conduction and transmission of nerve impulses.



(a) Name the parts labelled A, B and C.

(b) Which labelled part acquires information in the neuron?

(c) With reference to the given figure, how does information travel in a neuron?

(d) In what form does this information travel?

(e) Where is the impulse converted into a chemical signal for onward transmission?

36.

(a) State the rule to determine the direction of:

(i) Magnetic field produced around a straight conductor carrying current

(ii) Force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it

(iii) Current induced in a coil due to its rotation in a magnetic field

(b) Differentiate between AC and DC. Write one advantage of AC over DC. [5]

OR

Tanmay is studying his air conditioner's energy consumption. The refrigerator has a power consumption of 800 watts and is connected to a 220 V power supply.

(a) How much energy will the refrigerator consume if it is kept ON for 10 hours each day for a week? Express your answer in MJ.

(b) Tanmay replaced his Air conditioner during the Diwali sale; the new one has a power rating of half of its initial value. How much energy will the new Air conditioner consume if it is kept ON for the same time?

(c) Also, find the amount he saves if the charge of 1 unit of electricity is 4 rupees.

(1 unit = 3.6 MJ) [5]

SECTION - E

Question No. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.

37. A student took four metals P, Q, R and S and carried out different experiments to study the properties of metals. Some of the observations were:

- All metals could not be cut with knife except metal R.
- Metal P combined with oxygen to form an oxide M_2O_3 which reacted with both acids and bases.
- Reaction with water.

P - Did not react either with cold or hot water but reacted with steam

Q - Reacted with hot water and the metal started floating

R - Reacted violently with cold water.

S - Did not react with water at all

Based on the above observations answer the following: [5]

(a) Name the metal with example:

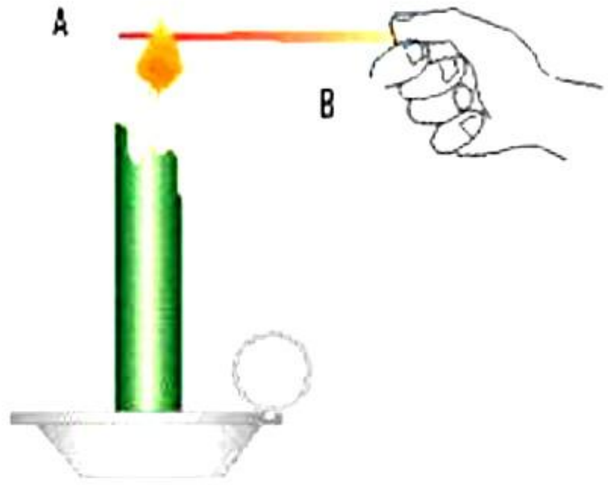
(i) Needs to be stored in kerosene.

(ii) React with hot water and floats on water.

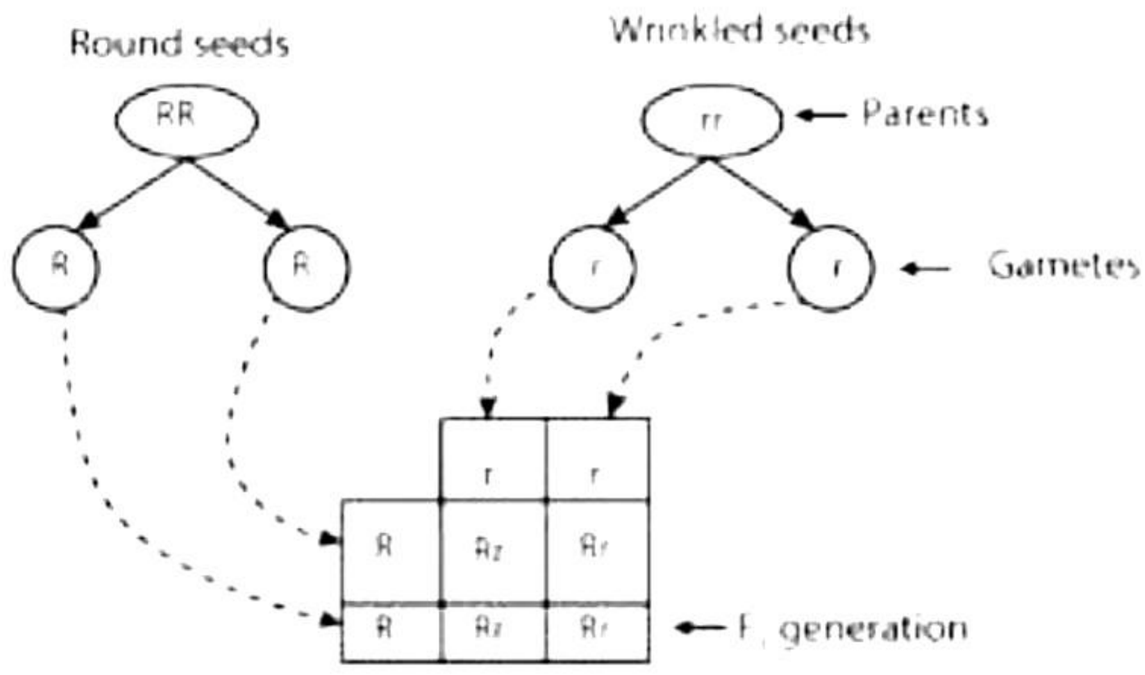
(b) Write the increasing order of the reactivity of the four metals. Which one of these metals can form amphoteric oxide? Give examples for the same.

OR

(c) Anisha heated an iron rod at an end A. What would have happened after some time? Which property of the iron rod does it indicate? Give two uses of iron based on this property.



38. Mendel crossed a homozygous pea plant having round seeds (RR) with a homozygous pea plant having wrinkled seeds (rr). He got different results. Based on it, answer the following questions: [4]



(a) Write the phenotype and the genotype of F_1 offspring.

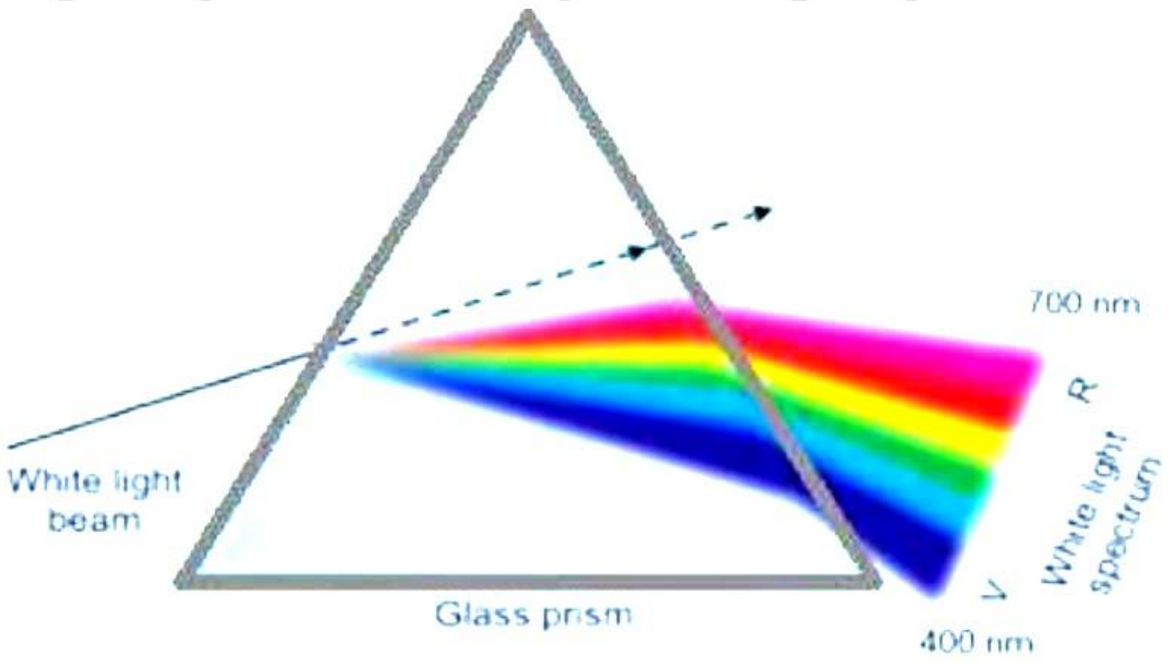
(b) Make a Punnett square for F_2 generation when two plants of F_1 offspring are crossed with each other.

(c) Mention and state the Mendel's law shown in the above cross.

OR

(c) Mention the common and scientific name of the plant used by Mendel for his experiments. Why did Mendel choose this plant? Give two reasons.

39. Light dispersion is the splitting of light into its component colours. When white light passes through a glass prism, it spreads out into the light spectrum, which is a band of various colours. The colours found in the spectrum of white light are violet, indigo, blue, green, yellow, orange, and red. The formation of a rainbow is an example of natural light dispersion. Raindrops act as a glass prism in this case, dispersing sunlight. [4]



(a) What is the color sequence in a pure spectrum?

(b) When we place a glass prism in the path of a narrow beam of white light a spectrum is obtained. What happens when a second identical prism is placed in an inverted position with respect to the first prism?

(c) Write a short note on dispersion of light. Also explain why white light is split into seven colour spectrum when passed through the glass prism.

OR

(c) Suggest an experiment to produce rainbow in your classroom and explain procedure?

Solution

SECTION - A

1. Correct option-c:(ii) and (iii).
Sour milk consist of lactic acid and ant sting has methanoic acid.

2. Correct option – c : Al > Zn > Fe > Cu
Al > Zn > Fe > Cu is the decreasing order of metals in reactivity series.

3. Correct option – c : both (i) and (ii) correct
When we heat copper sulphate crystals, their water of crystallization is removed, and the salt turns into white amorphous powder.

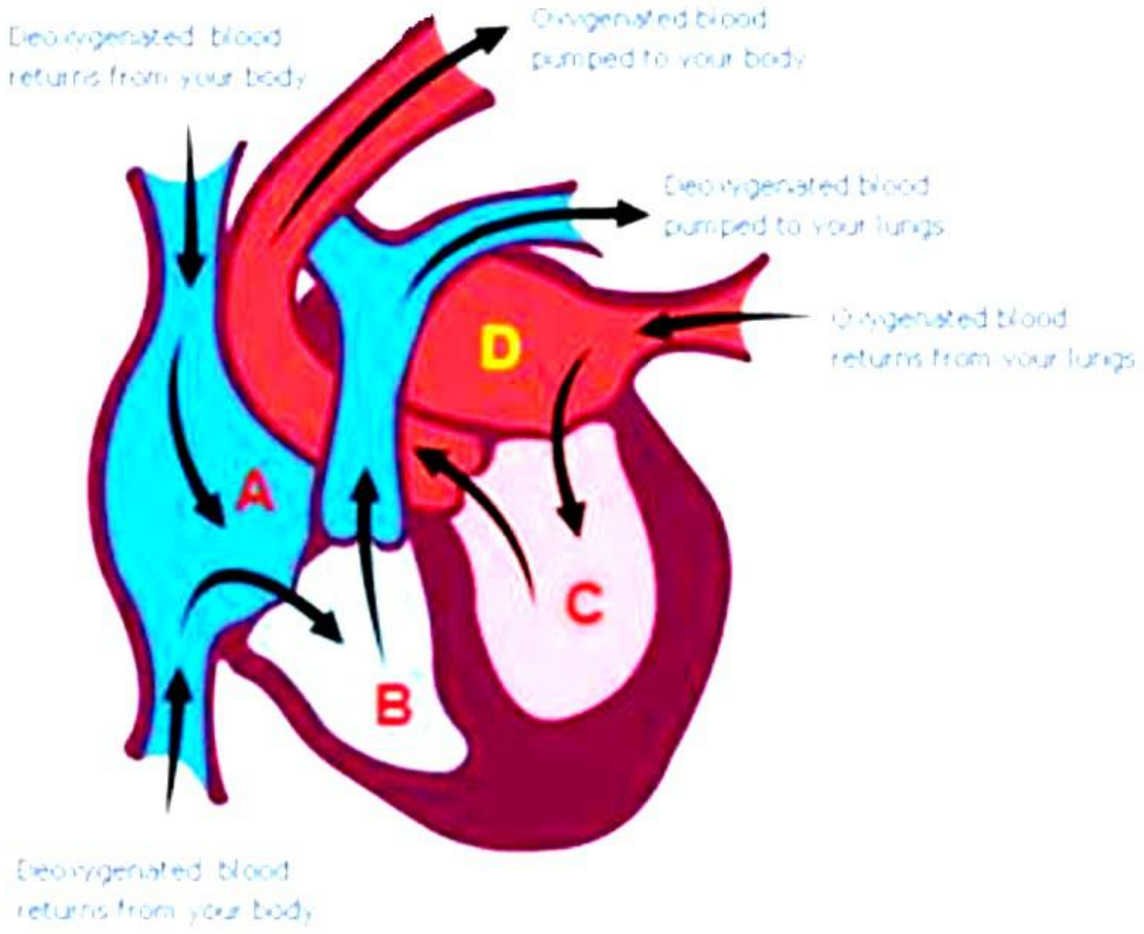
4. Correct answer- c: Exothermic reaction
During respiration, carbohydrates (glucose) combine with oxygen in the cell and energy is released hence it is considered an exothermic reaction.
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy

5. Correct answer- b: Sodium hydroxide.
Fat or oil + sodium hydroxide → Soap + Glycerol

6. Correct option – d: R > P > Q
R > P > Q
Red colour: pH range (0 - 2)
Green colour: pH range (5 - 8)
Violet colour: pH range (13 - 14)

7. Correct option – b: Na_2CO_3
Sodium hydroxide absorbs carbon dioxide from the air to form sodium carbonate.
$2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$

8. Correct option c. Oxygenated blood returns from the lungs and enters the aorta.
A – Right auricle, B – Right ventricle, C – Left ventricle, D –Left auricle



9. Correct option a. Opening and closing of stomata.
1 → Guard cells, 2 → Stomata, 3 → Chloroplast, 4 → Nucleus
The guard cells regulate the opening and closing of stomata.

10. Correct option – d : Natural selection can alter the frequencies of an inherited trait.
From Mendel's experiments and the laws, he formulated, it is clear that,

- In every organism, two copies of a gene, called alleles, control a single trait.
- When two parents, homozygous for a character, are crossed, in the F_1 generation only one parental character is observed and that is the dominant character.
- For a recessive character to appear, it has to be in a homozygous state e.g., tt (short plant) or rr (wrinkled seed).

The fourth statement, natural selection can alter the frequencies of an inherited character, is true with respect to theories of evolution but is not a direct conclusion of Mendel's experiments.

11. Correct option – d : P, Q and R
P- Stigma, Q – Style, R – Ovary, S – Anther, T – Filament
Stigma, style, and ovary constitute the carpel of a flower.

12. Correct option – d: All of the above
The plants A and B show movement in response to stimuli. These movements help the plant to adapt to the environment and adverse conditions. Such movements are called tropic movements. They are important for the growth and development of plants.

13. Correct option – c) at 12 cm
For magnification of -1, the object must be placed at $2F' = 2 \times 6 = 12$ cm

14. Correct option – c) Reversing the direction of current.
Reversing the direction of current does not affect the strength of an electromagnet.

15. Correct option – b) Consumer
Animals that feed upon plants or other animals are called consumers. Man cannot produce his own food. He obtains his food from plants or other animals. So, man is regarded as a consumer.

16. Correct option – b) Wilted flowers, pencil shavings, vegetable peels
Biodegradable items – Old clothes, wilted flowers, pencil shavings, vegetable peels
Non-biodegradable items - Polythene bags, glass bangles, bronze statue.

17. Correct option – a: Both A and R are true, and R is the correct explanation of A.
The colour of copper sulphate solution changes when iron nail is kept immersed in it due to the displacement reaction taking place between iron and copper leading to formation of iron sulphate.

18. A is false but R is true.
The sepals are collectively known as the calyx, and the petals are collectively known as the corolla. So, the assertion is false.
Sepals protect the flower when they are in the stage of bud and support the petals when in bloom. So, the reason is true.

19. Both A and R are true, and R is the correct explanation of A.
Jute bags can be used repeatedly for shopping and get decomposed when discarded. They are biodegradable. Polythene bags keep on accumulating as solid waste and harm our environment since they are non-biodegradable. Hence, using jute bags while shopping is more eco-friendly than using polythene bags. So, both assertion and reason are true and the reason correctly explains the assertion.

20. Correct option – c) A is true, but R is false.
At the junction of the optic nerve and retina, there are no light-sensitive cells due to which there is no image formation at the spot. This spot is called the blind spot.

SECTION – B

21.

Plaster of Paris is prepared by heating gypsum to a temperature of 100 °C in a kiln.

$$\underset{\text{Gypsum}}{CaSO_4.2H_2O} \xrightarrow{\text{Heat (100 C)}} \underset{\text{Plaster of paris}}{CaSO_4.\tfrac{1}{2}H_2O} + 1\tfrac{1}{2}H_2O$$

Plaster of Paris is used in hospitals for setting fractured bones in the right position to ensure correct healing.

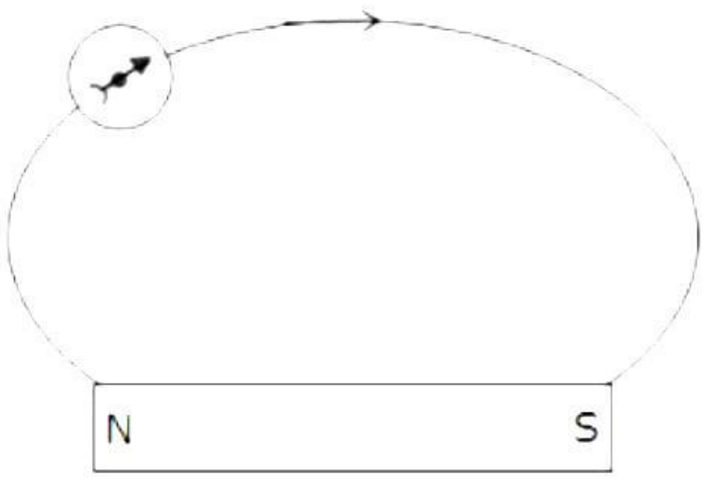
22. Multiple fission produces many new organisms at once, which can help a colony grow quickly. It can help protozoa deal with unfavorable conditions. Multiple fission can lead to a higher production rate, which can improve the protozoa's chances of survival. Hence, multiple fission is generally considered better than binary fission for protozoans.

23. Glomeruli are considered dialysis bags because they filter blood in a similar way to a dialysis machine. Like a dialysis bag, the main function performed by glomeruli is filtration. They filter small molecules containing glucose, salts, urea, and liquid serum. The large molecules such as proteins remain in blood. That is why glomeruli are considered as dialysis bags.

OR

Pancreatic juice secreted by the pancreas enters the duodenum through the pancreatic duct. The juice contains a variety of enzymes, including trypsinogen, chymotrypsinogen, elastase, carboxypeptidase, pancreatic lipase, nucleases, and amylase. The enzymes pancreatic amylase and trypsin help in the digestion of carbohydrates and proteins respectively. Therefore, if there is a blockage in the pancreatic duct, the pancreatic juice will not enter the duodenum. Hence, digestion of proteins and carbohydrates in the duodenum will not occur.

24.



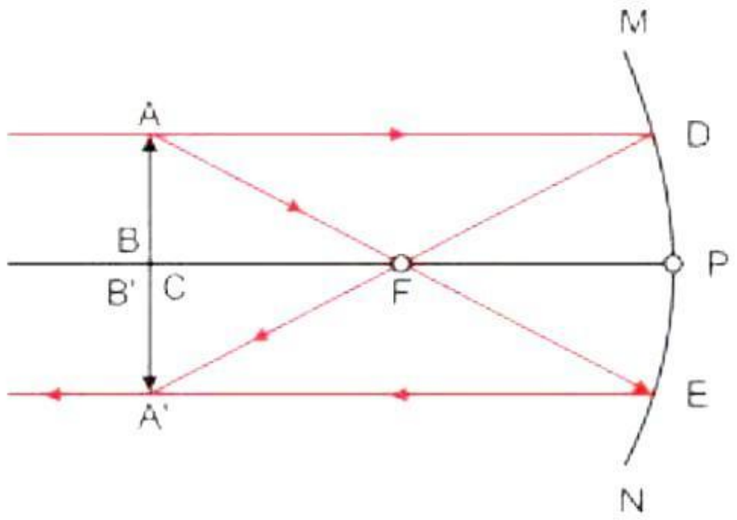
As the north pole of the magnetic needle is pointing in the opposite direction, so the nearer end of the magnet will be North Pole.

25. R = –12 cm (Radius of curvature of a concave mirror)

We know, f = R/2 = – 12/2 = – 6 cm.

The image formed by a concave mirror when an object is placed between the focus and pole is virtual, erect and magnified.

OR



The image forms at the centre of curvature itself. The image is real, inverted and of the same size as the object.

26. <u>Eco-friendly activities in daily life:</u> *(Any four)*

- Separation of dry wastes and wet wastes
- Use of water used for cooking and washing for gardening
- Use of gunny bags/paper bags in place of polythene/plastic bags
- Use of compost and vermicompost in place of chemical fertilisers
- Rainwater harvesting

SECTION - C

27.

(a) Acids ionise in water to produce positively charged hydrogen ions (H^+).
Bases ionise in water to produce negatively charged hydroxide ions (OH^-).

(b) Hydrochloric acid will be a stronger acid than acetic acid because it completely ionises in water to produce a large amount of hydrogen ions. On the other hand, acetic acid partially ionises in water to produce only a small amount of hydrogen ions.

(c) The concentration of hydrogen ions decreases if an acid is diluted by adding more and more water to it.
The concept used to determine the hydrogen ions concentration in solution is 'pH'.

28.

(a) Uses of bleaching powder:
- (i) For bleaching cotton and linen in the textile industry and for bleaching wood pulp in the paper industry
- (ii) Used as an oxidising agent in many chemical industries
- (iii) Used in the manufacture of chloroform

(b) Uses of baking soda:
- (i) Used as an antacid to alleviate stomach acidity. It is weakly basic and hence can neutralise excess acid in the stomach.
- (ii) Used in making baking powder which is used in making cakes and breads.
- (iii) On heating or mixing baking powder with water, carbon dioxide is evolved which causes breads and cakes to rise, making them soft and spongy.
- (iv) Used in soda-acid fire extinguishers.

OR

(a) The balanced chemical equation is:

$$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$$

(b) (i) Reducing agent: HCl, as it loses electrons and produces chlorine gas (Cl_2).
(ii) Oxidising agent: MnO_2, as it gains electrons and is reduced to manganese chloride ($MnCl_2$).

29.

(a) At the synapse, the electrical signals are converted into chemicals that easily cross the gap and pass on to the next neuron where they again get converted into electrical signals.

(b) Electrical impulse travels through a neuron. But to be transmitted to another neuron, it needs to pass in the form of neurotransmitters. Neurotransmitters are specialized chemicals which can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axons. Neurotransmitters are only produced at the axonal end and can enter a dendrite. Due to this, the flow of signals in a synapse is from the axonal end of one neuron to the dendritic end of another neuron but not the reverse.

30. With respect to seed colour, yellow seed colour (YY) is dominant while green seed colour (yy) is recessive.

Heterozygous yellow seeded plants = Yy

Parents – Yy × Yy

Gametes – Y, y and Y, y

	Y	**y**
Y	YY	Yy
y	Yy	yy

F_1 generation – YY, Yy, Yy and yy

In the F_1 generation, three types of plants are obtained – YY (yellow seeds), Yy (yellow seeds) and yy (green seeds)

Genotypic ratio – 1 : 2 : 1

Phenotypic ratio – 3 (yellow seeds) : 1 (green seeds)

If 100 plants are obtained in the F_1 generation, then according to the phenotypic ratio, 75 plants would bear yellow seeds and 25 plants would bear green seeds.

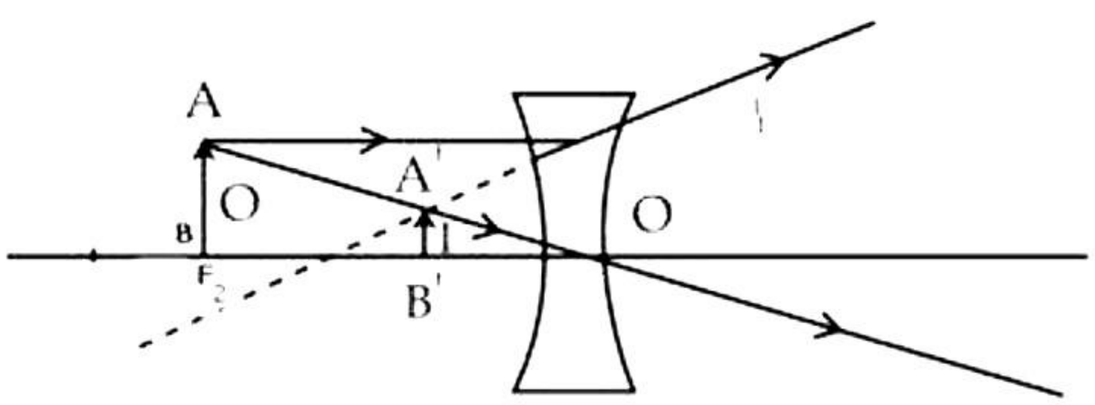
Yellow seeds = 75

Green seeds = 25

31.

(a) We must use concave lens since the image is virtual, erect, diminished.

(b)



(c) The nature of image formed by the convex mirror is virtual, erect and diminished irrespective of the position of the object.

32. For the given circuit,

(i) Resultant resistance is

$$R_{eq} = 7 + 5 || 10$$

$$\therefore R_{eq} = 7 + \frac{10 \times 5}{10 + 5} = 7 + \frac{50}{15}$$

$$\therefore R_{eq} = \frac{105 + 50}{15} = \frac{155}{15} = 10.33\ \Omega$$

Total current is

$$I = \frac{V}{R_{eq}}$$

$$\therefore I = \frac{6}{10.33} = 0.58\ A$$

(ii) Heat energy evolved in this circuit if it is switched on for 30 min.

By Joule's law of heating,

$$H = I^2Rt$$

$$H = 0.58^2 \times 10.33 \text{ x } (30 \times 60)$$

$$H = 0.3364 \times 10.33 \times 1800$$

$$H = 6255\ J/s$$

33. Power, P = 1.5 kW = 1500 W

V = 220 V

Current drawn, P = V × I

$$I = P/V$$

$$I = \frac{1500}{220}$$

$$I = 6.81\ A$$

Current drawn, I ≈ 7 A

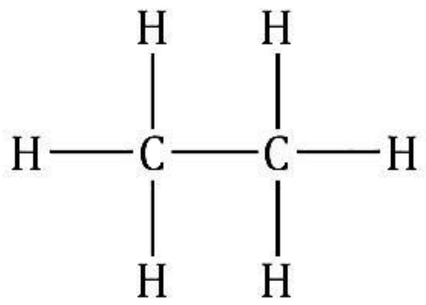
The current drawn by the electrical appliance is 7 A which is beyond the fuse rating capacity in the circuit. Hence, when a very high current of 7 A flows through the 5 A fuse, it will melt and break the circuit. Hence, the fuse wire of 5 A rating would not be suitable for this electrical appliance.

SECTION - D

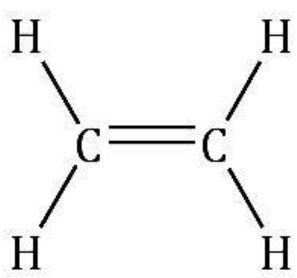
34. Distinguishing factors between alkanes, alkenes and alkynes are as follows:

Alkanes	Alkenes	Alkynes
Alkanes are hydrocarbons in which all the linkages between the carbon atoms are single covalent bonds.	Alkenes are unsaturated aliphatic hydrocarbons, which contain one double bond.	Alkynes are unsaturated aliphatic hydrocarbons, which contain one triple bond.
Alkanes are saturated hydrocarbons with the general formula C_nH_{2n+2}.	Alkenes are unsaturated hydrocarbons with the general formula C_nH_{2n}.	Alkynes are unsaturated hydrocarbons with the general formula C_nH_{2n-2}.
They are less reactive because of the non-availability of electrons in the single covalent bond.	Alkenes are more reactive than alkanes and alkynes because of the presence of a double bond.	Alkynes are more reactive than alkanes because of a triple bond.
They undergo substitution reactions.	They undergo addition reaction.	They undergo addition reaction.
Example: Ethane	Example: Ethene	Example: Ethyne

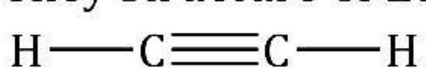
The structure of Ethane is:



The structure of Ethene is:



They structure of Ethyne is:



OR

An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound.

A is ethanoic acid, CH_3COOH.
B is sodium ethanoate, CH_3COONa

$$2CH_3COOH + 2Na \longrightarrow 2CH_3COONa + H_2 \uparrow$$
$$A(C_2H_4O_2) \qquad\qquad B$$

Compound A (ethanoic acid) on treatment with an alcohol C in the presence of a little concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$).

C is methanol, CH_3OH
D is methyl ethanoate, CH_3COOCH_3

$$CH_3COOH + CH_3OH \longrightarrow CH_3COOCH_3 + H_2O$$
$$A \qquad C \qquad D(C_3H_6O_2)$$

Compound D (methyl ethanoate) on treatment with NaOH solution gives back B (sodium ethanoate) and C (methanol).

$$CH_3COOCH_3 + NaOH \longrightarrow CH_3COONa + CH_3OH$$
$$D \qquad\qquad B \qquad C$$

35.

(a)

(i) (Part 2) <u>Seminiferous tubules:</u> Produce sperms by the process of spermatogenesis.
(Part 3) <u>Epididymis:</u> Stores sperms for some days during which they mature and become motile.

(ii) The production and survival of sperms require a temperature which is lower than the normal body temperature. So, the testes are located in the scrotal sac which is outside the abdomen to maintain a temperature 3°C below the normal body temperature.

(b) Before the rains, the tubers contained starch. When it rained, the plants started growing again producing new foliage. So, the plant converted the starch in the tuber to sugar, a water-soluble form, in order to be transported. This sugar made the tuber sweet.

OR

(a) A – Cyton
B – Dendrites
C - Axon

(b) Part B (dendrites) acquire information in the neuron.

(c) Information travels in a neuron from Part B (dendrites) to Part A (cyton) to Part C (axon).
(d) Information travels in a neuron in the form of electrical impulses.
(e) The impulse is converted into a chemical signal for onward transmission at the synapse.

36.

(a)

(i) Right-hand thumb rule: If one holds a wire carrying current in the right hand in such a way that the thumb indicates the direction of current, then the folded fingers indicate the direction of the magnetic field surrounding the wire.

(ii) Fleming's left-hand rule: If we stretch the first three fingers of the left hand mutually perpendicular to each other such that the forefinger points along the direction of the magnetic field and the middle finger points along the direction of the current, then the thumb indicates the direction of the force experienced by the conductor.

(iii) Fleming's right-hand rule: If the forefinger, middle finger, and thumb of the right hand are stretched at right angles to each other, with the forefinger in the direction of the field and the thumb in the direction of the motion of the wire, then the induced current in the wire is in the direction of the middle finger.

(b) The direction of AC changes after equal intervals of time. The direction of DC does not change. Advantage of AC over DC is that AC can be transmitted over long distances without much loss of energy.

OR

(a) Given that,

Potential difference, V = 220 V

Electric power, P = 800W

Time for which it is kept ON, t =60 × 60 × 10×7

Therefore,

Energy consumed by Air conditioner, E = P × t

E = 800 × 3600 × 70

E = 201,600,000 J or 201.6 MJ

(b) Given that,

New power rating, P’ = 800/2 = 400 W

Time, t = 60 × 60 × 10 × 7

Now,

Energy consumed, E = P’ × t = 400× 3600× 70

E = 100.8 × 106 -J = 100.8 MJ

Alternate method:

Since the power rating is halved, the new power rating can be determined by finding the ratio of initial and final energy consumption since the time period is constant.

i.e., P’ = ½ × P

$$\frac{E}{E} = \frac{P \times t}{P \times t}$$

$$\therefore E = 201.6 \times \frac{1}{2} = 100.8 \text{ MJ}$$

(c) Difference in energy consumption, $\Delta E = E - E' = 100.8$ MJ

Thus, Total unit of power consumed = 100.8/3.6 = 28 Units.

Net saving = 28 × 4 = 112 rupees

SECTION - E

37.

(a)

(i) R needs to be kept in kerosene as it reacts violently with water. Example: Sodium metal.

(ii) Metal Q and example of metal which can be represented by Q is magnesium since Mg starts floating due to the bubbles of hydrogen gas sticking to its surface. As the Bubbles move up it pulls Mg with it.

(b) The increasing order of reactivity series is: S < P < Q < R, as according to reactivity series: R > Q > P > S

P= Al, Q=Mg, R=Na or K, S=Cu/Ag/Au/Pt

The metal which can form amphoteric oxide is P. Al forms Al_2O_3. Al is amphoteric in nature since it reacts with both acid and base. Hence, P=Al (Aluminium).

OR

(c) Anisha would have felt the heat at end B.

This is because iron is a good conductor of heat.

Uses of iron based on this property:

A. Iron is used to make cooking utensils.

B. In iron machine or *Istri* to press clothes.

38.

(a) The F_1 offspring are round seeds (phenotype) with a genotype as Rr.

(b) F_1 generation: Rr (round) and Rr (round)

Gametes: R, r, R, r

F_2 generation: Rr × Rr

	R	r
R	RR (Round seeds)	Rr (Round seeds)
r	Rr (Round seeds)	rr (Wrinkled seeds)

(c) The above cross involves law of dominance.

Law of Dominance - Out of a pair of contrasting characters present together, only one can express itself while the other remains suppressed. The one that expresses is the dominant character and the one unexpressed is the recessive. The recessive character can be expressed only when the pair consists of both recessives (homozygous recessive).

OR

Mendel used pea plants for his experiments.

- Common name – Garden pea
- Scientific name – *Pisum sativum*

<u>Mendel selected pea plant for his hybridisation studies because:</u>

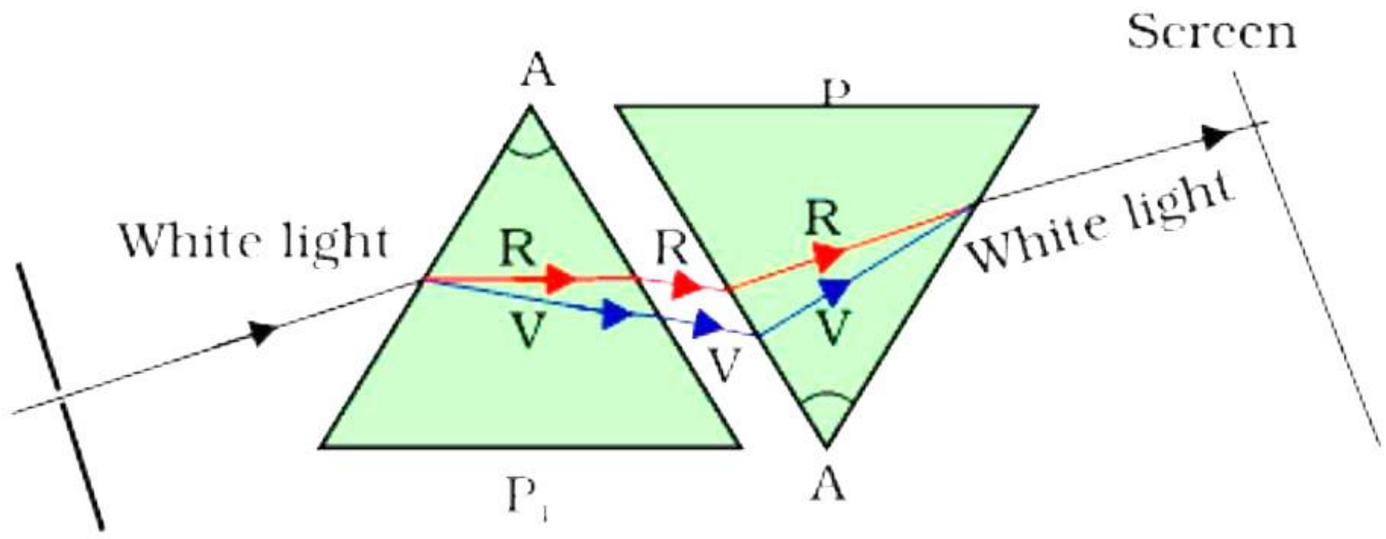
(i) Many varieties were available in alternative forms of a character.

(ii) The life span of a pea plant is short, and many generations can be obtained and studied in less time.

39.

(a) The color sequence is Violet, Indigo, Blue, Green, Yellow, Orange, and Red i.e., VIBGYOR.

(b) When the second identical prism is placed in an inverted position with respect to the first prism recombination of the spectrum of white light takes place.



(c) The phenomenon of splitting light into its component colours is called dispersion of light. When white light passes through a glass prism, it spreads out into a band of different colours called the spectrum of light. The colours in the spectrum of white light are violet, indigo, blue, green, yellow, orange and red. Formation of a rainbow is an example of dispersion of light in nature. In this case, raindrops act as a glass prism, and you get dispersion of sunlight. Dispersion takes place because the refractive index of material such as glass or water, is different for different colours. It is maximum for violet colour and minimum for red colour. Hence through prism violet light is deviated the most and red light is deviated the least. The other colours lie in between.

OR

(d) Select a white colored wall on which the sun rays fall. Stand in front of a wall such a way that the sun rays fall on your back. Hold a tube through which water is flowing. Place your finger in the tube to obstruct the flow of water. Water comes out through the small gaps between the tube and your finger like a fountain. While you are showering the water, you can see the colours of rainbow on the wall. The beautiful colours of rainbow are due to dispersion of the sunlight by millions of tiny water droplets.