Class X Session 2025-26
Subject - Science
Sample Question Paper - 01

**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. Study the given experimental set-up.   **[1]**
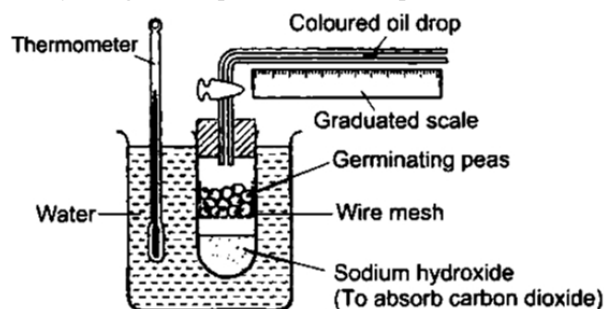
   By measuring the movement of the oil drop in the apparatus, what can be investigated?

   a) Carbon dioxide is released during germination

   b) Water is produced during germination

   c) Heat is released during germination

   d) Oxygen is used during germination

2. How are the two strands in a DNA molecule held together?   **[1]**

   a) Phosphate band

   b) Ionic bond

   c) Covalent bond

   d) Hydrogen bond

3. What will happen if deer is missing in the given food chain? Grass → Deer → Tiger.   **[1]**

   a) The population of grass will decrease.

   b) Tiger will start eating grass.

   c) The population of tiger will decreases and the population of grass will increase.

   d) The population of tiger will increase.

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. Flow of energy in an ecosystem is always**:**   **[1]**

   a) No specific direction   b) Multidirectional

   c) Bidirectional   d) Unidirectional

6. Which of the following statement(s) is (are) correct?   **[1]**

   i. Pyruvate can be converted into ethanol and carbon dioxide by yeast

   ii. Fermentation takes place in aerobic bacteria

   iii. Fermentation takes place in mitochondria

   iv. Fermentation is a form of anaerobic respiration

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

   c) (i) and (iii)   d) (i) and (iv)

7. Which neuron carries impulses from receptor to brain?   **[1]**

   a) Motor neuron   b) Sensory neuron

   c) Both Sensory neuron and Motor neuron d) Neither Sensory neuron and Motor neuron

8. **Assertion (A) :** Non flowering plants cannot reproduce sexually.   **[1]**
   Reason (R) : Flower is only reproductive part of the plant that can produce gametes.

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

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

9. **Assertion (A):** A food chain can have maximum of three trophic levels.   **[1]**
   Reason (R): Energy available at each trophic level keeps on decreasing as we move higher up the food chain.

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

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

10.   i. Write one difference between asexual and sexual modes of reproduction.   **[2]**
   ii. Which species is likely to have better chances of survival, the one reproducing asexually or the one
       reproducing sexually? Justify your answer.

11. What would happen, if all the microorganisms are removed from the environment?   **[2]**

                                    OR

   a. State one important function of ozone layer at the higher level in the atmosphere.

   b. How is ozone formed?

   c. It has been observed that ozone layer is getting depleted. Name the compound responsible for ozone depletion.

12. How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light?   **[2]**

13. A red-eyed individual is crossed with a white-eyed individual to produce F_1 progeny with red eyes. When F_1 **[3]**

   individuals are intercrossed, F_2 progeny is formed with both red as well as white-eyed individuals.

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. "If there were no algae there would be no fish in the sea." Comment. **[3]**

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

A purebred pea plant with smooth seeds (dominated characteristic) was crossed with a purebred pea plant with wrinkled seeds (recessive characteristic). The F_1 generation was self-pollinated to give rise to the F_2 generation.

i. What will be the genotypic ratio of the given F_2 generation? (1)

ii. What is the expected observation of the F_2 generation of plants? (1)

iii. If a genotype consists of different types of alleles, what is it called? (2)

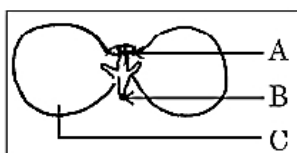**OR**

What is the alternative form of the gene? (2)

16. a. Name the two types of pollination and differentiate between them. **[5]**

b. Explain the post fertilization changes that occur in the ovary of a flower.

c. Given below is a diagram of a germinating seed. Label the parts that

i. gives rise to future shoot.

ii. gives rise to future root system.

iii. stores food.

OR

a. Why is the use of iodised salt advisable? Name the disease caused due to deficiency of iodine in our diet and state its one symptom.

b. How do nerve impulses travel in the body? Explain.

Section B

17. Which of the given statement is true about Sodium carbonate: **[1]**

A. It is a transparent crystalline white solid

B. It has the chemical formula $Na_2CO_3.10H_2O$

C. It gives acidic solution when dissolved in water

D. It is prepared by reacting with chlorine

a) C and D
b) A and C

c) A and B
d) All of these

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

Statement A: Oxyacetylene flame is used for welding purposes.

Statement B: Ethyne reacts with HCl in the presence of $HgCl_2$ to form vinyl chloride.

a) Neither statement A nor statement B is true.
b) Both the statements A and B are true.

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

19. What happens when ammonia reacts with hydrogen chloride? $NH_3 + HCl \rightarrow$? **[1]**

    a) Both H_2 and NH_4Cl b) Cl_2 gas is evolved.

    c) H_2 gas is evolved   d) NH_4Cl is formed

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

Column A	Column B
(i) Addition reaction	(a) Hydrogenation
(ii) Substitution reaction	(b) Methanol
(iii) Denaturation	(c) Carbon tetrachloride
(iv) Esterification	(d) Ethyl ethanoate

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

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

21. Aqueous solutions of zinc sulphate and iron sulphate were taken in test tubes I and II by four students A, B, C and D. Metal pieces of iron and zinc were dropped in the two solutions and observations made after several hours were recorded in the form of table as given below: **[1]**

Student	Metal	Solution	Colour change of solution	Deposit/Coating obtained
A	Fe	$ZnSO_4$	Turned green	Silvery grey coating
	Zn	$FeSO_4$	No change	No change
B	Fe	$ZnSO_4$	No change	Black deposit
	Zn	$FeSO_4$	Colour faded	Grey coating
C	Fe	$ZnSO_4$	No change	No change
	Zn	$FeSO_4$	Turned colourless	Black deposit
D	Fe	$ZnSO_4$	No change	Grey deposit
	Zn	$FeSO_4$	No change	Black deposit

The correct reporting has been made in observations:

    a) Student B   b) Student A

    c) Student C   d) Student D

22. A hydrocarbon with molecular formula C_4H_{10} has: **[1]**

    a) 10 covalent bonds   b) 7 covalent bonds

    c) 6 covalent bonds   d) 13 covalent bonds

23. Washing soda is a **[1]**

    a) neutralized salt   b) acidic salt

    c) basic salt   d) amphoteric salt

24. **Assertion (A):** Tap water conducts electricity but distill water does not conducts electricity. **[1]**

Reason (R): Tap water conducts electricity as it contains ions whereas distilled water does not contain ions.

    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 **[2]** sulphate (ii) Aluminium chloride?

26. i. Why are the chips packets puffed when we buy them from market? **[3]**

 ii. Paint is applied on articles made up of iron, why?

<div align="center">OR</div>

What happens when dilute hydrochloric acid is added to iron filings?

27. A zinc plate was kept in a glass container having copper sulphate solution. On examining it was found that the **[3]** blue colour of the solution is fading slowly. After a few days when the zinc plate was taken out of the solution, a number of small holes were noticed in it. State the reason and give chemical equation of the reaction involved.

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

Redox reactions are those reactions in which oxidation and reduction occur simultaneously. A redox reaction is made up of two half reactions. In the first half reaction, oxidation takes place and in second half reaction, reduction occurs. Oxidation is a process in which a substance loses electrons and in reduction, a substance gains electrons. The substance which gains electrons is reduced and acts as an oxidising agent. On the other hand, a substance which loses electrons is oxidised and acts as a reducing agent.

 i. Illustrate where oxidation and reduction occurs together with an example? (1)

 ii. What do you mean by oxidising agent and reducing agent? (1)

 iii. For the given reaction, identify the oxidation and reduction parts. (2)

   $ZnO + CO \longrightarrow Zn + CO_2$

   OR

   In the following reaction, which substance is reduced? (2)

   $PbS + 4H_2O_2 \longrightarrow PbSO_4 + 4H_2O$
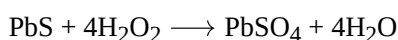
29. What is the difference between soaps and detergents? State in brief the cleansing action of soaps in removing an **[5]** oily spot from a fabric. Why are soaps not very effective when a fabric is washed in hard water? How is this problem resolved?

<div align="center">OR</div>

Name the following compounds.

1.
$$H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - OH$$

2.
$$H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{O}{\|}}{C} - OH$$

3.
$$H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - Cl$$

4.
$$H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - OH$$

5.
$$H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - C \equiv CH$$

6.
$$H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{}{}}{\underset{\underset{O}{\|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - H$$
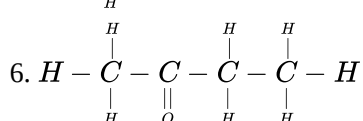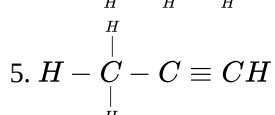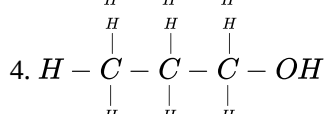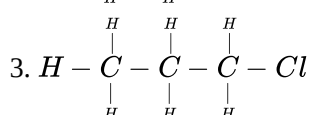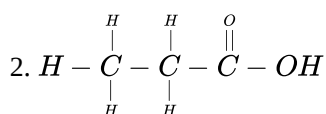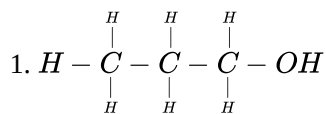
Section C

30. Which of the following statements is true? **[1]**

    a) A concave lens has 4 dioptre power having a focal length 0.25 m

    b) A concave lens has-8 dioptre power having a focal length of 0.25 m

    c) A convex lens has –4 dioptre power having a focal length 0.25 m

    d) A convex lens has 4 dioptre power having a focal length 0.25 m

31. In the following diagram showing dispersion of white light by a glass prism, the colours **P** and **Q** respectively are- **[1]**
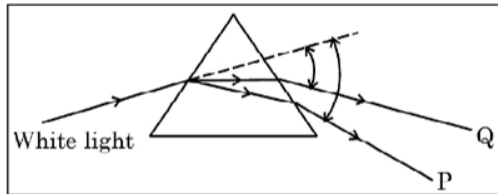
    a) Violet and Red

    b) Orange and Green

    c) Red and Blue

    d) Red and Violet

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

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

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

    c) A is true but R is false.

    d) A is false but R is true.

33. Name the factors on which brightness of image in a camera depends and how? **[2]**

34. A potential difference of 220 V is applied across a resistance of 440 Ω in an electric ion. **[2]**
    (i) Find the current.
    (ii) Heat energy produced is 30s.

    OR

    Calculate the cost of seeing 2 movies on colour T.V. daily for the month of September.

    Given wattage of colour T.V. = 60 W, duration each movie is 2 hours 30 min and 1kWh costs Rs. 4

35. A current-carrying wire produces a magnetic field around it. The phenomena in which an electromotive force and current (if the conductor is in the form of a closed circuit) is induced by changing magnetic field (or by passing magnetic field lines) through it is called electromagnetic induction. **[3]**
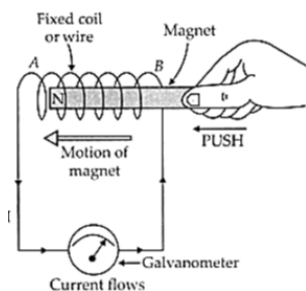
    i. What is the condition of electromagnetic induction?

    ii. An induced emf is produced when a magnet is plunged into a coil. The magnitude of induced emf does not depend?

36. A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram. **[3]**
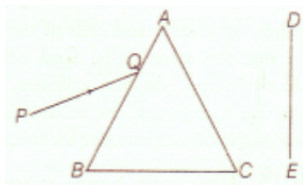
Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE.

  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.   i. A current through a horizontal power line flows in the east to west direction. What is the direction of the **[3]** magnetic field at a point directly below it and at a point directly above it?

  ii. List two methods of producing magnetic fields.

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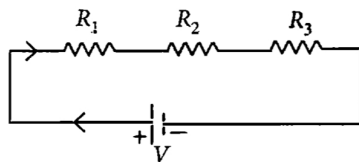
The two or more resistances are said to be connected in series if the current flowing through each resistor is the same.

  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)
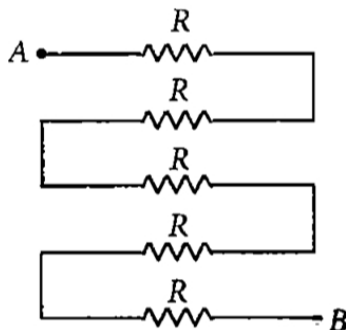
OR

In the given circuit, what is the current in each resistor? (2)
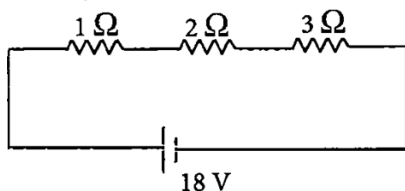
39.   a. A 5 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The **[5]** distance of the object from the lens is 30 cm. Find the position, nature and size of the image formed.

  b. Draw a labelled ray diagram showing object distance, image distance and focal length in the above case.

OR

A concave lens of focal length 60 cm is used to form an image of an object of length 9 cm kept at a distance of 30 cm

from it. Use lens formula to determine the nature, position and length of the image formed. Also draw labelled ray diagram to show the image formation in the above case.

Solution

1.

(d) Oxygen is used during germination

Explanation:

In the given experimental set-up, germinating peas will undergo aerobic respiration, in which they will use up oxygen and release carbon dioxide. Carbon dioxide released will be absorbed by sodium hydroxide present in this test tube. As germinating peas will consume oxygen present in test tube, a suction force will be developed. Due to pressure difference, the coloured oil drop will move towards the test tube. Thus, this experiment will help to investigate the amount of oxygen used during germination.

2.

(d) Hydrogen bond

Explanation:

Each DNA molecule consists of two twisted strands of bases that form a shape called a double helix. The two strands are held together by hydrogen bonds between pairs of bases.

3.

(c) The population of tiger will decreases and the population of grass will increase.

Explanation:

If deer are missing from the given food chain, the population of the tiger will decrease and the growth of the grass will increase. A missing link in a food chain will create an imbalance in the ecosystem.

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.

(d) Unidirectional

Explanation:

The flow of energy in an ecosystem is always unidirectional. As the energy moves progressively through one trophic level to another, it is no longer available to the previous level. The energy that is captured by the autotrophs (producers) does not revert back to solar radiation. The energy which passes on to the herbivores (primary consumers) from the autotrophs does not come back to the autotrophs.

6.

(d) (i) and (iv)

Explanation:

The respiration process can be aerobic or anaerobic. Aerobic respiration occurs in the presence of oxygen in mitochondria whereas, anaerobic respiration occurs in the absence of oxygen in the cytoplasm. Alcoholic fermentation, which is carried out by unicellular organisms like yeast. Yeast breaks down pyruvic acid anaerobically into ethanol and carbon dioxide in the cytoplasm.

Hence option (ii) and (iii) are wrong.

7.

(b) Sensory neuron

Explanation:

Sensory neuron carries electrical impulses from receptor to brain while motor neuron carries electrical impulses from the brain to effectors.

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

Explanation:

Gametes are mandatory for sexual reproduction. Though plants can reproduce through other parts like stem and roots (vegetative reproduction), but they cannot reproduce sexually in absence of flowers. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

9.

(d) A is false but R is true.

Explanation:

A food chain can have a maximum of five to six trophic levels, this is because a lot of energy is lost as heat at each trophic level on account of metabolism. So, a small amount of energy becomes available to the next trophic level. This limits the number of trophic level in a food chain.

10. Sexual reproduction takes place with the help of fusion of male and female gametes, thus 2 haploid gametes restore the diploid nucleus and thus form zygote, which have content from both the parent and hence producing a new recombination Whereas, in asexual reproduction the offspring develops from a single parent, the genetic material of the offspring is exact copy of the single parent.

Better chances of survival are seen in sexually reproducing organisms. This is because variation occurs in sexual reproduction which improves the vigour and vitality of the individual. This is helpful for the organisms in better adaptability to the environment.

11. If microrganisms are removed from the earth's environment then there would be dead bodies of plants and animals all around the Earth making it a difficult place to live in, more and more environmental pollution will pile up and accumalate. Moreover, the nutrient cycle will be stopped in the environment which will disturb the ecological balance.

OR

a. It shields the earth from the harmful ultraviolet (UV) radiations from the sun.

b. • By the action of UV radiations on oxygen molecule which splits to form free oxygen atoms.
   • These free oxygen atoms combine with oxygen molecule to form ozone.

c. The compound responsible for ozone depletion is chlorofluorocarbons (CFCs), along with other halogenated compounds such as halons and bromine-containing compounds.

12. Difference between movement of leaves of sensitive plants and movement of shoot towards light:

Movement of leaves of sensitive plant	Movement of shoot towards light
(i) Growth is not involved.	(i) Growth is involved.
(ii) Movement is away from the source of stimulus (touch).	(ii) Movement is towards the source of stimulus (light).

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

Red eyed fly   **White eyed fly**
RR   **rr**

R   r

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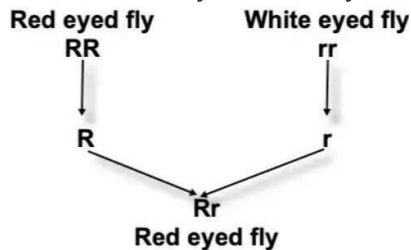
	R	r
R	RR Red eyed fly	Rr Red eyed fly
r	Rr Red eyed fly	rr White eyed fly

14. Algae are the main source of productivity in sea. they prepare there own food with the help of photosynthesis. they are food for many small aquatic animals living in the sea. hence the algae is food for small fishes and small fishes are food for big fishes. it is like a food chain.

Algae produce O_2 as a result of photosynthesis. This oxygen is utilized by fishes in the sea for carrying out respiration. If there were no algae, no oxygen would have been produced. Thus fishes might have died. Hence we can say if there were no algae there would be no fish in the sea.

15.   i. In given case, genotypic ratio of F_2 progeny will be 1 : 2 : 1 where one is homozygous dominant, two are heterozygous dominant and one is homozygous recessive.

   ii. $\frac{1}{4}$ of them have wrinkled seeds and $\frac{3}{4}$ of them have smooth seeds.

   iii. Factors representing the alternate or same form of a character are called alleles. In heterozygous individuals or hybrids, a character is represented by two contrasting alleles. Out of the two contrasting alleles, only one is able to express its effect in the individual. It is called the dominant allele. The other allele which does not show its effect in the heterozygous individual is called the recessive allele, e.g., in the case of hybrid tall pea plants (Tt). 'T' is a dominant allele whereas 't' is a recessive allele.

OR

The alternative form of the gene is called Allele. Alleles are a pair of genes that occupy a specific location on a particular chromosome and control the same trait.

16.   a. Two types of pollination are-

    I. Self-pollination

    II. Cross-pollination

     Differences between the two are given below:-

Self-pollination	**Cross-pollination**
If the transfer of pollen occurs in the same flower, it is referred to as self-pollination.	The pollen is transferred from one flower to another, it is known as crosspollination.
It occurs in bisexual flowers.	It occurs in both bisexual and unisexual flowers.
It refers to the transfer of pollen grains from anther to stigma of the same flower or to another flower of the same plant.	It refers to the transfer of pollen grains from anther to stigma of flowers belonging to two different plants.
It is not necessary to use pollinators.	This transfer of pollen from one flower to another is achieved by agents like wind, water or animals.

   b. The fusion of the female gamete (ovum or egg) and the male gamete created in the pollen tube by the pollen grains is known as fertilisation. The ovary transforms into the fruit after fertilisation, while the ovary wall transforms into the pericarp.

   c.   i. A: The young shoot of a plant embryo above the cotyledons is called a plumule. It is made up of the epicotyl and frequently immature leaves gives rise to mature shoot.

     ii. B: In the course of germination, the radicle is the first component of a seedling to emerge from the seed. The plant's first root, known as a radicle, emerges from the soil downward give rise to future root system.

    iii. C: The cotyledon is a crucial component of the embryo inside a plant seed. The cotyledon may develop into the seedling's first embryonic leaves after germination stored food.

a. Iodised salt is advisable because Iodine present in iodised salt is essential for functioning of thyroid and formation of thyroxine hormone. The disease caused due to deficiency of iodine is Goitre. The symptom due to goitre is Swollen neck.

b. Nerve impulses travels from dendrite to cell body, then along the axon to its end. At the end, some chemicals are released which fill the gap of synapse, and starts a similar electrical impulse to another neuron and the impulse further travel in the body.

Section B

17.

(c) A and B

Explanation:

(C) and (D) are incorrect because the solution of washing soda in water is alkaline which turns red litmus blue. And washing soda is prepared from sodium chloride.

18.

(b) Both the statements A and B are true.

Explanation:

- **The oxyacetylene flame** is used for welding purposes. The oxyacetylene welding process uses a combination of oxygen and acetylene (C_2H_2) gas to provide a high-temperature flame. It is commonly used to join mild steel permanently.
- Ethyne (C_2H_2) reacts with HCl in the presence of $HgCl_2$ to from vinyl chloride or chloroethane $H_2C=CHCl$. This colourless compound is an important industrial chemical. It is chiefly used to produce polyvinyl chloride (PVC).

19.

(d) NH_4Cl is formed

Explanation:

Ammonium chloride is formed when ammonia reacts with hydrogen chloride. It is a combination reaction.

$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$
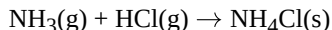
20.

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

Explanation:

- Hydrogenation is an addition reaction. The addition of hydrogen to an unsaturated hydrocarbon to obtain a saturated hydrocarbon is called hydrogenation.
- Carbon tetrachloride is a product of a substitution reaction - a characteristic property of saturated hydrocarbons.
- Alcohol meant for industrial purposes is made unfit for human consumption by adding small amounts (about 5%) of methanol to alcohol. The mixture is known as denatured spirit or denatured alcohol.
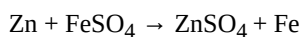- Ethyl ethanoate is a product of esterification.
  $CH_3COOH + C_2H_5OH \rightarrow CH_5COOC_2H_5 + H_2O$
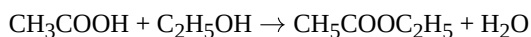
21.

(c) Student C

Explanation:

Fe + ZnSO4 → No reaction
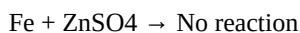
It is because iron is less reactive than Zinc.

$Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

The solution becomes colourless and black iron gets deposited.

22.

(d) 13 covalent bonds

Explanation:

Butane C_4H_{10} has 3 C-C covalent bonds and 10 C-H covalent bonds. Thus, it has 13 covalent bonds.

23.

(c) basic salt

Explanation:

Washing soda is a is basic salt because washing soda is an alkali salt. Alkali salts or basic salt are salts that are the product of the neutralization of a strong base and a weak acid. As it is strongly basic it is so-called basic salt.

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

Explanation:

Tap water conducts electricity as it contains ions whereas distilled water does not contain ions. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

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)
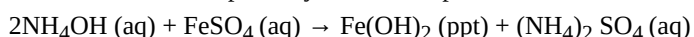
ii. When Ammonium Hydroxide is added to Aluminium Cholride then a white ppt. of Aluminium Hydroxide is formed with Ammonium Choride by Double Displacement Reaction.

$3NH_4OH$ (aq) + $AlCl_3$ (aq) → $Al(OH)_3$ (ppt.) + $3NH_4Cl$ (aq)
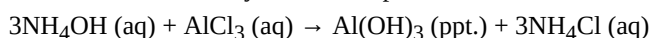
26. i. Cooking oil gets oxidized when comes in contact with air and gives a bad smell or turns "rancid". The oxygen present in the chips packet is replaced by flushing nitrogen in the packet, this in turn puffs up the packet.

ii. Iron easily reacts with atmospheric oxygen in presence of slight moisture to give iron oxide. In this process of 'corrosion', the outer layer of iron is oxidized and hence sacrificed leading to the shaping of the iron article. To avoid this oxidation, the article is coated with paint so as to make a barrier between the article's surface and atmosphere.

OR

Hydrogen gas and Iron chloride are produced.

$2HCl$ (aq) + Fe(s) → $FeCl_2$ (aq) + H_2(g)
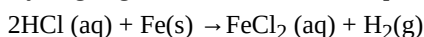
This is a redox reaction

Fe(0) - $2e^-$ → Fe(II) oxidation loss of electrons

$2H^+ + 2e^-$ → H_2 reduction: gain of electrons

So it is certainly a chemical reaction: bonds are broken and made.

HCl is not a sufficiently strong oxidizing agent to produce $FeCl_3$ (need Cl2).

27. Zinc is more reactive than copper. Hence, when a zinc plate is kept in a solution of copper sulphate, it slowly displaces copper from the solution and blue colour of the solution keeps fading away. Because of zinc going into solution as zinc sulphate, a number of holes are seen in the zinc plate. The reaction is

$$\underset{Blue}{CuSO_4(aq)} + Zn(s) \rightarrow \underset{Colourless}{ZnSO_4(aq)} + Cu(s)$$
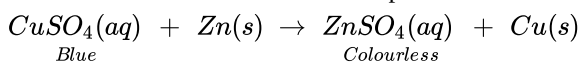
28. i. **The oxidation and reduction occurring together** are called a redox reaction. $CuO + H_2 \longrightarrow Cu + H_2O$. Example: In this reaction, copper oxide is being reduced to copper whereas hydrogen is being oxidised to water.

ii. Oxidising agents give oxygen to or removes hydrogen from other substances. The reducing agent undergoes loss of electrons. A reducing agent (also called a reductant or reducer) is an element or compound that loses (or "donates") an electron to another chemical species in a redox chemical reaction.

iii. ZnO is being reduced
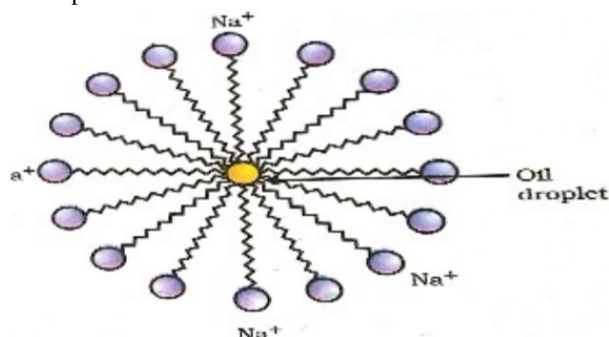
ZnO is reduced to Zn and CO is oxidised to CO_2

OR

H_2O_2 is reduced to water by removal of oxygen.

29. i. Soaps are sodium salts of fatty acids whereas Detergents are sodium salts of sulphonic acids. Soaps do not act in hard water due to formation of scum while detergents do.

ii. In soaps carbon chain dissolves in oil and the ionic end dissolves in water to form micelle
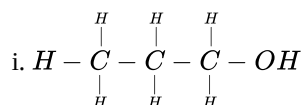

iii. Hard water contains Ca^{2+} / Mg^{2+} ions that react with soap and form precipitates called scum.
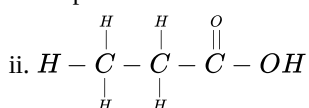
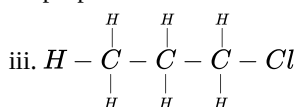iv. By using detergents in hard water this problem can be resolved.

<div align="center">OR</div>

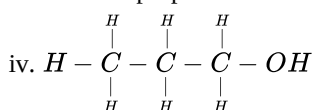According to the question, Given compounds are

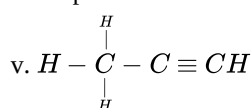i. $H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - OH$

Propan-1-ol

ii. $H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{O}{||}}{C} - OH$

propanic acid

iii. $H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - Cl$

1-Chloropropane

iv. $H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - OH$

Propanol

v. $H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - C \equiv CH$

Propyne

vi. $H - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{}{}}{\underset{\underset{O}{||}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - H$
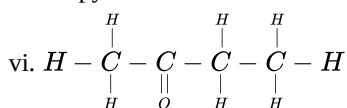
Butanone

<div align="center">**Section C**</div>

30.

(d) A convex lens has 4 dioptre power having a focal length 0.25 m

Explanation:

The power P of a lens of the focal length is given by $P = \frac{1}{f}$, where f is the focal length in meter and power in dioptre

$P = \frac{1}{f} \, or \, f = \frac{1}{P} = \frac{1}{4} = 0.25m$

The positive value for focal length indicates a convex lens.

31. **(a)** Violet and Red

Explanation:

The splitting of white light into its constituent colours is known as light dispersion. The spectrum is the band of seven colours produced by splitting white light. All of the constituent colours of white light have the same velocity in vacuum, but their velocity changes when they pass through a transparent 'medium' like a glass prism. Different colours are diverted by different angles on the prism's initial face. Violet's minimum speed is deviated by the maximum angle, whereas red's maximum speed is distorted by the minimum angle. As a result, the letters 'P' and 'Q' are violet and crimson, respectively.

32.

    (d) A is false but R is true.

    Explanation:

    A is false but R is true.

33. The brightness of the image in the camera is:

    a. directly proportional to time of exposure(t).

    b. directly proportional to the square of diameter of aperture of the lens system (i.e. light gathering power of the objective).

    c. inversely proportional to the square of focal length of the lens system.

    d. is inversely proportional to the square of the lateral magnification. i.e. Image Brightness $\propto (N_A/M)^2$; where N_A is the objective numerical aperture and **M** is the magnification.

34. Here V = 220 volts; R = 440Ω

    Now $I = \frac{V}{R} = \frac{220}{440} = 0.5\ A$

    Heat energy produced in 30s = $\frac{V^2}{R}T = \frac{(220)^2 \times 30}{440} = 3300J$

<div align="center">OR</div>

    Wattage of colour T.V. = 60 W

    Number of hours for which colour T.V. is on during September = $2 \times 2\frac{1}{2} \times 30 = 150h$

    Energy consumed = $\frac{watt \times hour}{1000} = \frac{60 \times 150}{1000} = 9\ kWh$

    Cost of seeing 2 movies per day for 30 days = 9 × 4 = Rs. 36 only.

35.   i. There must be a relative motion between the coil of wire and a magnet.

    ii. Resistivity of coil will determine the resistance of the coil and induced current through it, as induced current = $\frac{emf}{resistance}$
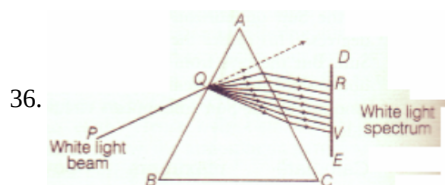
36.

    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.   i. The current is in the east-west direction. By applying the right-hand thumb rule, we get that the magnetic field (at any point below or above the wire) that turns clockwise in a plane perpendicular to the wire, when viewed from the east end, and anti-clockwise, when viewed from the west end.

    ii. Following are the methods of producing magnetic fields:

      a. By using a permanent magnet we can produce a magnetic field and it can be visualized by spreading iron fillings on a white paper and keeping a magnet beneath the paper.

      b. A current-carrying straight conductor produces a magnetic field.

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

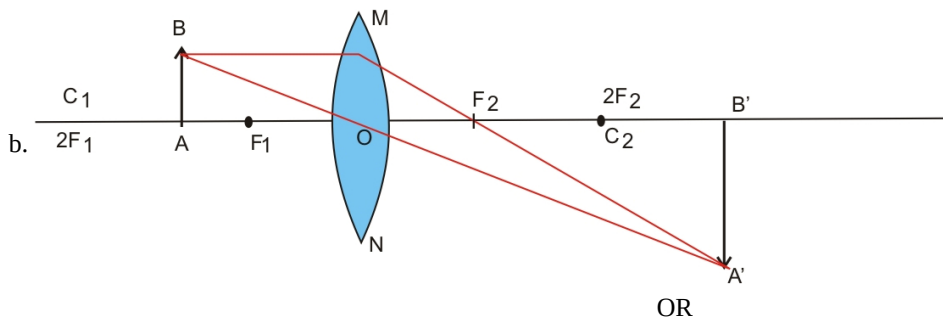 R_s = 1 + 2 + 3 = 6 Ω

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

39.   a. f = 20 cm, u = -30 cm

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

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

$\frac{1}{v} = \frac{1}{20} + \frac{1}{-30}$

$\frac{1}{v} = \frac{1}{60}$

v = 60 cm

ii. Real, inverted and magnified

iii. m = $\frac{v}{u}$

m = $\frac{60}{-30}$

m = -2

h' = m × h

h' = -2 × 5

h' = -10 cm

b.

OR

Concave lens-

focal length $(f) = -60\ cm$

Object length $(h) = 9\ cm$

Object distance $(u) = -30\ cm$

Lens formula, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

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

$v = \frac{-1}{60} + \left(\frac{-1}{30}\right)$

$m = \frac{v}{u} = \frac{-20}{-30} = \frac{2}{3}$

$m = \frac{h'}{h} \Rightarrow h' = m \times h$

$h' = \frac{2}{3} \times 9$

$h' = 6\ cm$

Image is virtual, erect and smaller than object.