Class X Session 2026-27
Subject - Science
Sample Question Paper - 7

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. The breakdown of glucose has taken the following pathway: **[1]**

$$\text{Glucose} \xrightarrow{(a)} \text{Pyruvate} + \text{Energy} \xrightarrow{(b)} \text{Lactic acid} + \text{Energy}$$

The sites 'a' and 'b' respectively are:

a) Cytoplasm and Yeast cells

b) Mitochondria and Oxygen deficient muscle cells

c) Cytoplasm and Oxygen rich muscle cells

d) Cytoplasm and Oxygen deficient muscle cells

2. When a pure-tall pea plant is crossed with a pure-dwarf pea plant, the percentage of tall pea plants in F_1 and F_2 generation pea plants will be respectively: **[1]**

a) 100%; 100%

b) 100%; 50%

c) 100%; 75%

d) 100%; 25%

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

Column A	Column B
(i) The master gland	(a) Control cell division and cell growth
(ii) Cytokinin	(b) Regulates metabolism
(iii) Insulin	(c) Reduces blood sugar
(iv) Thyroxine	(d) Pituitary gland

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

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

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

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

4. The plant hormone whose concentration stimulates the cells to grow longer on the side of the shoot which is away from light is: **[1]**

a) Cytokinins
b) Adrenaline
c) Auxins
d) Gibberellins

5. In an ecosystem, the 10% of energy available for transfer from one trophic level to the next trophic level is in the form of: **[1]**

a) Chemical energy
b) Heat energy
c) Mechanical energy.
d) Light energy

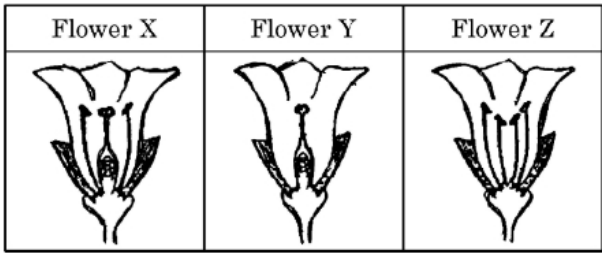
6. In aerobic respiration, the steps are: breakdown of glucose to pyruvate and its further conversion to carbon dioxide. Both processes respectively occur in- **[1]**

a) Mitochondria and Cytoplasm
b) Chloroplast and Mitochondria
c) Vacuole and Cytoplasm
d) Cytoplasm and Mitochondria

7. What will happen if the deer are missing in the following food chain? **[1]**
Grass → Deer → Tiger

a) The population of tigers will increase
b) The tigers will die
c) The amount of grass will decrease
d) The tigers will start eating grass

8. Consider the following three flowers namely X, Y and Z. Which flower(s) would develop into a fruit? **[1]**

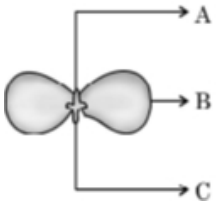


a) X and Y only
b) X only
c) Y and Z
d) Z only

9. **Assertion (A):** Variation is useful for the survival of a species over time. **[1]**
Reason (R): The process of DNA copying will have variation each time because biochemical reactions are not reliable.

a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
b) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
c) Assertion (A) is true, but Reason (R) is false.
d) Assertion (A) is false, but Reason (R) is true.

10. In the following figure showing a germinating gram seed, name the parts labelled as A, B and C: **[2]**



Why is part **B** considered to be important during germination?

11. a. State with reason the consequence of decrease in number of carnivores in an ecosystem. **[2]**

b. In a food chain, state the trophic level at which the concentration of harmful chemicals is maximum. Why is it so?

OR

i. Why does a kitchen garden called an artificial ecosystem while a forest is considered to be a natural ecosystem?

ii. While designing an artificial ecosystem at home, write any two things to be kept in mind to convert it into a self-sustaining system. Give reason to justify your answer.

12. Name a plant growth hormone synthesized at the shoot tip. Explain its effect on the growth of a plant in response to light. **[2]**

13. The lowest part of the ear called earlobe, is closely attached to the side of the head in some of us (Figure 'X'), and not in others, called free earlobe (Figure 'Y'). Attached and free earlobes are two variants found in human populations. The gene for free earlobe is dominant over attached earlobes. **[3]**



Figure 'X'



Figure 'Y'

a. A man with attached earlobes marries a woman having free earlobes. 50% of their children have free earlobes and 50% have attached earlobes. Explain the inheritance of this trait and write the trait combinations of the progeny.

b. Write the gene combinations of the father and the mother in the above case.

14. What is the probability of a male child or a female child being born in case of human beings? Explain. **[3]**

15. How to destarch the leaves for an experiment to show that sunlight is necessary for photosynthesis? **[4]**

16. Draw a neat diagram showing fertilisation in a flower and label (a) Pollen tube, (b) Male germ cell and (c) Female germ cell, on it. Explain the process of fertilisation in a flower. What happens to the **[5]**

i. ovary and

ii. ovule after fertilisation?

OR

a. Analyse the given situations and interpret the possible reason for each:

i. Iodine deficiency in diet increases the possibility of a disease of swollen neck in a person.

ii. Some people in population may have very short heights (dwarfs).

iii. Thick facial hairs develop in boys at the age of $10 - 12$ years.

b. Explain two reasons which necessitate the need of chemical communication in multicellular organisms.

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. 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. Which one of the following metals is malleable and a poor conductor of electricity? **[1]**

a) Copper

b) Silver

c) Lead

d) Zinc

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

Column A	Column B
(i) Welding	(a) Ethyl alcohol
(ii) Fuel in a spirit lamp	(b) Ester
(iii) Lime water turns milky	(c) Carbon dioxide
(iv) Fruity smell	(d) Ethyne and oxygen

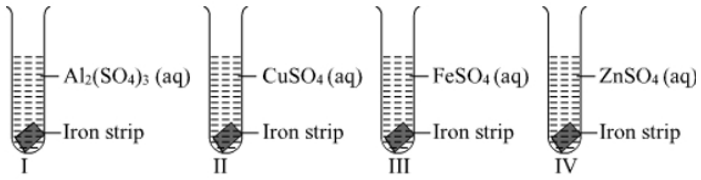
a) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

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

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

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

21. A student adds one big iron nail each in four test tubes containing solution of zinc sulphate, aluminium sulphate, copper sulphate and iron sulphate. A reddish brown coating was observed only on the surface of iron nail which was added in the solution of: **[1]**



a) Aluminium sulphate
b) Iron sulphate
c) Zinc sulphate
d) copper sulphate

22. Which one of the following properties of Carbon is **not** responsible for its formation of large number of compounds? **[1]**

a) Isomerism
b) Catenation
c) Tetravalency
d) Allotropy

23. An aqueous solution **A** turns phenolphthalein solution pink. When another aqueous solution **B** is added to the pink solution, the pink colour disappears. Now when a few drops of solution **A** are added to this reaction, the mixture appears pink again. The respective changes in the nature of the solution are from: **[1]**

a) acidic $\rightarrow$ basic $\rightarrow$ basic
b) acidic $\rightarrow$ basic $\rightarrow$ acidic
c) basic $\rightarrow$ acidic $\rightarrow$ acidic
d) basic $\rightarrow$ acidic $\rightarrow$ basic

24. Reaction between two elements A and B, forms a compound C. A loses electrons and B gains electrons. Which one of the following properties will not be shown by compound *C*? **[1]**

a) It has weak electrostatic forces of attraction between its oppositely charged ions.
b) It conducts electricity in its molten state or aqueous solution.
c) It has high melting point.
d) It is highly soluble in water.

25. Student added a few drops of phenolphthalein to an unknown solution A and B. Solution A acquired pink color. And solution B was added to it drop wise and the solution ultimately became colorless. Predict the nature of the solution A and B. **[2]**

26. Why are decomposition reactions called the opposite of combination reactions? Write one chemical equation each for these two types of reactions mentioning the name of the reactant(s) and the product(s) involved in the reactions. **[3]**

OR

Identify the substance oxidized and substance reduced in the following reaction. Write the ionic equation for the substance oxidized and reduced.

$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

27. There are 3 unknown metals - A, B and C. C displaces B from its oxide while with oxide of A, there is no reaction. Give the reactivity order of A, B and C. **[3]**

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

Carbon is a versatile element that forms the basis of all living organisms and many of the things we use. A large variety of compounds is formed because of its tetravalency.

Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements.

Answer the following questions:

a. What are hydrocarbons? **(1)**

b. List two properties by virtue of which carbon can form a large number of compounds. **(1)**

c. Write the formula of the functional group present in (1) aldehydes, and (2) ketones. Write chemical equation for the reaction that occurs between ethanoic acid and ethanol in the presence of a catalyst. **(2)**

OR

What are structural isomers? Write the structures of two isomers of butane (C_4H_{10}). **(2)**

OR

Read the following text carefully and answer the questions that follow:

Carbon compounds can be easily oxidised on combustion. In addition to this complete oxidation, we have reactions in which alcohols are converted to carboxylic acids.We see that some substances are capable of adding oxygen to others. These substances are known as oxidising agents. Also some compounds are capable of adding hydrogen. These substances are known as reducing agents.

i. Give any two examples of good oxidising agent. (1)

ii. Complete the reaction: (1)

$CH_3CH_2CH_2OH$ + Alk. $KMnO_4 \rightarrow$

iii. Give some uses of Alcohol. (2)

OR

Why Acidified potassium dichromate is called an oxidising agent? (2)

29. Explain chlor-alkali process and write balanced chemical equations for the reactions that occur. Name the gases obtained at the anode and cathode respectively. Mention two uses each of the two gases obtained in the above process. **[5]**

OR

An acid **X** present in tamarind when mixed with **Y**, produces a mixture **Z**. **Z** on addition to a dough when heated makes cakes soft and spongy. **Y** is prepared from common salt and helps in faster cooking.

i. Write the common names of **X, Y** and **Z**, and the chemical formula of **Y**.

ii. How is **Y** prepared and how does it help in making cakes soft and spongy? Illustrate the reaction with suitable chemical equation.

iii. Write the name and chemical formula of a mild base other than **Y** used as an antacid.

Section C

30. The defect of vision in which a person is able to see nearby objects clearly, but not far objects is called: **[1]**

a) Astigmatism

b) Short-sightedness or myopia

c) Cataract

d) Long-sightedness or Hypermetropia

31. **Assertion (A):** In the case of concave mirror, the minimum distance between real object and its real image is zero. **[1]**

Reason (R): If concave mirror forms virtual image of real object, the image is magnified.

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

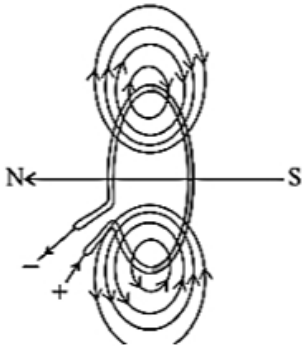
b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

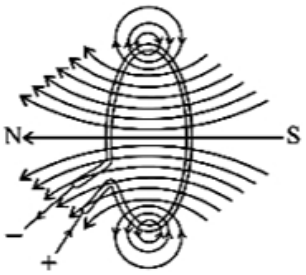
d) A is false but R is true.

32. The correct pattern of magnetic field lines of the field produced by a current carrying circular loop is: **[1]**

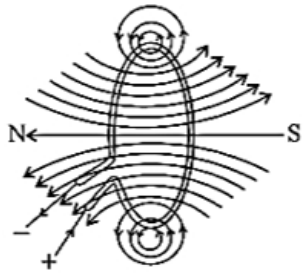
a)



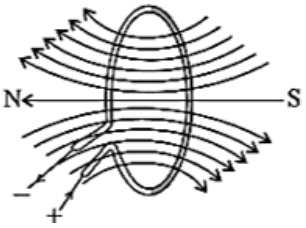
b)



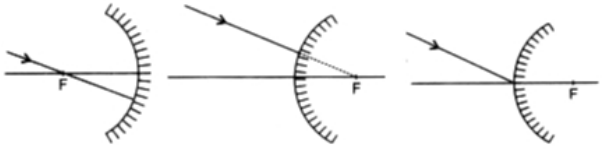
c)



d)



33. Draw the following diagram, in which a ray of light is incident on a concave/convex mirror, on your answer sheet. Show the path of this ray, after reflection, in each case. **[2]**



34. An electric heater rated 1100 W operates at 220 V. Calculate (i) its resistance, and (ii) **[2]**

the current drawn by it.

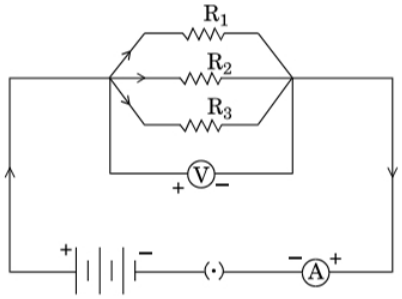
OR

In the circuit given below, the resistors R_1, R_2 and R_3 have the values 10 Ω, 20 Ω and 30 Ω respectively, which have been connected to a battery of 12 V. Calculate

a. the current through each resistor,

b. the total circuit resistance, and

c. the total current in the circuit.



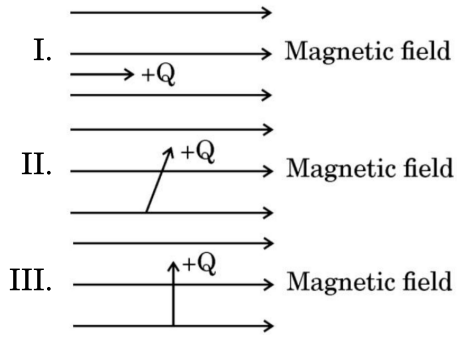
35. a. Draw a diagram to show the dispersion of white light by a glass prism. **[3]**

b. What is spectrum? Give reason for its formation.

36. Three resistors of 2Ω, 3Ω and 6Ω are connected in (i) series, and (ii) parallel. Draw the arrangements of the resistors and find the equivalent resistance of each arrangement. **[3]**

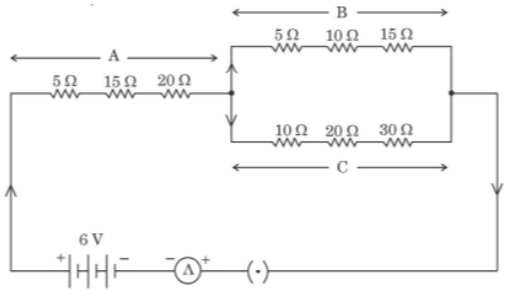
37. a. Name and state the rule which determines the force on a current carrying conductor placed in a uniform magnetic field. **[3]**

b. Consider the following three diagrams in which the entry of a positive charge (+Q) in a magnetic field is shown. Identify giving reason the case in which the force experienced by the charge is (i) maximum, and (ii) minimum.



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

Study the following electric circuit in which the resistors are arranged in three arms A, B and C:



i. Find the equivalent resistance of arm B. (1)

ii. Calculate the equivalent resistance of the parallel combination of the arms B and C. (1)

iii. Determine the current that flows through the ammeter. (2)

OR

Determine the current that flows in the ammeter when the arm B is withdrawn from the circuit. (2)

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

A ray of light incident on a convex mirror

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

ii. A 1.5 cm tall candle flame is placed perpendicular to the principal axis of a concave mirror of focal length 12 cm. If the distance of the flame from the pole of the mirror is 18 cm, use mirror formula to determine the position and size of the image formed.

OR

a. Define power of a lens and write its SI unit. Name the type of lens whose power is negative.

b. A convex lens forms a real and inverted image of finite size at a distance of 50 cm from it. Where is the object placed in front of the lens? Give all possible positions of the object stating reason in each case.

c. Draw labelled ray diagram for any one position of the object mentioned in (b) above.

Solution

Section A

1. **(d)** Cytoplasm and Oxygen deficient muscle cells
Explanation:
Cytoplasm and Oxygen deficient muscle cells

2. **(c)** 100%; 75%
Explanation:
100%; 75%

3. **(a)** (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
Explanation:
   - The pituitary gland is a master gland that produces growth hormones.
   - Cytokinins are a group of hormones that promote cell division in plant roots and shoots and the growth of buds.
   - The insulin hormone is secreted by the pancreas which maintains blood sugar level in the body.
   - Thyroxine a hormone that is made by the thyroid gland and is one of the most important thyroid hormones and it also maintains metabolism in the body.

4. **(c)** Auxins
Explanation:
Auxins

5. **(a)** Chemical energy
Explanation:
The autotrophs capture the energy present in sunlight and convert it into chemical energy. Therefore, the energy available for transfer from one trophic level to the next trophic level in an ecosystem is in the form of chemical energy. When one form of energy is changed to another, some energy is lost.

6. **(d)** Cytoplasm and Mitochondria
Explanation:
Cytoplasm and Mitochondria

7. **(b)** The tigers will die
Explanation:
The tigers will die

8. **(a)** X and Y only
Explanation:
A flower's ovary develops into the flower's fruit. Because Flowers X and Y both contain ovaries, they can both develop into fruit.

9. **(b)** Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation

of the Assertion (A).

Explanation:

Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).

10. The part labelled as A is Plumule , B is Cotyledon while C is Radicle.
    Part B is the cotyledon which serves as a food store during germination. It provides nutrients to the growing embryo during germination.
11. a. The consequence of the decrease in the number of carnivores in an ecosystem is the Population of herbivores will increase as their predator number is less, leading to imbalances in species composition and trophic dynamics, as well as potential disruptions in ecosystem structure and function.

    b.
    - Top carnivore/ Tertiary consumer
    - They are nonbiodegradable, and while passing from one trophic level to another they keep on accumulating at each level / Biomagnification.

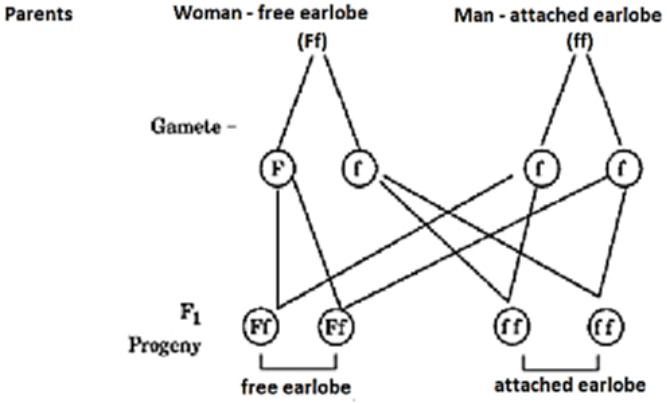
    OR

    i. The kitchen garden is known as an artificial ecosystem because they are manmade where specific biotic and abiotic elements are utilized. A kitchen garden is an ecosystem where the plants such as rice, wheat, vegetables, etc. are cultivated. Farmers operate the relationship between the abiotic factors and producers

    ii. When designing an artificial ecosystem at home, there are two important things that need to be kept in mind to convert it into a self-sustaining system: Balance between biotic and abiotic factors and Recycling of nutrients and waste.

12.
    - Auxin
    - When light is coming from one side of the plant, auxin located at shoot tip diffuses towards the shaded side of the shoot.
    - Concentration of auxin in the shaded region stimulates the cells to grow longer as compared to the region exposed to light. So the plant tends to bend towards the light.

13. a. Dominant trait - free earlobe: F f
    Recessive trait - Attached earlobe: ff.

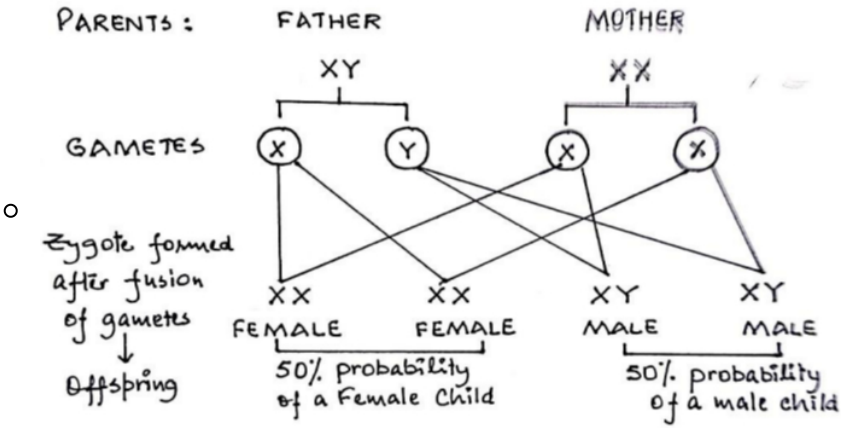


50% 50%

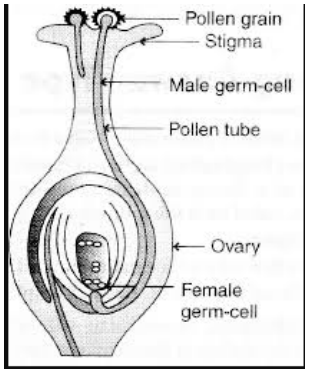
Progeny- Ff : ff

    b. Gene combinations of:
    Father - 'ff'
    Mother - 'Ff'

14.
    - Probability of male child born is 50% and female child born is 50% in human beings.



15. Destarching occurs when part of a plant is "deprived of starch, as by translocation". It is also the process of eliminating starch reserves in a plant for experiments concerning photosynthesis. This is done by leaving the plant in a dark place for a long period of time.
16. Process of fertilization :
    i. 1. On reaching the stigma, pollen grain germinates carrying the two male gametes in pollen tube.
    ii. 2. The first male gamete fuses with the egg cell, present in the embryo sac resulting in formation of zygote.
    iii. 3. The second male gamete fuses with secondary nucleus and result in formation of primary endosperm nucleus this is known as double fertilisation.
    iv. 4. After fertilisation, the ovule develops and converts into a seed containing embryo the embryo is the future plant and when it is provided with suitable conditions like water air and optimum temperature, it develops into a seedling.



    i. The ovary grows rapidly and ripens to form a fruit the fruit and closes the seeds the seed contains embryo which has a plumule and a radicle. radicle give rise to root and plumule gives rise to shoot.
    ii. Ovule forms the embryonal axis inside the seed.

OR

a. i. Iodine is necessary for the thyroid gland to make thyroxin hormone, its deficiency causes goitre.
    ii. Deficiency of growth hormone in childhood causes dwarfism.
    iii. Secretion of testosterone during puberty in males.

b.
- Hormones or chemical compounds can potentially reach all cells of body steadily and persistently.
- Hormones help to coordinate growth, development and responses to environment.

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.

(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.

(c) Lead

Explanation:

Lead

20.

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

Explanation:

- The oxyacetylene welding process uses a combination of ethyne (C_2H_2) and oxygen gas to provide a high-temperature flame. It is commonly used to permanently join mild steel.
- Alcohol meant for industrial purposes (fuel for spirit lamps) 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.
- Carbon dioxide turns lime water turns milky due to the formation of insoluble calcium carbonate.
- Esters have a fruity smell and are used in perfumes and cosmetics due to their characteristic odour.

21.

(d) copper sulphate

Explanation:

The copper sulphate solution will turn green due to the formation of iron sulphate. A reddish brown coating of copper is formed on the nail. Iron is less reactive than aluminium and zinc. It is however, more reactive than copper. It displaces copper from its solution (displacement reaction). The less reactive copper comes out of the solution and more reactive iron goes into the solution.

$CuSO_4$ (aq) + Fe (s) à $FeSO_4$ (aq) + Cu s)

22. **(a)** Isomerism

Explanation:

Isomerism

23.

(d) basic $\rightarrow$ acidic $\rightarrow$ basic

Explanation:

basic $\rightarrow$ acidic $\rightarrow$ basic

24. **(a)** It has weak electrostatic forces of attraction between its oppositely charged ions.
Explanation:
It has weak electrostatic forces of attraction between its oppositely charged ions.

25.
- Solution A is basic in nature as phenolphthalein turns into pink colour from colourless solution.
- When Solution B was added drop wise it made the solution colourless, it indicates Solution B is an acid.

26.
- In combination reaction single product (substance) is formed from two or more reactants (substances) whereas in decomposition reaction a single reactant (substance) breaks down to give two or more products (substances). So, the two are opposite.
- Example of combination reaction

$$\underset{\text{Carbon}}{C(s)} + \underset{\text{Oxygen}}{O_2(g)} \longrightarrow \underset{\text{Carbon dioxide}}{CO_2(g)} + \text{Heat}$$

- Example of decomposition reaction

$$\underset{\text{Calcium carbonate}}{CaCO_3(s)} \xrightarrow{\text{Heat}} \underset{\text{Calcium Oxide}}{CaO(s)} + \underset{\text{Carbon dioxide}}{CO_2(g)}$$

OR

$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

a. Substance oxidized, H_2

$H_2 \rightarrow 2H^+ + 2e$

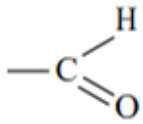
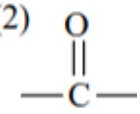
[Substance getting oxidized is H_2]

b. Substance reduced, Cl_2

$Cl_2 + 2e \rightarrow 2Cl$

[Substance getting reduced is Cl_2]

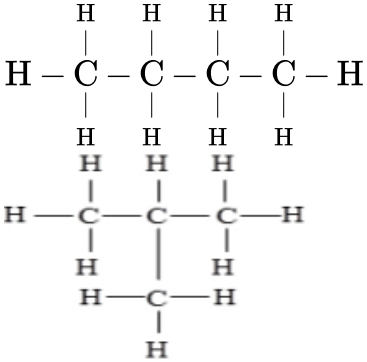
27. C displaces B from its oxide, therefore, C is more reactive than B.
There is no reaction when C is treated with oxide of A or C does not displace A from its oxide. So, A is more reactive than C. Thus, the reactivity order is B< C< A.

28. a. Compounds formed by carbon and hydrogen only.
b. Tetravalency and Catenation
c. (1)  (2) 

$$CH_3COOH + C_2H_5OH \xrightarrow{\text{Acid}} \underset{\text{Ester}}{CH_3COOC_2H_5} + H_2O$$

OR

Compounds with identical molecular formula but different structures
Two isomers of butane C_4H_{10}



OR

i. Alkaline potassium permanganate or acidified potassium dichromate are examples of good oxidising agents.

ii. $CH_3CH_2CH_2OH + Alk.\ KMnO_4 \rightarrow CH_3CH_2COOH$

iii. Alcohol is used as a solvent, spirit, alcoholic drinks, fuels, etc

OR

Acidified potassium permagnet $K_2Cr_2O_7$ is a good oxidising agent because it can add oxygen to the reactant molecule very easily and convert them to acid.

29.
- Chlor-akali process - When electricity is passed through aqueous solution of sodium chloride (brine), it decomposes to form sodium hydroxide, chlorine and hydrogen.
- $2NaCl\ (aq) + 2H_2O(l) \rightarrow 2NaOH + Cl_2 + H_2$
- Anode - Chlorine gas/Cl_2
- Cathode - Hydrogen gas/H_2
- Cl_2
  1. Used in the preparation of bleaching powder.
  2. To make drinking water free from germs or any other.
- H_2
  1. Used in the manufacture of ammonia fertilisers.
  2. Used in fuels and margarine.

OR

i. X-Tartaric acid Y-Baking soda Z- Baking powder Y- $NaHCO_3$

ii. $NaCl + H_2O + CO_2 + NH_3 \longrightarrow NH_4Cl + NaHCO_3$

$NaHCO_3 + H^+ \longrightarrow CO_2 + H_2O +$ Sodium salt of acid

CO_2 released during heating makes the cake soft and spongy

iii. Magnesium hydroxide; $Mg(OH)_2$

Section C

30.

(b) Short-sightedness or myopia

Explanation:

Short-sightedness or myopia

31.

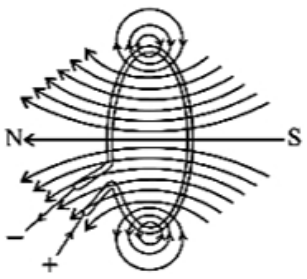
(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

If object is placed at centre of curvature of concave mirror, its image is at the centre of curvature. Thus, minimum distance between object and its real image is zero. If object is between pole and focus of concave mirror, its image is virtual and magnified.

32.

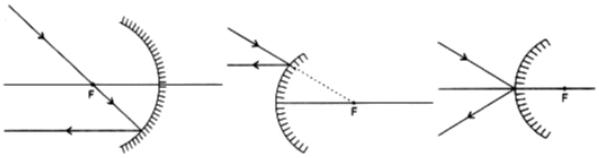
(b)



Explanation:

Magnetic field lines enter from the south pole and exit from the north pole. A circular coil that conducts current has curved lines, a straight line running through the centre, and concentric

circles at the coil's two opposite ends.

33. 

34. i. $P = \frac{V \times V}{R}$

$R = \frac{V \times V}{P}$

$R = \frac{220 \times 220}{1100}$

$R = \frac{48400}{1100}$

$R = 44$ ohm

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

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

$I = \frac{220}{44}$

$I = 5$ A

OR

Given: $R_1 = 10\ \Omega$; $R_2 = 20\ \Omega$; $R_3 = 30\ \Omega$

According to Ohm's law,

$V = IR$

Given $V = 12$ V

a. Current through resistor R_1:

$$I_1 = \frac{V}{R_1} = \frac{12}{10} = 1.2 \text{ A}$$

Current through resistor R_2:

$$I_2 = \frac{V}{R_2} = \frac{12}{20} = 0.6 \text{ A}$$

Current through resistor R_3:

$$I_3 = \frac{V}{R_3} = \frac{12}{30} = 0.4 \text{ A}$$

b. Total circuit resistance, R

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

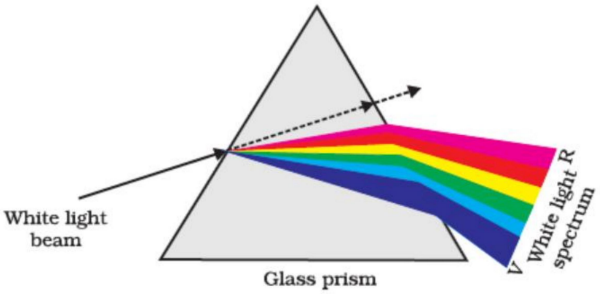
$$\frac{1}{R} = \frac{1}{10} + \frac{1}{20} + \frac{1}{30}$$

$$\frac{1}{R} = \frac{11}{60}$$

$$R = \frac{60}{11} = 5.45\Omega$$

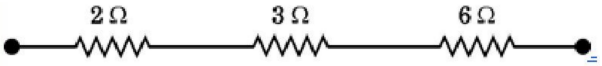
c. The total current in the circuit is $I = I_1 + I_2 + I_3$

$= 1.2 + 0.6 + 0.4 = 2.2$ A

35. a. 

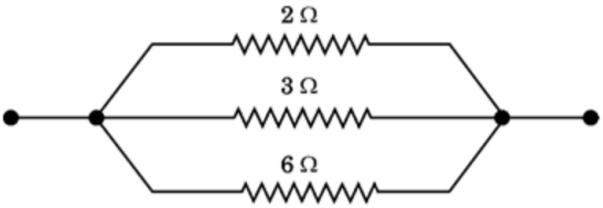
b. The band of seven colours obtained on the screen after dispersion of white light

Reason: Different components of white light (colours) bend through different angles with respect to the incident ray as they pass through a prism

36. i. 

In series, $R_s = R_1 + R_2 + R_3$

$= (2 + 3 + 6)\Omega = 11\Omega$

ii. 

In parallel, $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

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

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

$R_p = 1.0\Omega$

37. a. Fleming's Left hand rule

Statement : Stretch the thumb, fore figure and the middle figure of your left hand such that they are mutually perpendicular. If the first finger points in the direction of field (F) and the second finger in the direction of current, then the thumb will point in the direction of the force acting on the conductor.

b. i. Maximum in Case III - Magnetic field and current/motion of charge are perpendicular to each other.

ii. Minimum in Case I - Magnetic field and current/motion of charge are parallel to each other.

38. i. Since the resistance in arm B are connected in series.

So, $R_B = 5\Omega + 10\Omega + 15\Omega$

$R_B = 30\Omega$

ii. Total resistance in arm C

$R_C = 10\Omega + 20\Omega + 30\Omega$

$R_C = 60\Omega$

Now as arm B and arm C are in parallel

Equivalent resistance $\frac{1}{R} = \frac{1}{R_B} + \frac{1}{R_C}$

$\frac{1}{R} = \frac{2+1}{60} = \frac{3}{60}$

$R = 20\Omega$

iii. Total resistance in arm A

$R_A = 5\Omega + 15\Omega + 20\Omega$

$R_A = 40\Omega$

Now, Equivalent resistance of circuit

$R_{eq} = R_{eq} + R$

$R_{eq} = 40 + 20 = 60\Omega$

By ohm's law

$V = IR$

$I = \frac{V}{R} = \frac{6}{60} = 0.1$ A

OR

If arm B is removed

Equivalent resistance in circuit

$R_{eq} = R_A + R_C$

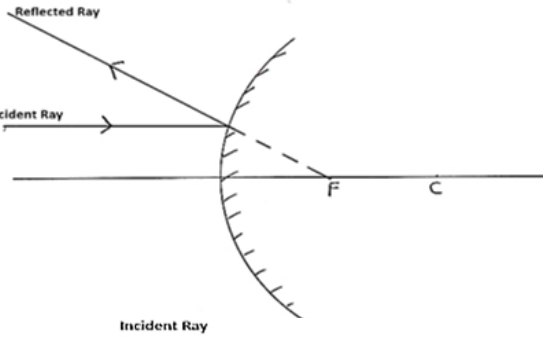
$R_{eq} = 40 + 60 = 100\Omega$

From ohm's law

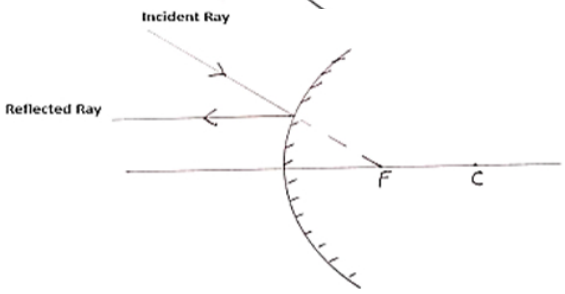
V = IR

$I = \frac{V}{R} = \frac{6}{100}$ = 0.06 A

39. i. 1.



2.



ii. Here f = -12 cm, u = -18 cm, v = ?, h = 1.5 cm, h' = ?

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

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

$= \frac{1}{-12}$ cm $- \frac{1}{-18}$ cm

$= \frac{-1}{36}$

$\therefore$ v = -36 cm

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

$\frac{h'}{1.5} = -\frac{(-36)}{(-18)}$

h' = -3.0 cm

OR

a. Power of a lens is the Ability of a lens to diverge or converge light rays and SI unit of Power – diopter (D).
Type of lens whose power is negative is Concave lens.

b. Position of object:

i. Beyond $2F_1$

ii. At $2\ F_1$

iii. Between $2F_1$ and F_1

c. Labelled ray diagram -

