Class X Session 2025-26
Subject - Science
Sample Question Paper - 07

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

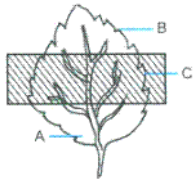
1. Where does the embryo develop in a human female? **[1]**

   a) Vagina
   b) Seminal vesicles
   c) Fallopian tube
   d) Uterus

2. The two versions of a trait (character) which are brought in by the male and female gametes are situated on **[1]**

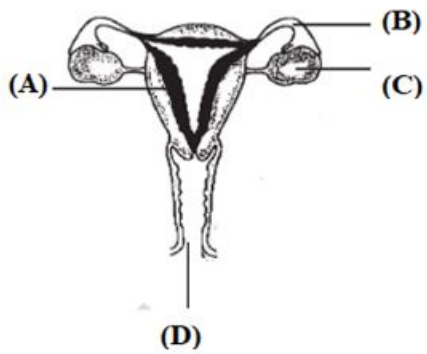
   a) sex chromosomes
   b) copies of the same chromosome
   c) two different chromosomes
   d) any chromosome

3. Which part of the leaf will have starch when exposed to sunlight ? **[1]**



   a) C only
   b) Both A and B
   c) B only
   d) A only

4. Which part of the following is a site of implantation? **[1]**



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

5. Food web is constituted by **[1]**

a) relationship between plants and animals

b) relationship between the organisms and the environment

c) relationship between animals and environment.

d) various interlinked food chains in an ecosystem

6. In the slides showing binary fission in Amoeba and budding in yeast, the correct observations are: **[1]**

A. The daughter cells of Amoeba and the bud of Yeast are smaller than their respective parental cells.

B. The daughter cells of Amoeba and the bud of Yeast are the same sizes as their respective parental cells.

C. The daughter cells of Amoeba are bigger than the parent cell but the bud of yeast is smaller than the parent.

D. The daughter cells of Amoeba are smaller than the parent but the bud of Yeast is larger than the parent.

a) (B)

b) (A)

c) (D)

d) (C)

7. Which of the following is not associated with the growth of a plant? **[1]**

a) Auxin

b) Cytokinins

c) Abscisic acid

d) Gibberellins

8. **Assertion (A):** If mother is homozygous for black hair and father has red hair then their child can inherit black hair. **[1]**

Reason (R): Gene for black hair is recessive to gene for red hair in humans.

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

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

c) A is true but R is false.

d) A is false but R is true.

9. **Assertion (A):** The brain allows us to think and take actions based on that thinking. **[1]**

Reason (R): The hind brain is the main thinking part of the brain which has regions which receive sensory impulses from various receptors.

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

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

c) A is true but R is false.

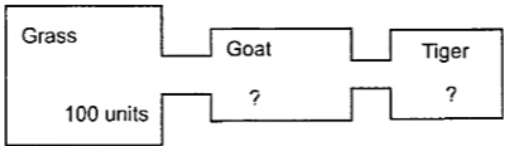
d) A is false but R is true.

10. Explain, how pesticides get accumulated in the environment. **[2]**

11. What is meant by an artificial ecosystem? Give two examples of artificial ecosystems. **[2]**

OR

Given below is an energy flow diagram. Study it carefully and answer the following questions:



a. How much energy (in units) will pass from grass to goat?

b. How much energy (in units) will pass from goat to tiger?

c. Which law operates during the transfer of energy from grass to goat to tiger?

12. During a street fight between two individuals, mention the effects on the following organs by the autonomic nervous system, in the table given below: **[2]**

Organs	Sympathetic nervous system	Parasympathetic system
Lungs		
Heart		
Salivary gland		
Pupil of eye		

13. Differentiate between the process of binary fission and multiple fission giving an example of each. **[3]**

14. Food does not pass through the digestive system by 'gravity'. This is clear from the fact that we can digest the food even if we are lying down. Explain the logic behind the passage of food through our digestive system. **[3]**

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

Kidneys are vital organs for survival. Several factors like infections, injury or restricted blood flow to kidneys reduce the activity of kidneys. This leads to accumulation of poisonous wastes in the body, which can even lead to death. In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.

a. i. Name the artery that brings oxygenated blood to the kidney.
   ii. Name the cluster the thin-walled blood capillaries present in the Bowman's capsule. **(1)**

b. In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control? **(1)**

c. List two major steps involved in the formation of urine and state in brief their functions. **(2)**

OR

In which part of the nephron does selective reabsorption take place? List the factors which the amount of water reabsorbed depends on. **(2)**

16. a. With the help of Mendel’s experiments show that **[5]**
   i. traits may be dominant or recessive, and
   ii. traits are inherited independently.

b. Birds and bats are more closely related to each other than to squirrels or lizards. Comment.

OR

Draw the structure of a neuron and describe its function.

Section B

17. When a small amount of acid is added to water, the phenomena which occur are : **[1]**

A. Dilution

B. Neutralisation

C. Formation of H_3O^+ ions

D. Salt formation

The correct statements are:

a) (C) and (D) b) (A) and (C)

c) (B) and (D) d) (A) and (B)

18. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved? **[1]**

i. Displacement reaction

ii. Precipitation reaction

iii. Combination reaction

iv. Double displacement reaction

a) (iv) only

b) (ii) and (iv)

c) (ii) and (iii)

d) (i) only

19. Which of the following represents favourable conditions for the process of fermentation of ethyl alcohol? **[1]**

a) Presence of light

b) Presence of air

c) None of these

d) Very high temperature

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

Column A	Column B
(i) Alcohol	(a) - X
(ii) Aldehyde	(b) - CHO
(iii) Ketone	(c) - OH
(iv) Haloalkane	(d) - CO -

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

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

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

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

21. Generally, non-metals are not conductors of electricity. Which of the following is a good conductor of electricity? **[1]**

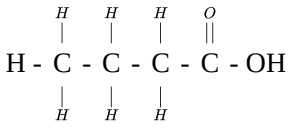
a) Graphite

b) Diamond

c) Sulphur

d) Fullerene

22. The correct structural formula of butanoic acid is **[1]**

a)


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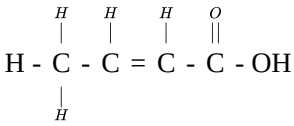
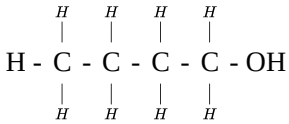
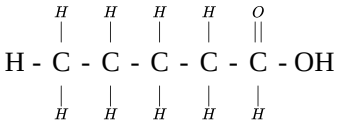


c)


d)


23. Baking soda is a mixture of: **[1]**

a) Sodium carbonate and acetic acid

b) Sodium hydrogen carbonate and acetic acid

c) Sodium hydrogen carbonate and tartaric acid

d) Sodium carbonate and tartaric acid

24. **Assertion (A):** Hydrogen peroxide is kept in coloured bottles. **[1]**

Reason (R): Hydrogen peroxide is a moderately reactive metal that can react with light or heat slowly to produce water.

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. Account for the following: **[2]**

i. State the relation between hydrogen ion concentration of an aqueous solution and its pH.

ii. An aqueous solution has a pH value of 7.0. Is this solution acidic, basic or neutral.

iii. Which has a higher pH, 1 M HCl or 1 M NaOH solution?

iv. Tooth enamel is one of the hardest substance in our body. How does it undergo damage due to eating chocolates and sweets? What should we do to prevent it?

v. How do H^+ ions exist in water?

26. An organic compound 'A' has the molecular formula CH_2O_2. It turns blue litmus red and gives brisk effervescence with $NaHCO_3$. Identify 'A' and give chemical reaction. **[3]**

OR

What is a homologous series? Find the difference in molecular mass between the two consecutive members of a homologous series. State how in a homologous series of carbon compounds the following properties vary with increase in molecular mass:

a. Melting and boiling points

b. Chemical properties

27. P, Q and R are 3 elements which undergo chemical reactions according to the following equations: **[3]**

a. $P_2O_3 + 2Q \rightarrow Q_2O_3 + 2P$

b. $3RSO_4 + 2Q \rightarrow Q_2(SO_4)_3 + 3R$

c. $3RO + 2P \rightarrow P_2O_3 + 3R$

Answer the following questions:

i. Which element is most reactive?

ii. Which element is least reactive?

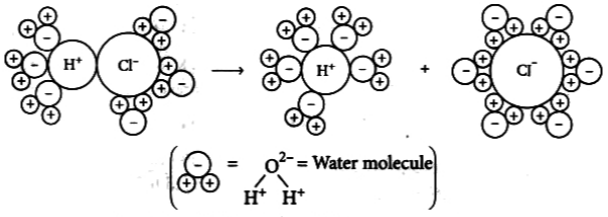
iii. State the type of reaction listed above.

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

The acidic behaviour of acids is due to the presence of hydrogen (H^+) ions in them. They produce hydrogen ions in the presence of water. Water is a polar solvent and this property of water helps in weakening the bond between the ions and makes them soluble.

Hence, acids and bases produce ions in aqueous solutions. It may be noted that a dry HCl gas or a solution of hydrogen chloride in organic, non-polar solvents like toluene or benzene do not show acidic properties. This is because hydrogen chloride does not undergo ionization in toluene.

The reason why HCl splits into H^+ and Cl^- ions in presence of water lies in the fact that water molecules, being polar, pull the H^+ and Cl^- ions apart and thus, the bond in HCl is broken.



Dissociation of HCl into H^+ and Cl^- ions in presence of water

i. Which acids are present in bee stings? (1)

ii. If the pH of a solution is 8, then find its $[H^+]$ ion. (1)

iii. If you are given water, Hydrochloric acid, and Acetic acid, then mention increasing the order of acid strength. (2)

OR

If you are provided H_3PO_4, C_2H_5OH, H_2CO_3, and CH_3COOH, then which compound does not give H^+ ions in an aqueous solution? (2)

29. Compound 'A', when dissolved in water, gives compound 'B' and liberates heat. Compound 'A' is used in whitewashing. Compound 'B' reacts with CO_2 to form a white precipitate of compound 'C'. Identify compounds 'A', 'B' and 'C' Also write the equations involved. **[5]**

OR

What happens when (Write the balanced equation involved) –

i. Copper is heated in air?
ii. Aluminum oxide is reacted with hydrochloric acid?
iii. Potassium reacts with water?
iv. Cinnabar is heated in air?
v. Aluminium oxide reacts with sodium hydroxide?

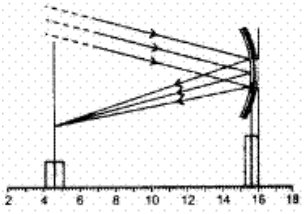
Section C

30. Which of the following statements is/are incorrect? **[1]**

A. A neutron has a positive charge of $+1.6 \times 10^{-19}$ C
B. An ammeter is a low resistance device.
C. The resistance of semiconductors decreases with temperature.
D. One ampere is equal to 10^{-6} uA.

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

31. The focal length of the concave mirror in the experimental set up, shown below, equals **[1]**



a) 11.0 cm
b) 12.2 cm
c) 1.7 cm
d) 10.3 cm

32. **Assertion (A):** The stars twinkle while the planet do not. **[1]**
Reason (R): The stars are much bigger in size than the planets.

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. List four sources of magnetic field. **[2]**

34. A wire of given material having length l and area of cross-section A has a resistance of 4Ω. What would be the resistance of another wire of the same material having length l/2 and area of cross-section 2A? **[2]**

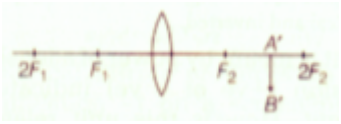
OR

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

35. The image formed by a spherical mirror is real, inverted and is of magnification -2. If the image is at a distance of 30 cm from the mirror, where is the object placed? Find the focal length of the mirror. List two characteristics of the image formed if the object is moved 10 cm towards the mirror. **[3]**

36. When one enters a less lighted room from a place of intense light, he is not able to see anything for sometime, but after sometime the things become somewhat visible. Explain how this happens? **[3]**

37. Observe the following incomplete ray diagram of an object where the image A'B' is formed after refraction from a convex lens. **[3]**



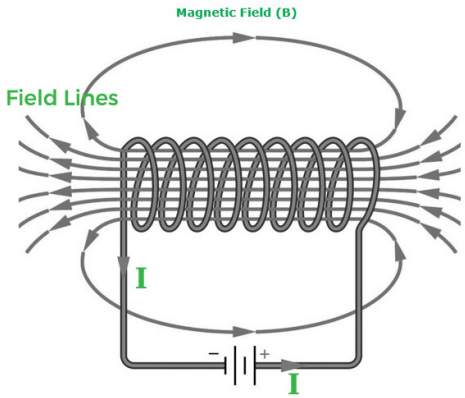
On the basic of above information fill in the blanks.

i. The position of object AB would have been...

ii. Size of the object would have been ... than the size of image.

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

An insulated copper wire wound on a cylindrical cardboard tube such that its length is greater than its diameter is called a solenoid. When an electric current is passed through the solenoid, it produces a magnetic field around it. The magnetic field produced by a current-carrying solenoid is similar to the magnetic field produced by a bar magnet. The field lines inside the solenoid are in the form of parallel straight lines. The strong magnetic field produced inside a current-carrying solenoid can be used to magnetize a piece of a magnetic material like soft iron when placed inside the solenoid. The strength of the magnetic field produced by a current-carrying solenoid is directly proportional to the number of turns and strength of the current in the solenoid.



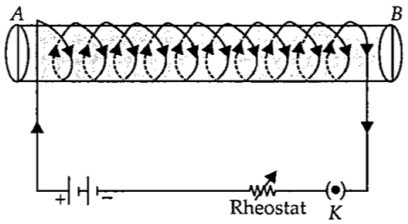
i. What would be the strength of the magnetic field inside a long current-carrying straight solenoid? (1)

ii. Which end is north and which end is south pole when current flows through a solenoid? (1)

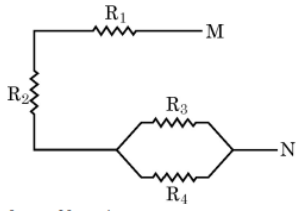
iii. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is double and the number of turns per cm is halved, then what will be the new value of the magnetic field? (2)

OR

A soft iron bar is enclosed by a coil of insulated copper wire as shown in the figure. When the plug of the key is closed, then where would the face B of the iron bar be marked? (2)



39. i. For the combination of resistors shown in the following figure, find the equivalent resistance between M & N. **[5]**



ii. State Joule's law of heating.

iii. Why we need a 5 A fuse for an electric iron which consumes 1 kW power at 220 V?

iv. Why is it impracticable to connect an electric bulb and an electric heater in series?

OR

i. What is meant by resistance of a conductor? Define its SI unit.

ii. List two factors on which the resistance of a rectangular conductor depends.

iii. How will the resistance of a wire be affected if its

I. length is doubled, and

II. radius is also doubled?

Give justification for your answer.

Solution

Section A

1.

(d) Uterus

Explanation:

The fertilized embryo gets attached to the uterus and all the developmental process of the embryo takes place in the uterus.

2.

(b) copies of the same chromosome

Explanation:

The two versions of a trait that are brought in by the male and female gametes are situated on copies of the same chromosome. Each parent contributes one copy of the gene for a particular trait.

3.

(b) Both A and B

Explanation:

Uncovered portion of the leaf is exposed to the light and photosynthesis reaction takes place there.

$6CO_2 + 12H_2O \xrightarrow[Chlorphyll]{Sunlight} C_6H_{12}O_6 + 6H_2O + 6O_2$

4.

(b) A

Explanation:

Uterus is a site of implantation.

5.

(d) various interlinked food chains in an ecosystem

Explanation:

A food chain is a series of plants/animals which are interrelated in the form of an organism being eaten as food by the other. The Food web is constituted by various interlinked and interdependent food chains in a community. It is also called a consumer-resource system. The ecosystem consists of living organisms and their abiotic environment. Thus, the correct answer is 'Various interlinked food chains in a community.'

6.

(b) (A)

Explanation:

(A) is the correct observation.

Daughter cells originate as small buds of the parent cell and grow very fast. Daughter cells remain attached to parent cells and separate later on. And the daughter cells of Amoeba and the bud of Yeast are smaller than their respective parental cells.

7.

(c) Abscisic acid

Explanation:

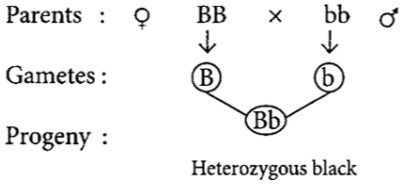
Abscisic acid inhibits the growth of plant hence it is not associated with the growth of the plant.

8.

(c) A is true but R is false.

Explanation:

Gene for black hair colour is dominant to gene for red hair colour in humans. Mother has black hair and can be represented by (BB) whereas father can be represented by (bb).



So, the child will be heterozygous for black hair colour.

9.

(c) A is true but R is false.

Explanation:

A is true but R is false.

10. Pesticides are poisonous chemical substances, which are sprayed over crop plants to protect them from pests and diseases by either killing them or stopping their growth. These chemical pesticides mix up with soil and water from where they are absorbed by the growing plants along with water and other minerals and get deposited in plant tissues. When herbivorous animals eat plants then these poisonous chemical pesticides go into their bodies through the food chain and further when they are consumed by carnivores, then the pesticides get transferred to their bodies. In this process of transfer of food through food chains these harmful chemicals get concentrated at each subsequent trophic level and their concentration keep on increasing (Biomagnification) with increasing trophic level.
11. Man-made ecosystem are called artificial ecosystem. For example- Garden, Aquarium.

OR

a. 10 units of energy will pass from grass to goat.
b. 1 unit of energy will pass from goat to tiger.
c. Lindeman's Ten percent law operates during the transfer of energy from grass to goat to tiger.

12.

Organs	Sympathetic nervous system	Parasympathetic system
Lungs	Dilates bronchi and bronchioles	Constricts bronchi and bronchiole
Heart	Increases heart rate	Decreases heart rate
Salivary gland	Inhibits saliva secretion	Stimulates saliva secretion
Pupil of eye	Dilation	Constriction

13.

Binary fission	Multiple fission
A parent cell is present which on cytokinesis forms 2 daughter cells.	A parent cell is present which forms multiple daughter cells.
It undergoes cytokinesis.	It undergoes multiple divisions to form many daughter cells.
Occurs during favorable conditions.	Occurs during unfavorable conditions.
most common form of reproduction in prokaryotes.	most common form of reproduction in Protists and parasitic species.
both cytoplasm and nucleus divide together	the nucleus divides first and is surrounded by cytoplasm whose division occurs in the later stage.
Example: Bacteria, Amoeba, etc.	Example: Plasmodium, Algae, etc.

14. The lining of the alimentary canal has muscles that contract rhythmically so that the food can be pushed down through it easily. This action is known as peristalsis. These movements of muscles help the passage of food through the gut.
15. a. i. Renal Artery
    ii. Glomerulus

    b.
    - Urinary bladder
    - Nervous control

c. Filtration: Nitrogenous wastes such as urea or uric acid are removed

Reabsorption: Glucose, amino acids, salts/some useful materials and major amounts of water reabsorbed

OR

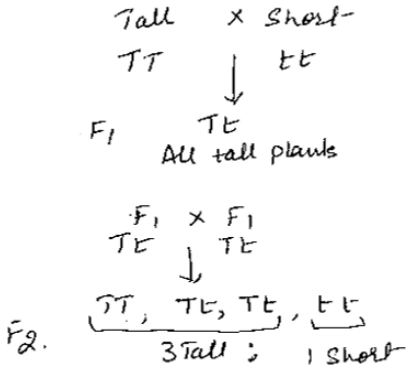
Tubular part of nephron.

The amount of water absorbed depends on:

how much water is there in the body.

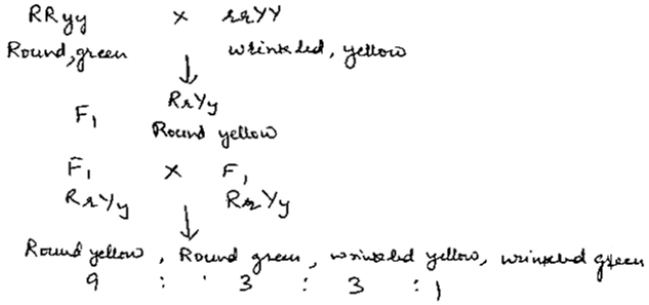
how much dissolved waste is there to be excreted.

16. a. i.
- Mendel crossed pure tall pea plants with pure short pea plants.
- All tall plants were produced in the F1 generation.
- When F1 tall plants were self-pollinated, Mendel got both tall and short plants in the ratio of 3 Tall : 1 Short.
- This clearly indicated that tall character is dominant over short character which although present would not be expressed in F1 generation. /



ii. When pea plants with two different characteristics like plants with **round and green seeds** and the plants with wrinkled and yellow seeds; were bred with each other, the F1 generation had plants with round and yellow seeds **(dominant character).**

On self-pollination of F1 generation plants, F2 generation obtained **was a mixture of round yellow, round green, wrinkled yellow and wrinkled green** in the ratio **9:3:3:1**, thus showing that the traits are inherited independently. /



b. Birds and bats are more closely related because they have wings to fly, whereas squirrels and lizards do not. The wings of birds and bats are analogous organs.

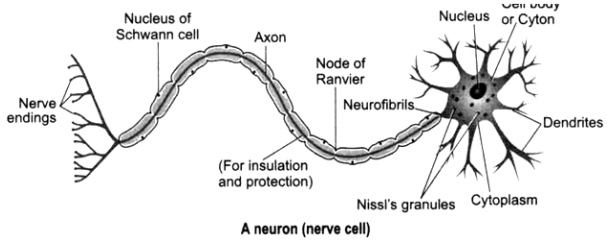
OR

Neuron or nerve cell is a structural and functional unit of the nervous system that is specialised to receive, conduct and transmit nerve impulses. A neuron (nerve cell) has three components:

i. Cell body (cyton)

ii. Dendrites

iii. Axon



A neuron (nerve cell)

Functions: The information acquired at the end of the dendritic tip of a neuron sets off a chemical reaction which creates an electrical impulse. This impulse travels from die dendrite to the cyton along the axon of its end. At the end of axon, the electrical impulse sets off the release of some chemicals, which cross the synapse and start a similar electrical impulse in a dendrite of the next neuron. In this way nerve impulses travel in the body, from one neuron to another till it reaches the brain or the target organ.

Thus, a nervous tissue is made up of an organised network of nerve cells or neurons which are specialised in conducting information via electrical impulse from one part of the body to another.

Section B

17.

(b) (A) and (C)

Explanation:

(A) and (C)

18.

(b) (ii) and (iv)

Explanation:

Barium chloride on reacting with ammonium sulfate forms barium sulfate and ammonium chloride, it is the double displacement and precipitation reaction.

19.

(c) None of these

Explanation:

The process of fermentation is carried in the dark at a temperature of about 30^oC. The vessel is kept closed and air is not allowed to enter.

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

Explanation:

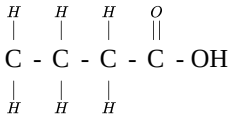
- The general formula of an alcohol is R-OH.
- The general formula of an aldehyde is R-CHO.
- The general formula of a ketone is R-CO-R'.
- The general formula of a halo-alkane is R-X.

21. **(a)** Graphite

Explanation:

Graphite is a good conductor of electricity and heat. Graphite has weak intermolecular forces between its layers. Hence it has de-localized electrons. As electrons are free to move through its structure, it conducts heat and is a good conductor of electricity.

22. **(a)**



Explanation:

The general formula of a carboxylic acid is R-COOH where R is an alkyl group. So, because 'butane' shows the presence of 4 single-bonded carbon atoms 'oic acid' shows the presence of $-\overset{\overset{O}{\|}}{C}- \ OH$ group. The formula of butanoic acid is C_3H_7COOH.

23.

(c) Sodium hydrogen carbonate and tartaric acid

Explanation:

Baking soda is a mixture of sodium hydrogen carbonate ($NaHCO_3$) and a mild edible tartaric acid.

24.

(c) A is true but R is false.

Explanation:

Hydrogen peroxide is a highly reactive metal that can react with light or heat to produce water. It decomposes into water and oxygen in the presence of sunlight. To prevent this reaction with light and heat it is stored in coloured bottles so that light cannot pass through it. Thus assertion is true, but reason is false.

25. i. Hydrogen ion concentration of an aqueous solution is inversely proportional to its pH.
ii. The solution is neutral.
iii. 1 M NaOH solution has higher pH because base have higher pH value than acids.
iv. Tooth enamel gets corroded slowly when pH in the mouth is below 5.5. Acid is produced in mouth due to degradation of food which is partially hydrolysed by saliva. But if excess acid is produced, it causes tooth decay. It can be prevented by using tooth paste which are generally basic.
v. H^+ ions exist in water as H_3O^+ ions.

26. A is methanoic acid, HCOOH. It turns blue litmus red.
$HCOOH + NaHCO_3 \rightarrow HCOONa + CO_2 + H_2O$

OR

a. A group of organic compounds having similar structures and similar properties and whose successive members differ by $-CH_2$ group is called a homologous series.
Example: All the alkanes have a similar structure with single covalent bonds and show similar chemical properties. Therefore, they form a homologous series of alkanes. The first six members of this homologous series are given below:

Name of the alkane	Molecular formula	Name of the alkane
Methane	CH_4	Butane
Ethane	C_2H_6	Petane
Propane	C_3H_{11}	Hexane

The general formula of the homologous series of alkanes is C_nH_{2n+2}.

b. i. Molecular formula of any two adjacent homologues differ from each other by 14 units with regard to molecular mass.
ii. Molecular formulae of any two adjacent homologues differ by $-CH_2$ group, i.e., they differ by one carbon and two hydrogen atoms.

27. i. Q is the most reactive metal out of P, R and Q as it has replaced both P and R from their compounds.
ii. R is the least reactive element as it has been displaced by both P and Q.
iii. The type of reaction is Displacement reaction.

28. i. Formic acid is the common name for methanoic acid and it is present in a bee stings.
ii. $pH = -\log_{10}[H^+] = 8$

$\log 10 [H^+] = -8$

$[H^+] = 10^{-8}$ mol/L
iii. Water < Acetic acid < Hydrochloric acid
OR
C_2H_5OH is not an ionic compound, it is a covalent compound and hence does not give H^+ ions in aqueous solution.

29. $\underset{\substack{Used for\\ Whitewashing}}{\text{'A'}} \xrightarrow[\substack{Exothermic\\ reaction}]{+H_2O} \text{'B'} \xrightarrow{CO_2} \underset{Whiteppt.}{\text{'C'}}$

Quicklime (CaO) is used for whitewashing. So 'A' is CaO.
$Cao + H_2O \rightarrow \underset{\substack{Calcium\\ Carbonate}}{Ca(OH)_2} + Heat$

'B' is $Ca(OH)_2$

$Ca(OH)_2(aq) + CO_2(aq) + CO_2(g) \longrightarrow \underset{\substack{Calcium Carbonate\\ (Whiteppt.)}}{CaCO_3(s)}$

'C' is $CaCO_3$.

OR

i. **Copper is heated in air**
Copper is heated in the presence of air to produce black copper oxide.
$2Cu(s) + O_2(g) \longrightarrow 2CuO(s)$

ii. **Aluminum oxide is reacted with hydrochloric acid**

Aluminum oxide is treated with hot dilute hydrochloric acid to produce aluminum chloride and water.

Al_2O_3 (s) + 6HCl (aq) $\longrightarrow$ 2$AlCl_3$ (aq) + 3H_2O (l)

iii. **Potassium reacts with water**

When potassium combines with water, potassium hydroxide and hydrogen gas are formed.

2K (s) + 2H_2O (l) $\longrightarrow$ 2KOH (aq) + H(g)

iv. **Cinnabar is heated in air**

When cinnabar is burned in air, it is converted to mercuric oxide, which produces sulfur dioxide gas.

2HgS (s) +3O_2 (g) $\longrightarrow$ 2HgO (s) + 2SO_2 (g)

v. **Aluminum oxide reacts with sodium hydroxide**

Sodium aluminate and water are formed when aluminum oxide combines with sodium hydroxide.

Al_2O_3 (s) + 2NaOH(aq) $\longrightarrow$ 2$NaAlO_2$ (aq) + H_2O (l)

Section C

30.

(c) A and D

Explanation:

B and C are correct. An ammeter is a low resistance device. A semiconductor material has an electrical conductivity value falling between that of a conductor, such as copper, and an insulator, such as glass. As the temperature increases, their resistance decreases.

A and D are incorrect. A neutron is a sub-atomic particle that has no charge. One μA is equal to 10^{-6} A. An ampere is a bigger unit. Micro-ampere (μA) is a smaller unit.

31. **(a)** 11.0 cm

Explanation:

Distance of pole to focus is called focal length :

$\therefore$ f = 15.6 - 4.6 = 11.0 cm

32.

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

Explanation:

As planets are of larger size than stars and much closer to the earth, planets can be considered as a collection of a large number of point-sized sources of light. The total variation in the amount of light entering our eye from all these individual point-sized sources will average out to zero which nullifies the twinkling effect of each other. Therefore, planets do not twinkle.

33. (1) Magnetic field around a magnet.

(2) Magnetic field around current carrying conductor.

(3) Magnetic field around a current carrying solenoid.

(4) Magnetic field around an electromagnet.

34. For first wire

$R_1 = \rho\frac{l}{A} = 4\Omega$

Now for the second wire

$R_2 = \rho\frac{l/2}{2A} = \frac{1}{4}\rho\frac{l}{A}$

$R_2 = \frac{1}{4}R_1$

$R_2 = 1\Omega$

The resistance of the new wire is 1Ω

OR

I=10 A, V=220 V

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

= $\frac{220}{10}$

= 22 Ω

35. Image distance, v = - 30 cm

Magnification, m = - 2

Magnification produced by a mirror,

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

-2 = $-\frac{(30)}{u}$

u = -15 cm

Now, using mirror formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

$\frac{1}{f} = -\frac{1}{30} - \frac{1}{15}$

$\frac{1}{f} = \frac{-1-2}{30}$

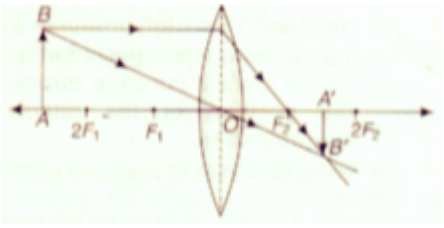
$\frac{1}{f} = \frac{-3}{30} = -\frac{1}{10}$

f = -10 cm

If the object is shifted 10 cm towards the mirror then, u = -5 cm, i.e., object is between pole and focus, thus image formed will be virtual, erect and magnified.

36. When we are in bright sunlight the aperture of the pupil would be small to regulate the amount of light entering the eye preventing glare, discomfort and damage to eyes. As we enter a dark room less amount of light would enter our eyes due to small size of pupil, and we won't be able to see objects clearly. It takes some time to regulate the size of the pupil through iris. Hence, it requires some time to see things.

37. i. The position of object AB would have been beyond $2F_1$.



ii. Size of the object would have been bigger than the size of image.

38. i. Magnetic field inside the infinite solenoid is uniform. Hence it is the same at all points.

ii. The end of the current carrying solenoid at which the current flows anti-clockwise behaves as a north pole while that end at which the direction of current clockwise behaves as a south pole and this is according to clock wise.

iii. For a long solenoid, magnetic field B $\propto$ In; where I is the flowing current and n is number of turns per unit length in the solenoid. Therefore, in the given case magnetic field will remain unchanged.

OR

For a solenoid, if we imagine gripping the solenoid with your right hand so that your curl fingers follow the direction of the current then your thumb will point towards the north end of the electromagnet.

39. i. Equivalent resistance between M and N

= $\left[\frac{(R_3 \times R_4)}{(R_3 + R_4)}\right]$

ii. Joule's law of heating states that when a current i passes through a conductor of resistance r for time t then the heat developed in the conductor is equal to the product of the square of the current, the resistance, and time. This can be expressed as:

$H = I^2Rt$

iii. We need a fuse of 5A for an electric iron which consumes 1 kW power at 220 V. It is because:

Given P = 1000 W, V = 220 V

As we know, P = V $\times$ t

Or I = $\frac{P}{V}$

Or I = $\frac{1000}{220V}$ = 4.5 A

Hence,4.54 ampere current flows in the circuit, the fuse should be of 5A.

iv. As you know, in a series circuit the current is constant throughout the electric circuit. Thus it is obviously impracticable to connect an electric bulb and an electric heater in series because they need currents of widely different values to operate properly.

OR

i. Resistance is the quality of a conductor that causes it to resist the flow of an electric current through it. It is the proportion of the potential difference between ends to the current flowing. The SI unit is ohm (Ω).

ii. Two factors on which the resistance of a rectangular conductor depends are:

I. Length of conductor

II. Area if cross-section

iii. I. $\mathrm{R} = \frac{\rho \mathrm{l}}{\mathrm{A}}$

Where, ρ = electrical resistivity

l = length of the conductor

A = cross-sectional area of the conductor

Hence, if the length is double then

$\Rightarrow \mathrm{R}_1 = \rho\frac{(2|)}{\mathrm{A}}$

$\therefore \mathrm{R}_1 = 2(\mathrm{R})$

So, if the length of the resistance gets doubled then resistance also gets doubled.

II. Now, when the radius is double then

$\Rightarrow \mathrm{R}_2 = \frac{\rho \mathrm{l}}{\mathrm{A}}$

$\Rightarrow \mathrm{R}_2 = \frac{\rho l}{\pi(2\mathrm{r})^2}$

$\therefore \mathrm{R}_2 = \frac{1}{4}$ (R)

So, if the radius gets doubled then resistance will be $\left(\frac{1}{4}\right)^{\text{th}}$ of initial resistance.