Sample Paper

Max. Marks: 80 **Duration:3 hours**

General Instructions

(i) The question paper comprises four sections A, B, C, and D. There are 36 questions in the question paper. All questions are compulsory.

(ii) (Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple-choice questions (MCQs), very short answer questions, and assertion - reason type questions. Answers to these should be given in one word or one sentence.

(iii) Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should be in the range of 30 to 50 words.

(iv) Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should be in the range of 50 to 80 words.

(v) Section–D – question no. - 34 to 36 are long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.

(vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(vii) Wherever necessary, neat, and properly labelled diagrams should be drawn.

Section-A

1. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

OR

Write the chemical name and formula of washing soda?

2. The example of olfactory indicators is

   A. Methyl orange B. Onion

   C. Blue litmus D. Phenolphthalein

3. The magnification produced by a spherical mirror and a spherical lens is + 0.8.

   A. The mirror and lens are both convex

   B. The mirror and lens are both concave

   C. The mirror is concave but the lens is convex

   D. The mirror is convex but the lens is concave

4. What is the shape of current-carrying conductor whose magnetic field pattern resembles that of a bar magnet?

5. State whether it is true or not:

   "When a ray of light goes from air into a clear material, you see the ray bend. How much the ray bends is determined by the refractive index of the material."

6. Name the material which is used for making the heating element of an electric iron.

OR

For which positions of the object does a concave mirror produce an inverted, magnified and real image?

7. Why do different coloured rays deviate differently in a prism? Which color deviates the least?

8. An object is moved closer to an eye. What changes must take place in the eye in order to keep the image sharp at the focus?

9. If 20 C of charge pass a point in a circuit in 1 s, what current is flowing?

10. When air is blown from mouth into a test tube containing lime water, the lime water turned milky due to the presence of:

A. oxygen
B. carbon dioxide
C. nitrogen
D. water vapour

11. Apart from sunlight and chlorophyll, what other things are required to make food by photosynthesis?

OR

What is the scientific name of the organisms which are:

(i) Dead and decaying organic matter (Detritus) eaters

(ii) Both plant and meat eaters

12. Fill in the blanks in the given sentence with appropriate terms.
_____ is widely regarded as the Father of Genetics. He performed his experiments on the Pea plant. His work was widely known as the _____.

OR

A zygote which has an X-chromosome inherited from the father will develop into a:

A. Boy
B. Girl
C. X-chromosome does not determine the sex of a child at all.
D. Either a boy or girl

13. What is meant by a saturated hydrocarbon?

Direction: Each of these questions (14-16) contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion

(b) If both Assertion and Reason are correct, but Reason is sot the correct explanation of Assertion.

(c) If Assertion is correct but Reason is incorrect.

(d) If Assertion is incorrect but Reason is correct.

14. Assertion: We cannot produce a real image by plane or convex mirrors under any circumstances.

Reason: The focal length of a convex mirror is always taken as positive.

15. Assertion: Arteries are thick-walled and elastic in nature.

    Reason: Arteries have to transport blood away from the heart.

16. Assertion: Rusting of iron is a chemical change.

    Reason: The chemical properties of hydrated iron oxide are different from iron and oxygen.

17. **Read the following paragraph carefully and answer any four out of the five questions 17 (i) to 17 (v) based on your understanding of the paragraph.**

"You meet lots of new people and friends every day. Try to notice the lowest part of their earlobes. You will find out that there are two types of people – Some of them might have an attached earlobe and others might have a free earlobe. In general, most people have free earlobes."

(i) What does figure (a) and (b) indicate? About which hereditary phenomenon does the paragraph talk about?

(ii) State the law of inheritance which explains this phenomenon.

(iii) Give an example of the same phenomenon in a plant or an animal.

(iv) How will you define the gene of a particular protein?

(i) genes are specific sequence of bases in DNA molecule
(ii) a gene does not code for proteins
(iii) in individuals of a given species, a specific gene is located on a particular chromosome.
(iv) each chromosome has only one gene

A. (i) and (ii)
B. (i) and (iii)
C. (i) and (iv)
D. (ii) and (iv)

18. Read the following paragraph carefully and answer any four out of the five questions 18 (i) to 18 (v) based on your understanding of the paragraph.

All organisms such as plants, animals, microorganisms and human beings as well as the physical surroundings interact with each other and maintain a balance in nature. All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem. Thus, an ecosystem consists of biotic components comprising living organisms and abiotic components comprising physical factors like temperature, rainfall, wind, soil and minerals.

(i) What is meant by an 'ecosystem'?

(ii) What are the abiotic components of an ecosystem?

(iii) In what way, the biotic components of an ecosystem are different from abiotic components?

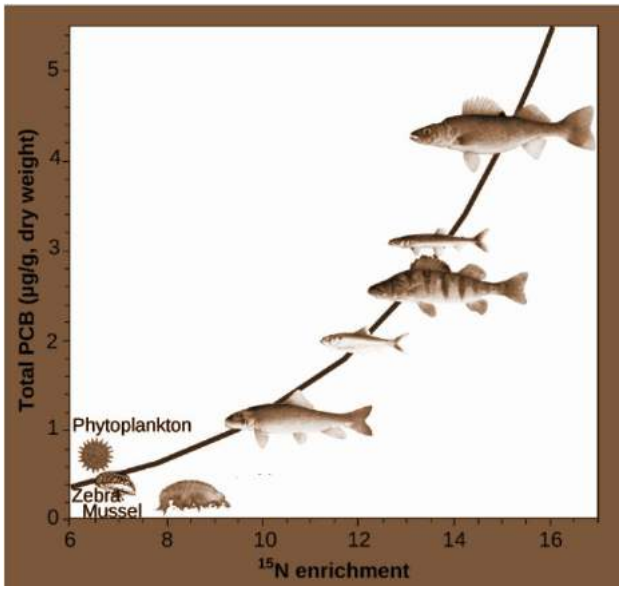
(iv) Which one of the following is an artificial ecosystem?

A. pond B. crop field

C. lake D. forest

(v) Study the following graphical representation and answer the question:

Polychlorinated biphenyls (PCBs) were used in coolant liquids in the United States until their use was banned in 1979, and heavy metals, such as mercury, lead, and cadmium. These substances were best studied in aquatic ecosystems, where fish species at different trophic levels accumulate toxic substances brought through the ecosystem by the primary producers. As illustrated in a study performed by the National Oceanic and Atmospheric Administration (NOAA) in the Saginaw Bay of Lake Huron, PCB concentrations increased from the ecosystem's primary producers (phytoplankton) through the different trophic levels of fish species. The apex consumer (walleye) has more than four times the amount of PCBs compared to phytoplankton.



Why does the concentration of PCBs increase as we move upwards the aquatic food chain?

A. PCBs are easily metabolized in the animal's body.

B. PCBs are easily excreted outside the body.

C. They are processed as non-harmful products inside the body, hence their concentration rises.

D. They are not easily metabolized and don't get excreted out of the body easily.

19. **Read the following paragraph carefully and answer any four out of the five questions 19 (i) to 19 (v) based on your understanding of the paragraph.**

A substance X reacts with sodium metal and hydrogen gas is evolved. X reacts in the molar ratio of 1:1 with a sodium hydroxide to form Y and Z in molar ratio of y:z. Answer the following question based on the information given below.

i. What is the substance X present here?

ii. Write the reaction of X with sodium metal.

iii. Explain the acidity/ basicity of X ?

iv. What are the substance Y and Z formed?

v. Write the balanced chemical reaction of X with sodium hydroxide. What would be the value of ration y:z ?

20. Read the following paragraph carefully and answer any four out of the five questions 20 (i) to 20 (v) based on your understanding of the paragraph.

A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the center of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the board gently and observes that the iron filings arrange themselves in a particular pattern.

i. Why do the iron filings arrange in a pattern?

ii. What does the crowding of iron filings at the end of the magnet indicate?

iii. What does the lines along which the iron filings align represent?

iv. Draw a neat diagram to show the magnetic field lines around a bar magnet.

v. Write any two properties of magnetic field lines.

Section-B

21. What is glomerulus?

OR

Draw a well-labelled diagram showing the nephron.

22. Why are budding, fragmentation and regeneration, all considered to be asexual type of reproduction?

23. The way metals like sodium, magnesium and iron react with air and water is an indication of their relative positions in the 'reactivity series'. Is this statement true? Justify your answer with examples.

OR

Name the following:

(a) A metal, which is preserved in kerosene.

(b) A lustrous coloured non-metal.

(c) A metal, which can melt while kept on the palm.

(d) A metal, which is a poor conductor of heat.

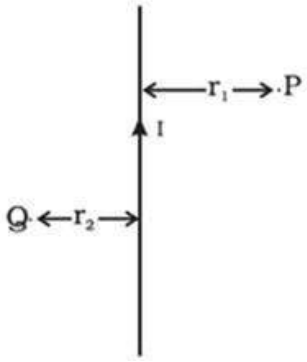
24. (i) Explain why, if we look at objects through the hot air over a fire, the objects appear to be moving (or shaking) slightly. (1)

(ii) Explain why, the sun can be seen about two minutes before actual sunrise. Draw a diagram to illustrate your answer. (1)

25. A. What is the principle of reversibility of light? Show that the incident ray of light is parallel to the emergent ray of light when the light falls obliquely on a side of a rectangular slab.

26. AB is a current carrying conductor in the plane of the paper as shown in the figure. What are the directions of magnetic fields produced by

it at points P and Q? Given $r_1 > r_2$, where will the strength of the magnetic field be larger?



Section- C

27. Which of the processes, sexual reproduction or asexual reproduction, brings about maximum variations in the offspring?

OR

How are the alveoli designed to maximize the exchange of gases?

28. Why do autotrophic organisms form the starting point of a food chain?

29. What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem?

30. Out of hydrochloric acid and acetic acid, which one is a weak acid and why? Describe an activity to support your answer.

31. Write one equation each for decompositions reactions where energy is supplied in the form of heat, light or electricity.

32. Name the products formed in following cases

(a) when hydrochloric acid reacts with caustic soda.

(b) when granulated zinc reacts with caustic soda.

(c) when carbon dioxide is passed into lime water.

33. (i) What is the principle of an electric motor? Name some of the devices in which electric motors are used. (1)

(ii) An electric kettle rated as 1200 W at 220 V and a toaster rated at 1000 W at 220 V are both connected in parallel to a source of 220 V. If the fuse connected to the source blows when the current

exceeds 9.0 A, can both appliances be used at the same time? Illustrate your answer with calculations. (2)

Section-D

34. Draw a well-labelled diagram of the human respiratory system. Explain the overall process of breathing.

35. (a) Define activity series of metals. Arrange the metals gold, copper, iron and magnesium in order of their increase in reactivity.

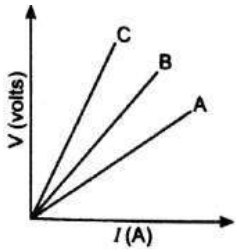
(b) What will you observe when:

(i) Some zinc pieces are put in copper sulphate solution.

(ii) Some silver pieces are put into green coloured ferrous sulphate solution.

36. (i) The resistivity of copper is 1.7×10^{-8} Ωm. What length of copper wire of diameter 0.1 mm will have a resistance of 34Ω? (3)

(ii) Three V-I graphs are drawn individually for two resistors and their series combination. out of A, B, C which one represents the graph for series combination of the other two? Give reason for our answer. (2)



OR

a) Define optical centre of a spherical lens.

(b) A divergent lens has a focal length of 20 cm. At What distance should an object of height 4 cm from the optical centre of the lens be placed so that its image is formed 10 cm away from the lens, Find the size of the image also.

(c) Draw a ray diagram to show the formation of image in above situation.

Hints & Solutions

Section-A

1. Solution: When copper is mixed in silver nitrate solution, it displaces the silver because copper is more reactive than silver.

$$2AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2Ag$$

OR

Solution: Washing soda: Sodium Carbonate, $Na_2CO_3.10H_2O$

2. Solution: The example of olfactory indicators is onion.

3. Solution: The magnification of the mirror/lens is + 0.8; it suggests that the image is virtual, erect and diminished.

A convex mirror and concave lens can only produce an erect, virtual and diminished image.

4. Solution: A current carrying conductor is of solenoid shape whose magnetic field pattern seems to that of the bar magnet.

5. Solution: The degree at which the light will bend depends on the refractive index of the material. In accordance with the Snell's law i.e.

$$\mu = \frac{\sin i}{\sin r}$$

6. Solution: Nichrome wire is used as a heating element because it is very stable, even at high temperatures.

OR

Object should be placed between focus and center of curvature to produce an inverted, magnified and real image.

7. Solution: Different color has different speed of travelling inside the prism so different color deviates at different angle.

Among all the colors Red deviates the least.

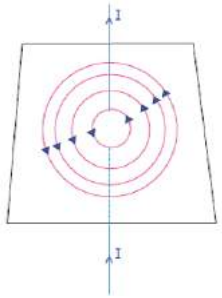
8. Solution: The shape of the eye-lens must be changed by the ciliary muscles to make it thicker and increase its converging power in order to keep the image sharp at the focus i.e., Retina.

9. Solution: The flow of electric charge is known as electric current. Here, 20 C charge passes in a circuit in one second.
Thus,

$$I = \frac{Q}{t} \Rightarrow \frac{20}{1} = 20\ A$$

OR

Solution: The direction of the current in the wire is in the anticlockwise direction. This can be determined by using Maxwell's right hand thumb rule.



10. Solution: We exhale carbon dioxide, so when air is blown from the mouth, i.e., carbon dioxide, into a test tube that contains lime water, the lime water turns milky due to presence of carbon dioxide. Carbon dioxide turns lime water milky. This is due to the formation of calcium carbonate when carbon dioxide combines with calcium hydroxide (limewater).

11. Solution: Carbon dioxide and Water

$$6CO_2 + 6H_2O + (\text{sunlight}) \rightarrow C_6H_{12}O_6 + 6O_2$$

OR

(i) Saprotrophs

(ii) Omnivores

12. Solution: **Gregor Mendel** is widely regarded as the Father of Genetics. He performed his experiments on the Pea plant. His work was widely known as the **Laws OR Principles of Inheritance.**

(*Using the term Principles is more accurate here, but Laws of Inheritance is an acceptable answer as well*).

In humans, the sex of the child is determined by the sex chromosomes inherited from parents. As females have a set of XX sex chromosomes, the mother can contribute only an X chromosome to the child. The males have a set of XY sex chromosomes and thus, the father can contribute either an X or a Y chromosome. If an X chromosome is inherited from the father, the child will be a female having XX as her sex chromosomes.

13. Solution: Those hydrocarbons in which valency of carbon is satisfied by single bonds only are called saturated hydrocarbons.
14. Solution: A plane or a convex mirror always produces virtual image irrespective of the position of the image. The focal length of a convex mirror is always taken to be positive in any circumstances.

    Thus, option (a) is the correct answer.
15. Solution: The reason does not explain the assertion properly. Arteries carry the blood under the pressure exerted by the heart, that's why these are thick-walled.
16. Solution: If the assertion is INCORRECT, but the reason is CORRECT.

    Nitrogen is flushed to avoid potato chips getting rancid.
17. Solution:

    (i) The figure (a) represents the Free Earlobe and the figure (b) represents the Attached Earlobe. The above paragraph talks about the Dominance of Free earlobes vs attached earlobes. The Phenomenon is Dominance.

    (ii) The law of Dominance states that When two homozygous plants, with one contrasting Character, is crossed, the character which is expressed in an F1 generation is known as a dominant character while the character which is not expressed in an F1 generation is known as recessive character.

    (iii) Plants- Tallness in Pea Plant is a dominant trait while Dwarfness is a recessive one.

    Animals- Brown eye color is Dominant whereas Blue eye color is a recessive trait.

(iv) The part of cellular DNA, which provides information regarding a particular protein, i.e. codes for that protein, is called the gene for that protein.

(v) Answer: B

Solution: Genes are specific sequences of bases on a DNA molecule, located on a particular chromosome, and code for proteins. A chromosome has more than one gene.

18. Solution :

(i) All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem.

(ii) The non-living parts of an ecosystem are called abiotic components. Abiotic components include sunlight, water, wind, temperature, altitude (height), soil, pH, and atmospheric gases.

(iii).

	Biotic components	Abiotic Components
Are they living things?	YES	NO
Examples	Animals, plants, fungi, bacteria – all living things	Forest fires, water, climate, habitat, soil, minerals

(iv). Answer: B

An artificial ecosystem is a man-made system where there is interaction among plants, animals, and people living in an area together with their surroundings. Examples are crop fields, aquarium.

(v). Answer: D

PCBs are not easily metabolized and hence cannot be excreted easily. This leads to its accumulation within the animal's body. When the organisms in upper trophic levels consume the individuals of the lower trophic levels, the concentration of these toxic substances start to accumulate and enrich with each trophic level. Hence, they are harmful to the topmost consumer, which in most cases is the human itself.

19. Solution:

a) The substance X present here could be any acid for example HCl , HNO_3 HBr etc.

b) The reaction of an acid with sodium metal leads to the formation of hydrogen gas and a salt.

Let X be HNO_3, the balanced chemical reaction would then be-

$$HNO_3 + Na \rightarrow NaNO_3 + H_2$$

c) Sodium hydroxide is monobasic, that is it has one hydroxide ion. Hence the acid would be monoprotic acid or it has one hydronium ion.

d) When an acid reacts with a base it forms salt and water so Y and Z would be salt and water.

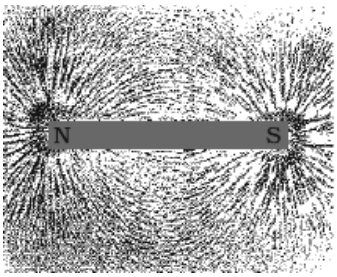
e) The balance chemical reaction between X and NaOH is given as under

$$HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$$

Since both base and acid has 1 hydroxide ion and 1 hydronium ion the molar ratio of y:z would also be 1:1.

20. Solution :

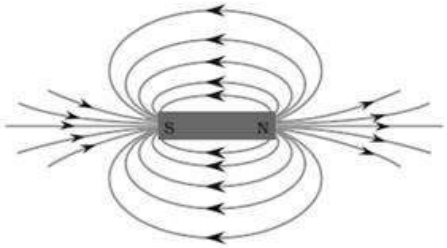
i. The bar magnet kept at the center of board has its magnetic field around it. The iron filings sprinkled on the board experience a force on them due to the magnetic field of bar magnet. So, when the student taps the board the iron filings align themselves according to the magnetic field lines of the bar magnet.



ii. The relative strength of magnetic field is shown by the degree of closeness of magnetic field lines. The iron fillings are crowded near the poles of the bar magnet. This shows that the magnetic field due to the magnet is maximum near the poles of the magnet.

iii. The force exerted on the iron filings align themselves according to the magnetic field lines of the magnet. Thus, the lines along which the fillings align represent the magnetic field lines.

iv. Following figure represent the magnetic field line around a bar magnet: -



v. The properties of magnetic field lines are:

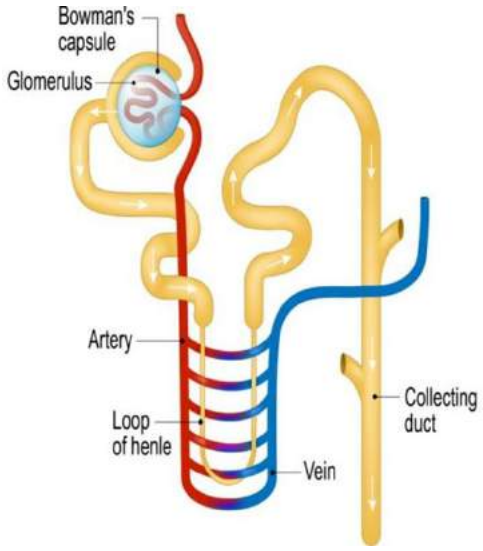
- They are closed curves. They originate from North pole and merge at the South pole outside magnet. Inside the magnet, they direct from South to North pole.

- No two magnetic field lines can cross each other. If they do, it means that there are two directions of the field at that point which is impossible.

SECTION – B

21. Solution: Glomerulus is a tiny spherical structure present in nephrons (functional unit of a kidney). It is formed by the cluster of very thin-walled blood capillaries that are involved in filtration of blood to form urine. Each of this clustered group of capillaries is associated with a cup-shaped tube that collects the filtered urine.

OR



A Nephron

22. Solution: Because in all these methods, only a single parent takes part and forms new off springs without using gametes.

23. Solution: Yes, sodium reacts explosively even with cold water, it is most reactive. Magnesium reacts with hot water, it is less reactive than Na. Iron reacts only with steam which shows it is least reactive among the three.

OR

Solution: (a) Sodium is preserved in kerosene

(b) Iodine is lustrous coloured non-metal

(c) Gallium

(d) Lead

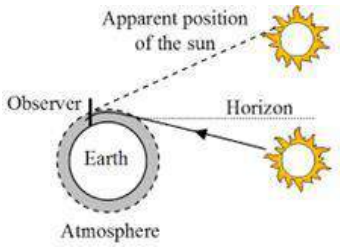
24. Solution:

(i) When we look at objects through the hot air over a fire, the objects appear to be moving (or shaking) slightly this happens because the air just above the fire becomes hotter. This hotter air is optically rarer but the colder air further up is optically denser, so

when we see the objects by the light coming from them through hot and cold air layers having different optical densities, then refraction of light takes place randomly.

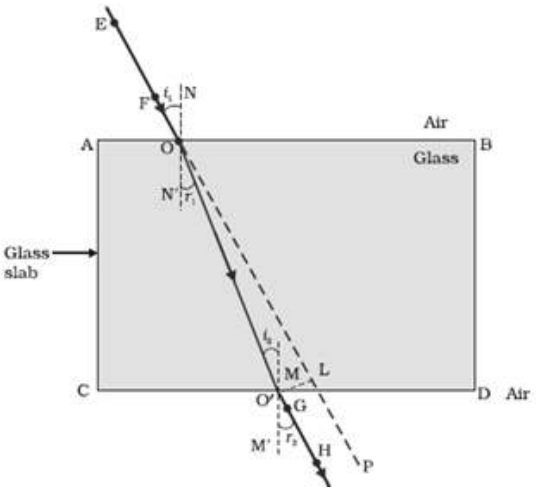
(ii) The atmospheric refraction of sun's light the sun can be seen about two minutes before actual sunrise. When the sun is slightly below the horizon, then the sun's light coming from less dense air to denser air is refracted downwards as it passes through the atmosphere and the appears to be raised above the horizon.

Let us see a diagram to illustrate it: -



25. Solution: The principle of reversibility of light states that light follows the same path if the direction of the travel of light is reversed. The refractive index of light when it passes from medium 1 to medium 2 is equal to the refractive index of light when it goes from medium 2 to medium 1.

The incident ray of light is parallel to the emergent ray of light when light falls obliquely on a side of a rectangular glass slab can be shown with the help of the following diagram:



26. Solution: (b) At point P: By applying Fleming's right hand rule, magnetic field will be in anticlockwise direction around the current direction. The magnetic field will be to point P and towards the plane of paper.

At point Q: At this point, the direction of the current is away from the conductor and away from the plane of paper.

Magnetic field will be stronger at point Q than at point P because the strength of magnetic field is stronger when it is near to the conductor and weak when away from the conductor.

SECTION – C

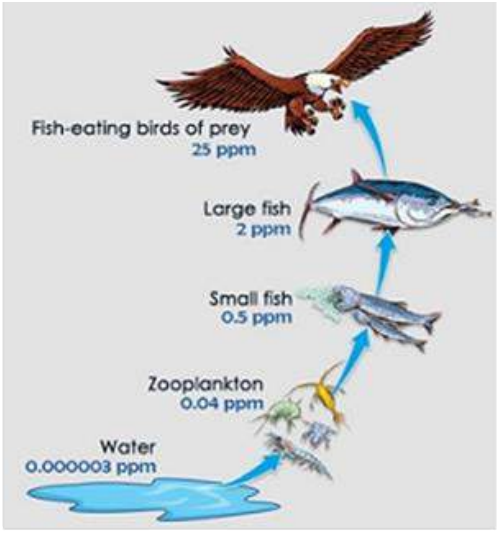
27. Solution: Sexual Reproduction brings about maximum variations in the offspring because it involves fusion of gametes, thus causing variations whereas asexual reproduction does not involves fusion of gametes so the offspring inherits genes from one parent only and thus variations are rare.

OR

Solution: Alveoli are pouch-like air sacs that are made up of simple squamous epithelial tissue. The alveolar walls or layers are thin enough to facilitate gaseous exchange. The presence of millions of alveoli in the lungs increases the surface area to facilitate gaseous exchange between the air in alveoli and blood in the surrounding capillaries. Oxygen diffuses easily across the alveolar and capillary wall into the bloodstream while carbon dioxide diffuses from blood across the mentioned walls into the alveoli as the walls of alveoli and capillaries are one cell-thick only.

28. Solution: Producers form the starting point of a food chain. Producers are autotrophic and they produce their own food through photosynthesis. They manufacture organic matter from inorganic materials, hereby fixing the radiant energy of the Sun in the form of chemical energy (Food) that can pass to the later trophic levels.

29. Solution: Biomagnification is a phenomenon in which certain harmful chemicals such as pesticides, fungicides get accumulated in the body of organisms in higher concentration through the food chain.



Different concentration of pesticides at different trophic levels

- The organisms at highest trophic level, in them accumulation is the highest.
- Example: DDT shows biomagnification. It is an insecticide used to kill mosquitoes.
- DDT gets accumulated in the successive trophic levels. Zooplankton, small nekton, larger fish etc., anyone who eats these fish also has a higher level of DDT than fish.
- DDT found in phytoplankton is 800 times more than that of water and zooplanktons have five times more than that of Phytoplanktons.

30. Solution: Acetic acid is a weaker acid because it does not dissociate completely into its ions in aqueous solution.

Activity:

Add zinc metal in hydrochloric acid and acetic acid respectively. The hydrogen gas will be evolved faster in HCI and slowly in acetic acid. It shows acetic acid is a weak acid.

Alternative Method:

If we use pH paper, the colour of pH paper will be dark red in hydrochloric acid and light red in acetic acid which shows HCI is a strong acid and acetic acid is a weak acid.

31. Solution: When Calcium Carbonate is heated, it decomposes to give calcium oxide and carbon dioxide

$$CaCO_3\ (s) \longrightarrow CaO\ (s) + CO_2$$

When electric current is passed through H_2O, it decomposes to give hydrogen and oxygen

$$2H_2O\ (l) \longrightarrow 2H_2\ (g) + O_2\ (g)$$

When silver chloride is exposed to light, it decomposes to form silver metal and chlorine gas

$$2AgCl\ (s) \longrightarrow 2Ag\ (s) + Cl_2\ (g)$$

32. Solution:

(a) Sodium chloride and water are formed.

$$\underset{\text{Sodium hydroxide}}{NaOH(aq)} + \underset{\text{Hydrochloric acid}}{HCl(aq)} \longrightarrow \underset{\text{Sodium chloride}}{NaCl(aq)} + \underset{\text{Water}}{H_2O(l)}$$

(b) Sodium zincate and $H_2(g)$ are formed.

$$\underset{\text{Zinc}}{Zn(s)} + \underset{\text{Sodium hydroxide}}{2NaOH(aq)} \longrightarrow \underset{\text{Sodium zincate}}{Na_2ZnO_2(aq)} + \underset{\text{Hydrogen gas}}{H_2(g)}$$

(c) Calcium carbonate and water are formed.

$$\underset{\text{Lime water}}{Ca(OH)_2(aq)} + \underset{\text{Carbon dioxide}}{CO_2(g)} \longrightarrow \underset{\text{(white ppt) Calcium carbonate}}{CaCO_3(s)} + \underset{\text{Water}}{H_2O(l)}$$

33. Solution: (i) The principle on which the electric motor work says that if a rectangular current carrying coil is placed in a magnetic field, a force act on it which make it to rotate continuously.

Some of the devices using electric motors are: - electric fans, washing machine, mixer, grinder, etc.

(ii) Given, P_1=1200W, P_2=1000W

V = 220V

Fuse rating = 9A

We know,

P = VI

Total current required,

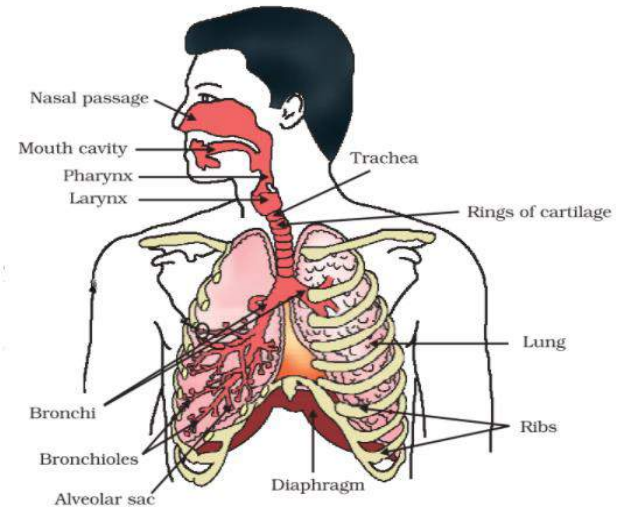
$$I = \frac{P}{V}$$

$$\frac{P_1+P_2}{V} = \frac{1200+1000}{220} = 10A$$

The fuse will get burnt if both the appliances are switched on together. So one should not use both the appliances at the same time.

SECTION – D

34. Solution:



Human Respiratory System

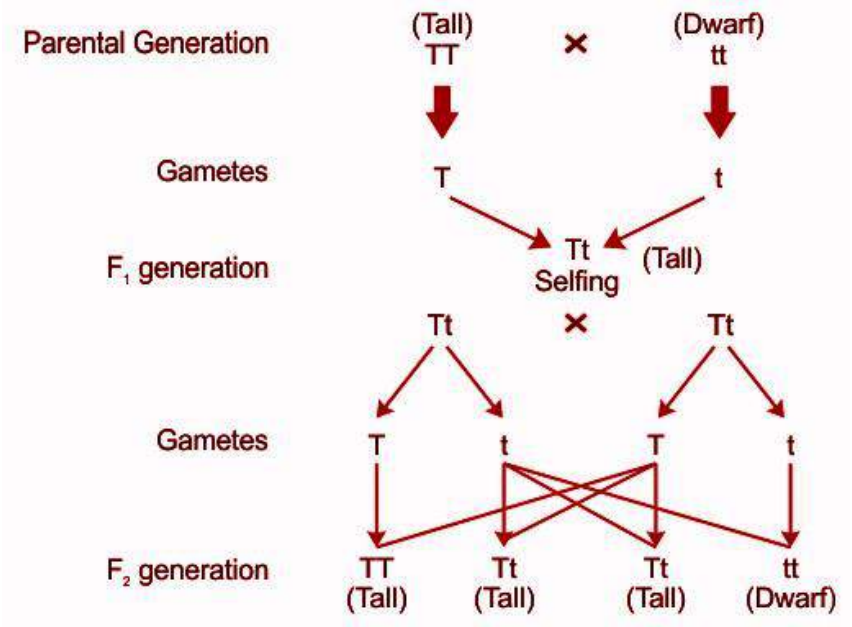
Overall process of Breathing comprises two steps: Inspiration and Expiration.

Inspiration: During this process we inhale the oxygen-rich air through the nostrils which passes through the trachea and then through bronchioles finally reaches the alveoli. What happens during this process is that diaphragm becomes flattened and the rib cage expands. Due to this the size of the thoracic cavity increases. The pressure during this process is low inside and is high outside and as a result we inhale the oxygen-rich air and this process is called inhalation.

Expiration: During this process we exhale the CO_2 rich air outside the body. The diaphragm becomes flattened and the size of the thoracic cavity decreases. Due to this the pressure inside the lungs is high as compared to atmospheric pressure and as a result the air is exhaled outside the lungs.

OR

In a monohybrid cross, for any character, the F1 generation individual derived from crosses between the two different varieties having alternative characters, showed only one of the characters and never the other. This feature was expressed as dominance of one trait over the other. The trait which appeared in the F1 generation was called the dominant and the other which did not appear in the F1 population was called recessive. It is obvious that though, in F1 generation the dominant phenotype appears, the recessive is not lost but reappears in the F2 generation. This suggests that there is no blending of Mendelian factors in the F1 generation but they stay together and only one is expressed.



Therefore, two or more forms of a single character can exist in a single gene locus of a homologous chromosome within a species that may put different effects on the phenotype of an organism. In the hybrids between two individuals displaying different phenotypes only one character is observable. This phenotype or the character (allele) which is expressed in the hybrid is said to be dominant and the other to be recessive, whose phenotype remains masked in

heterozygous condition, but is only expressed in homozygous condition. This is known as the law of dominance.

35. Solution:

(a) The series of metals in which metals are arranged in decreasing order of their reactivity. Au < Cu < Fe < Mg is increasing order of reactivity.

(b) (i) The blue solution will become colorless and reddish brown copper metal will be deposited.

$$\underset{\text{Blue}}{Zn\ (s) + CuSO_4\ (aq)} \longrightarrow \underset{\text{colourless}}{ZnSO_4\ (aq)} + \underset{\text{(reddish brown)}}{Cu\ (s)}$$

(ii) $Ag\ (s) + FeSO_4\ (aq) \longrightarrow$ No reaction

Reaction will not take place because 'Ag' is less reactive than iron.

Reaction will not take place because Ag' is less reactive than iron.

36. (i) Given

Resistivity (ρ) = 1.7×10^{-8} Ωm

Diameter (d) = 0.1 mm = 0.1×10^{-3} m ($\because$ 1m = 1000 mm)

Resistance(R) = 34 Ω

Area of cross section (A),

$$\frac{\pi d^2}{4}$$

$$\frac{3.14 \times (0.1 \times 10^{-3})^2}{4}$$

Now,

$$R = \rho \frac{l}{A}$$

$$34 = \frac{1.7 \times 10^{-8} \times l}{\frac{3.14 \times (0.1 \times 10^{-3})^2}{4}}$$

$$\frac{34}{1.7\times10^{-8}}\times\frac{0.0314\times10^{-6}}{4}=l$$

$$l=\frac{17}{17\times10^{-9}}\times\frac{31.4\times10^{-9}}{2}$$

$$l=\frac{31.4}{2}=15.7$$

Hence the length of the wire is 15.7 m.

(ii) By Ohm's Law

$$V=IR$$

The slope of a V-I graph is the resistance of the conductor.

Therefore, the slope of the V-I graph represents the effective resistance.

Now in series combination of the resistance all the resistances get summed up

$$R_e=R_1+R_2+R_3+\cdots.+R_n$$

Therefore, the series combination will have the maximum resistance than the other resistors.

Hence the line with maximum slope (line C) will give the series combination of the other two resistors.

OR

(a) Optical centre of the lens. It is a point within the lens that lies on the principal axis through which a ray of light passes un-deflected.

(b) Given, f = – 20 cm; H_o (Size of the object) = 4 cm; v = – 10 cm; u (Object distance) = ? ; (Size of the image) H_I = ? Using the lens formula,

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

$$\frac{1}{-20}=-\frac{1}{10}-\frac{1}{u}$$

$$\frac{1}{u} = -\frac{1}{10} + \frac{1}{20}$$

$$\frac{1}{u} = -\frac{1}{20}$$

∴ u = – 20 cm

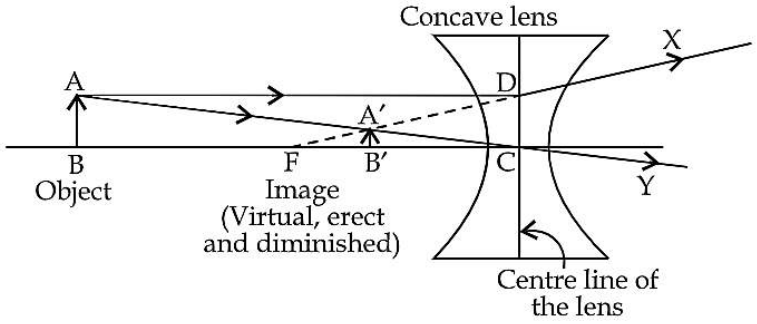
Now, The magnification of the image is determined using the following experience,

$$m = \frac{H_i}{H_O} = \frac{v}{u}$$

$$\frac{H_i}{4} = -\frac{10}{-20}$$

$$H_i = \frac{1}{2} \times 4 = 2$$

(c) Following ray diagram is the required answer:



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