केंद्रीय विद्यालय संगठन ,जयपुर संभाग

Kendriya Vidyalaya Sangathan, Jaipur Region

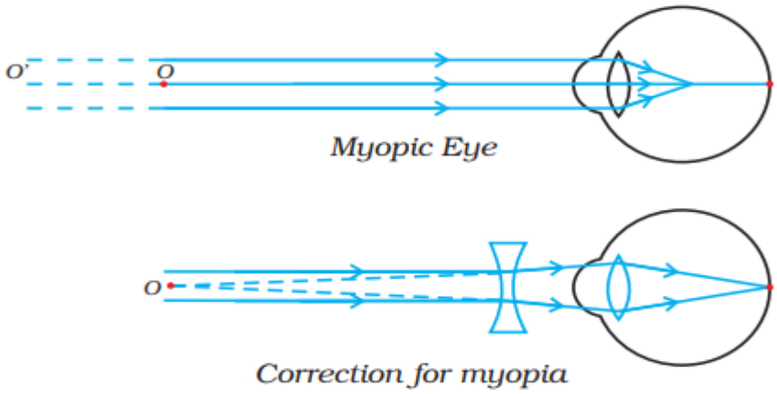
प्रथम बोर्ड पूर्व परीक्षा/ 1st Pre-Board Examination : 2024-25

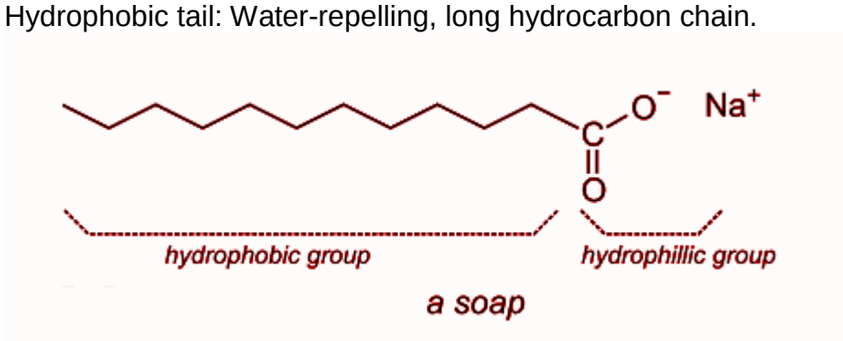
सेट सं./ SET NO.- 1

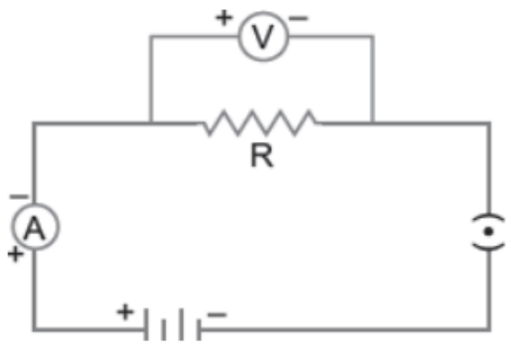
कक्षा/ Class : 10वीं	**विषय/ Subject :** Science (086)
अधिकतम अंक/ M.M: 80	**Marking Scheme**

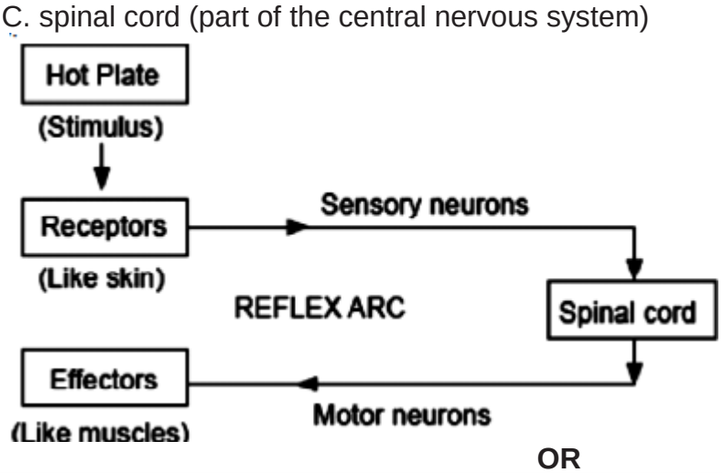
Q no.	Questions	Marks
	SECTION – A	
1.	*a) Copper is less reactive than zinc*	1
2.	c) 1-c, 2-a, 3-b, 4-d	1
3.	b) HCl gas needs water to ionize and release H^+ ions.	1
4.	c) Vinegar is acidic, and baking soda solution is basic.	1
5.	b) Copper will be displaced, and the solution will turn colorless.	1
6.	c) They consist of large, charged ions held together by strong electrostatic forces of attraction.	1
7.	c) Sodium chloride (NaCl) and silver nitrate ($AgNO_3$)	1
8.	b) Aerobic respiration produces more energy than anaerobic respiration.	1
9.	b) Pulmonary veins	1
10.	c) Pepsin	1
11.	b) Heart rate and breathing **OR** b) Damage to the taste buds	1
12.	b) 1/4	1
13.	d) Virtual, erect, and magnified **OR** d) Between the focus and the mirror	1
14.	b) Red, Orange, Yellow, Green, Blue, Indigo, Violet	1
15.	b) Energy is lost as heat at each trophic level and cannot be reused	1
16.	b) Dead plants and animals would accumulate, leading to a disruption in the nutrient cycle	1
17.	a) Both A and R are true, and R is the correct explanation of A**.**	1
18.	c) A is true, but R is false.	1
19.	a) Both A and R are true, and R is the correct explanation of A**.**	1
20.	b) Both A and R are true, but R is not the correct explanation of A.	1
	SECTION – B	
21.	(i) When magnesium burns in air, it reacts with oxygen to form magnesium oxide (MgO), a white powder. (ii) The balanced chemical equation is: $2Mg+O_2 \rightarrow 2MgO$	1+1
22.	(a) Alveoli are designed to maximize gas exchange by having a large surface area, thin walls (only one cell thick), and being richly supplied with blood capillaries. This structure allows efficient diffusion of gases between the alveoli and blood. (b) The nephron is the functional unit of the kidney that filters blood, reabsorbs essential nutrients and water, and secretes waste materials like urea to form urine.	1+1
23.	CO_2: Through stomata on leaves from the air. Water: Absorbed by roots from the soil. Sunlight: Captured by chlorophyll in leaves. Chlorophyll: Found in chloroplasts **OR** Kidneys: Filter waste from blood and form urine. Ureters: Transport urine from kidneys to bladder. Urinary bladder: Temporarily stores urine. Urethra: Expels urine from the body.	2
24.	(a) The relation between the angle of incidence $\mathbf{i_1}$ and the angle of emergence **e** is that they are **equal**. (b) The light ray bends towards the normal upon entering the glass slab because it is transitioning from a rarer medium {lower optical density (air)} to a denser medium {higher optical density (glass)}.	1+1

25.	A. 1. **Total resistance**: $R_{\text{total}} = 1\,\Omega + 2\,\Omega + 3\,\Omega = 6\,\Omega$ 2. **Total current** using Ohm's law: $I = \frac{V}{R} = \frac{2\,\text{V}}{6\,\Omega} = 0.33\,\text{A}$ 3. **Potential difference across 3 Ω**: $V = I \times R = 0.33\,\text{A} \times 3\,\Omega = 1\,\text{V}$ **OR** B. 1. Total resistance: $R_{total} = 1\,\Omega + 2\,\Omega = 3\,\Omega$ 2. Current: $I = \frac{6\,V}{3\,\Omega} = 2\,A$ 3. Power in 2 Ω resistor: $P = I^2 \times 2\,\Omega = 2^2 \times 2 = 8\,W$	2
26.	(a) Biomagnification. It refers to the increasing concentration of toxic chemicals in organisms at higher trophic levels in a food chain. (b) The concentration increases because organisms at each level consume large amounts of organisms from the lower level, accumulating higher concentrations of the chemical, which eventually affects humans at the top of the food chain.	$\frac{1}{2}+\frac{1}{2}$ $+1$
	SECTION – C	
27.	(a) Zinc is more reactive than copper and reacts with dilute HCl to release hydrogen gas: $Zn+2HCl \rightarrow ZnCl_2+H_2$ Copper, being less reactive than hydrogen, does not react with dilute HCl, so no bubbles or gas evolution is observed in the copper test tube. (b) Sodium is highly reactive with water and reacts vigorously, releasing hydrogen gas and forming sodium hydroxide (NaOH): Aluminum, on the other hand, has a protective oxide layer on its surface (Al_2O_3) that prevents it from reacting with water at room temperature. However, aluminum can react with water at higher temperatures or in the presence of acids or bases.	$1\frac{1}{2}$ $+1\frac{1}{2}$
28.	A. (i) X is calcium carbonate ($CaCO_3$) (ii) The conversion of calcium carbonate (X) to calcium oxide (Y) and carbon dioxide is a thermal decomposition reaction. (iii) The solution with the lowest pH value (3) will have the maximum concentration of hydronium ions (H_3O^+) D (pH 3) <E (pH 8) <F (pH 10) **OR** B. (i) The juice is likely to be slightly sour because a pH of 4.6 indicates it is acidic. Acids generally taste sour. (ii) A strong acid ionizes completely in aqueous solutions, producing many hydrogen ions (H^+), while a weak base only partially ionizes, producing fewer hydroxide ions (OH^-). (iii) Acid rain lowers the pH of water bodies, making them more acidic. This can harm aquatic life by disrupting physiological processes, and in extreme cases, can lead to death due to inhospitable water conditions.	1+1+1
29.	Water and minerals are absorbed by the roots from the soil. These nutrients enter the plant through root hairs and travel to the xylem vessels. (i) The xylem tissue transports water and dissolved nutrients from the roots to the	1+2

	stem, branches, and leaves. (ii) Transpiration causes water to evaporate from the leaf surfaces, creating a transpiration pull. This force helps in drawing water and minerals upward from the roots through the xylem, allowing their distribution throughout the plant.	
30.	A. Parental Cross: ○ Red-eyed male (RR) × White-eyed female (rr) F1 Generation: All offspring will be Rr (red eyes). Genotypic Ratio: Rr = 1 (all heterozygous) Phenotypic Ratio: Red: White = 100% red eyes (since R is dominant). B.If the F1 generation (Rr) is crossed with a white-eyed fly (rr), the expected offspring phenotypic ratio will be 1:1 (red: white). The offspring will have either Rr (red eyes) or rr (white eyes), resulting in one red-eyed fly and one white-eyed fly.	2+1
31.	The person is suffering from myopia or nearsightedness. Myopia can be corrected using concave (diverging) lenses  	1+1+1
32.	A. In a parallel circuit, the potential difference is uniform throughout the resistors. Let I_1, I_2 and I_3 be the current in the resistors. Let $R_1, R_2$and R_3 be the three resistors. The total current, $I = I_1 + I_2 + I_3$ Use Ohm's law: $V_1 = 1_1R_1, V_2 = I_2R_2, V_3 = I_3R_3$ here, $V = V_1 = V_2 = V_3$ $\therefore V = I_1R_1, V = I_2R_2, V = I_3R_3$ $\Rightarrow I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}$and $I_3 = \frac{V}{R_3}$ $\therefore I = I_1 + I_2 + I_3$ **Step 2: Deriving the expression for the three resistance:** $\frac{V}{R_eq} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$ $V \times \frac{1}{R_eq} = X\left[\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right]$ $\frac{1}{R_eq} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ Where R_eq is equivalent resistance. From this, we know that the resistance in each circuit is more than the equivalent resistance. Thus, the expression for the three resistance connected in a parallel circuit is $\frac{1}{R_eq} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$. B. Since, resistances are connected in parallel, so $\frac{1}{R} = \frac{1}{2} + \frac{1}{3} + \frac{1}{6}$ $\Rightarrow \frac{1}{R} = \frac{3+2+1}{6}$ $\Rightarrow \frac{1}{R} = \frac{6}{6}$ $\Rightarrow R = 1\ \Omega$	2+1

33.	(1) If the current is increased, the force on the conductor will increase, and the displacement will also increase. (2) If the magnetic field strength is decreased, the force on the conductor will reduce, and the displacement will decrease. (3) If the direction of the magnetic field is reversed, the direction of the force on the conductor will also reverse, causing it to move downward.	1+1+1
	SECTION – D	
34.	(i) Identify A, B, and C: • Compound A is ethanol (C_2H_5OH), as it belongs to the homologous series of alcohols. • Compound B is ethene (C_2H_4), formed by the dehydration of ethanol. Its molecular mass is 28 u. • Compound C is ethane (C_2H_6), formed by the hydrogenation of ethene. (ii) Chemical equations showing the conversion of A into B: The dehydration of ethanol to ethene can be represented by the following chemical equation: The hydrogenation of ethene to ethane is: (iii) What happens when compound C undergoes combustion? When ethane (compound C) undergoes complete combustion, it reacts with oxygen to form carbon dioxide and water, releasing energy: (iv) One industrial application of the hydrogenation reaction: Hydrogenation is widely used in the food industry to convert unsaturated vegetable oils into saturated fats (like margarine), making them solid at room temperature. (v) Products formed when compound A reacts with sodium: When ethanol (compound A) reacts with sodium, it forms sodium ethoxide (C_2H_5ONa) and hydrogen gas: **OR** **B.** (i) Structure of a soap molecule: • Hydrophilic head: Water-attracting, ionic part ($-COO^-$). • Hydrophobic tail: Water-repelling, long hydrocarbon chain.  *a soap* Cleaning action: • The hydrophobic tail attaches to grease, and the hydrophilic head interacts with water, forming micelles. The dirt is trapped in the micelles and washed away with water. (ii) Experiment with test tubes P (detergent) and Q (soap): 1. Test tube P will show better foam formation because detergents do not react with hard water ions (Ca^{2+}, Mg^{2+}), forming foam easily. 2. In test tube Q, a curdy precipitate (scum) will form as soap reacts with calcium and magnesium ions in hard water, preventing foam formation.	1 1 1 1 2 $1\frac{1}{2}$ $1\frac{1}{2}$
35.	A. (1) Female reproductive system (i) Fallopian tube (ii) Ovary (iii) Cervix (iv) Uterus (v) Vagina (2) Contraception is the use of methods or devices to prevent pregnancy. Three advantages: 1. Prevents unintended pregnancies for better family planning. 2. Reduces health risks associated with unsafe or high-risk pregnancies. 3. Prevents STDs, especially when using condoms. **OR** B. (i) Spores are reproductive structures formed in sporangia. They survive unfavourable conditions due to a thick protective wall. Rhizopus (bread Mold) multiplies through spores.	$10 \times \frac{1}{2}$ 3 2

	(ii) Reasons for vegetative propagation: • Faster growth and fruit production. • Genetically identical plants are produced. Methods: • Cutting: Using plant parts like stems. • Layering: Bending stems to root in the soil.	
36.	A. (i). A fuse is a safety device used in electrical circuits to protect appliances from excessive current. It consists of a thin wire made of materials with a low melting point, such as tin or lead. The fuse is connected in series with the circuit it protects, so that all current flowing through the circuit also flows through the fuse. (ii). Common fuse ratings include 1 A, 2 A, 3 A, 5 A, 10 A, and 15 A. The choice of fuse rating depends on the current rating of the circuit or appliance. (iii). The function of a fuse is to protect electrical appliances and wiring from damage due to excess current. When the current flowing through the circuit exceeds the rated value, the fuse wire heats up and melts due to the heat generated by the high current. This breaks the circuit, preventing any further flow of current, thereby protecting the appliances. (iv). Given: • Power, $P = 1.5\,\text{kW} = 1500\,\text{W}$ • Voltage, $V = 220\,\text{V}$ We know that power P is related to current I and voltage V by the formula: $$P = V \times I$$ Rearranging to find the current: $$I = \frac{P}{V} = \frac{1500}{220} \approx 6.82\,\text{A}$$ The nearest fuse rating should be chosen, so a **7 A fuse** should be used. **OR** B. (i).  According to **Ohm's Law**, the potential difference V across the ends of the resistor is directly proportional to the current III flowing through it. V=IR where R is the resistance of the resistor. (ii)	

	The resistance R of a wire is given by: $$R = \rho\frac{L}{A}$$ where ρ is the resistivity of the material, L is the length of the wire, and A is the cross-sectional area. For the original wire: $$R_1 = \rho\frac{L}{A} = 5\,\Omega$$ For the second wire: $$R_2 = \rho\frac{L/3}{3A} = \rho\frac{L}{9A}$$ So the resistance of the second wire is: $$R_2 = \frac{R_1}{9} = \frac{5}{9}\,\Omega \approx 0.56\,\Omega$$	
	SECTION – E	
37.	A. The change of blue litmus to red indicates that vinegar is acidic in nature. B. Lime water turns milky because carbon dioxide reacts with calcium hydroxide (Ca $(OH)_2$ in lime water to form calcium carbonate ($CaCO_3$), which is insoluble in water and appears as a milky white precipitate. $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ C. Neutralization is a chemical reaction in which an acid reacts with a base to form salt and water. In the reaction between sodium hydroxide (a base) and hydrochloric acid (an acid), they react to form sodium chloride (a salt) and water. $NaOH + HCl \rightarrow NaCl + H_2O$ **OR** D. Indicators are substances used to determine whether a solution is acidic or basic. They undergo distinct colour changes in acidic and basic media, helping to identify the nature of the solution. Comparison of three indicators: • Litmus Paper: Acidic medium: Blue litmus turns red. Basic medium: Red litmus turns blue. • Phenolphthalein: Acidic medium: Colourless. Basic medium: Pink. • Methyl Orange: Acidic medium: Red. Basic medium: Yellow	1+1+2
38.	A. It is a reflex action. B. The cerebellum is responsible for maintaining posture and balance. C. spinal cord (part of the central nervous system)  **OR**	1+1+2

	D. Voluntary actions are conscious movements controlled by the cerebrum (forebrain). Rahul walking in the park is an example of a voluntary action, as he is consciously deciding to walk and using his muscles under the control of his brain. Involuntary actions are unconscious and automatic movements controlled by other parts of the brain, like the medulla or the spinal cord. An example is the blinking of Rahul's eyes when something comes close to them. This is an involuntary action that helps protect the eyes without needing conscious thought.	
39,	A. Concave mirror B. The image formed is real, inverted, and smaller in size than the object. C. **Given:** Focal length, $f = -20\,cm$ (concave mirror) Object distance, $u = -40\,cm$ Using the **mirror formula**: $$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$ Substituting the values: $$\frac{1}{-20} = \frac{1}{v} + \frac{1}{-40}$$ Solving for v: $$\frac{1}{v} = \frac{1}{-20} + \frac{1}{40} = \frac{-2+1}{40} = \frac{-1}{40}$$ Therefore, $$v = -40\,cm$$ **Position of the image**: The image is formed at **40 cm** in front of the mirror. **OR** D.