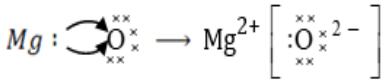
SECONDARY SCHOOL EXAMINATION, 2025

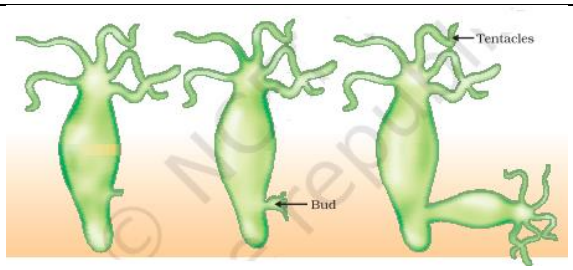
SOLUTIONS

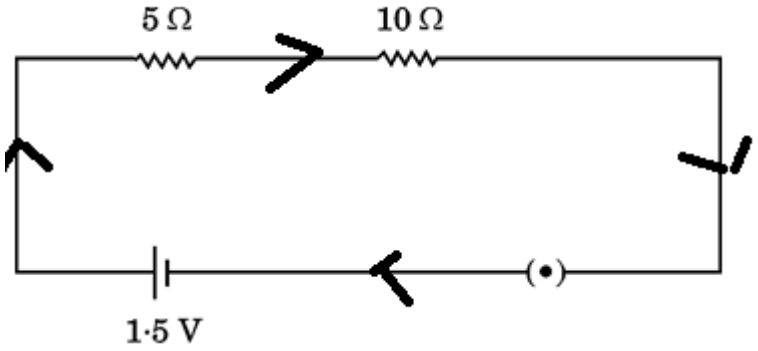
CLASS: X [SCIENCE (Subject Code–086)]

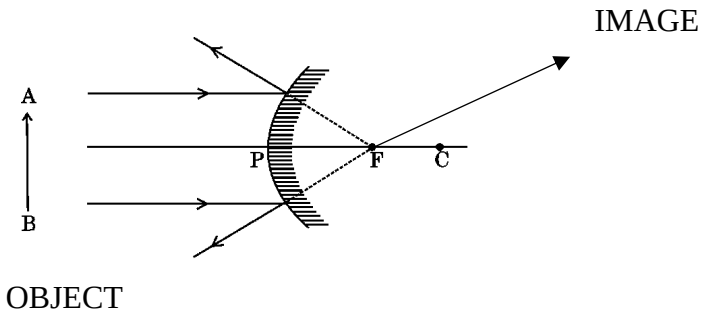
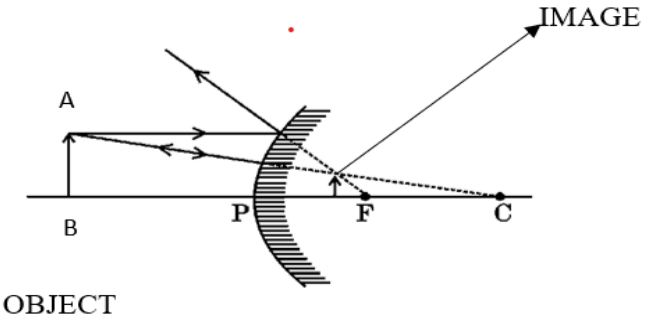
[Paper Code: 31/1/3]

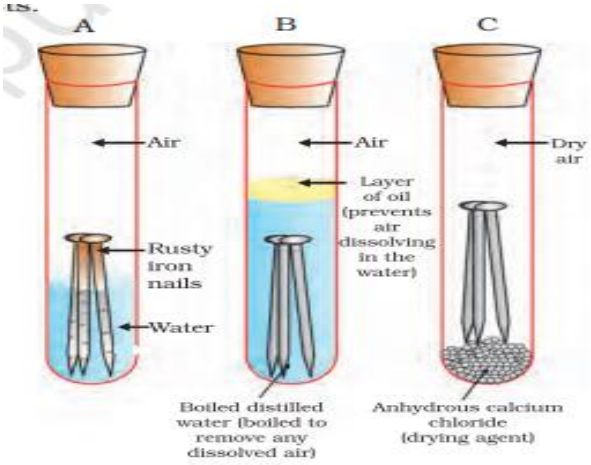
Maximum Marks: 80

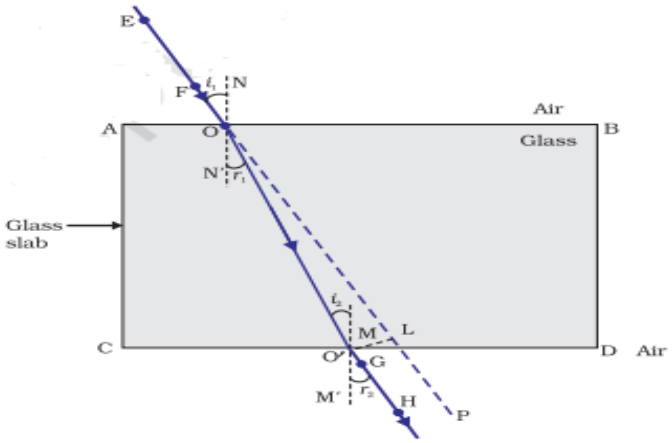
Q. No.	EXPECTED ANSWERS / VALUE POINTS	Marks	Total Marks
	SECTION A	**1**	**1**
1.	B / Calcium and Magnesium	1	1
2.	A / 	1	1
3.	C / It has weak electrostatic forces of attraction between its oppositely charged ions.	1	1
4.	A / Salt and water is formed	1	1
5.	B /5	1	1
6.	B / Al_2O_3 and MgO	1	1
7.	D / 1 : 8	1	1
8.	D / Cytoplasm and Oxygen deficient muscle cells.	1	1
9.	C / 100% round and yellow	1	1
10.	C / (i) and (iii)	1	1
11.	D / Auxins	1	1
12.	C / starch into simple sugars	1	1
13.	D / 99%	1	1
14.	D / (ii) and (iv)	1	1
15.	A / Scattering of light	1	1
16.	A / (i) and (ii)	1	1
17.	B / Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).	1	1
18.	A / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1	1
19.	C / Assertion (A) is true, but Reason (R) is false.	1	1
20.	B / Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).	1	1
	SECTION B		
21.	Here u = – 10 cm; f = – 15 cm ; $\frac{1}{f}=\frac{1}{v}+\frac{1}{u}$ $\frac{1}{-15}=\frac{1}{v}+\frac{1}{-10}$ $\frac{1}{v}=\frac{1}{-15}+\frac{1}{10}$ v =+30 cm Position of image is 30 cm from the mirror	½ ½ 1	2
22.	(a) $P=\frac{V^2}{R}$	½	

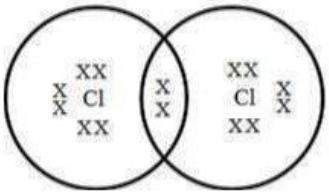
	$R=\frac{V^2}{P}$ $R_A=\frac{(220)^2}{50}$ $R_B=\frac{(220)^2}{25}$ $\frac{R_A}{R_B}=\frac{1}{2}$ / $P=\frac{V^2}{R}$ Since V is same means P is inversely proportional to R. Power of lamp A is double that of B hence Resistance of A is half that of B. $\frac{R_A}{R_B}=\frac{1}{2}$ **OR** (b) $H=\frac{V^2}{R}\times t$ $400=\frac{V^2}{4}\times 1$ $V^2=1600$ V=40V	½ 1 1 1 ½ ½ 1	2
23.	 diagram labelling	1 1	2
24.	(a) • Plugging of the leak in blood vessels prevents lowering of the blood pressure / maintains the efficiency of the pumping system. • Platelets • Help to clot the blood at the site of injury. **OR** (b) (i) Plants have low energy needs because they have a large proportion of dead cells in many tissues / Plants have low energy needs as they do not move (ii) Translocation of soluble products of photosynthesis from leaves to other parts of the plant / It transports amino acids and other substances to storage organs of roots, fruits and seeds and to growing organs.	1 ½ ½ 1 1	2

25.	• Evolution of gas • Change / Rise in temperature	1 1	2
26.	(a) $2\,HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + 2\,H_2O$ (b) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$ (**Deduct half mark if equation is not balance**d)	1 1	2
	SECTION C		
27.	(a) It is the amount of work done to bring one coulomb charge from one point to another in the field is 1 joule. / 1V=$\frac{1J}{1C}$ (b)  **Current** = $\frac{\textbf{Potential difference}}{\textbf{Resistance}} = \frac{\textbf{1·5 V}}{(\textbf{5 Ω + 10 Ω})}$ $= \frac{1{\cdot}5\ V}{15\ \Omega} = 0{\cdot}1$ A	1 1 1	3
28.	(a) $\frac{1}{R_1} = \frac{1}{10\ \Omega} + \frac{1}{15\ \Omega} = \frac{1}{6\ \Omega} \Rightarrow R_1 = 6\ \Omega$ $\frac{1}{R_2} = \frac{1}{60\ \Omega} + \frac{1}{40\ \Omega} = \frac{100}{2400\ \Omega} \Rightarrow R_2 = 24\ \Omega$ $\because$ R_1 and R_2 are in series $\therefore$ $R_{total} = R_1 + R_2 = (6 + 24) = 30\ \Omega$ (b) $V = IR \quad \Rightarrow \quad I = \frac{V}{R} = \frac{15\ V}{30\ \Omega} = 0{\cdot}5$ A (c) $V = IR_1 = 0{\cdot}5\ A \times 6\ \Omega = 3{\cdot}0$ V	 1 1 1	 3

29.	(i)  OBJECT (ii)  OBJECT **(Note: Deduct ½ mark if arrows are not drawn.)**	1 ½ 1 ½	3
30.	(a) • 23 pairs or 46 chromosomes • 1 Pair or 2 chromosomes **(**b) In sexually reproducing organisms chromosomes occur in pairs. The members of the pair separate at the time of gamete formation. The two germ cells fuse and form zygote thus restore the same number of chromosomes as their parents**.** **(Award marks if explained by any other method.)**	½ ½ 2	3
31.	(a) Adrenaline Adrenal Gland **(b**) It acts on heart. Heart beats faster, resulting in more supply of oxygen to skeletal muscles. The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. Breathing rate increases because of contraction of diaphragm and the rib muscles**.**	½ ½ 2	3
32.	(a) ➢ Take three test tubes and place clean iron nails in each of them. ➢ Label these test tubes A, B and C.		

	➢ Pour some water in test tube A and cork it. ➢ Pour boiled distilled water in test tube B, add about 1 mL of oil and cork it. The oil will float on water and prevent the air from dissolving in the water. ➢ Put some anhydrous calcium chloride in test tube C and cork it. Anhydrous calcium chloride will absorb the moisture, if any, from the air. Iron nails rust in test tube A, but they do not rust in test tubes B and C. Rusting of iron takes place when exposed to both air and water. /  Iron nails rust in test tube A, but they do not rust in test tubes B and C. Rusting of iron takes place when exposed to both air and water. **(Note: if a student explains activity through description or through labelled diagram, give full marks.)** **OR**	3	
	(b) (i) • Sodium, Potassium, Lithium **(any two)** • Observations: ➢ A violent reaction occurs. ➢ Large amount of heat is evolved. ➢ Evolved gas catches fire. (ii) The gas (bubbles) burns with a pop sound	½,½ 1 ½ ½	3
33.	(a) $3\ MnO_2(s)\ +\ 4\ Al(s) \longrightarrow 3\ Mn(l)\ +\ 2\ Al_2O_3(s)\ +\ heat$ $Fe_2O_3(s)\ +\ 2\ Al(s) \longrightarrow 2\ Fe(l)\ +\ Al_2O_3(s)\ +\ heat$ **(Award marks if explained through statement)** (b) Metals towards the top of the reactivity series (Na, Mg, Ca) have more affinity for oxygen than carbon.	1 1 1	3
	SECTION D		
34.	(a) (i) • Concave lens	½	

	• $P = \frac{1}{f(m)}$ $-2{\cdot}5 = \frac{1}{f}$ $f = \frac{10}{-2{\cdot}5} = -0{\cdot}4\ m = -40\ cm$ • Myopia	½ ½ ½	
	(ii) (I) Real and inverted (II) magnified image /size of image is double the size of object (III) beyond 2F/ on the other side as that of object (IV) Negative	½×4	
	(iii) • The lens with focal length 10 cm • less focal length, more converging/diverging power	½ ½	
	OR		
	(b) (i)  **(if arrows not marked , deduct half mark)**	2	
	(ii) The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for a given pair of media. / $\frac{\sin i}{\sin r} = constant$	1	
	(iii)		
	<table><tr><td>Convex Lens</td><td>Concave Lens</td></tr><tr><td>(I) Object to be placed between O and F</td><td>Object can be placed anywhere in front of the lens</td></tr><tr><td>(II) Magnified image</td><td>Diminished image</td></tr></table>	1 1	5
35.	(a) (i) (I) Ovary: Produces female gamete (egg) and female hormones(oestrogen). (II) Fallopian tube: Site of Fertilization (III) Uterus: Site of implantation and embryonic development.	½,½ 1 1	
	(ii) Methods of contraception used by males: • Mechanical barrier - Condoms	1	

	• Surgical method – blocking the vas deferens in males (Vasectomy) **OR** (b) (i) Self-pollination: Pollen grains are transferred from stamen to the stigma of the same flower. Cross-pollination: Transfer of pollen grains from stamen of one flower to the stigma of another flower of same species. (ii) A – Stigma : Receives pollen and provides suitable environment for its germination. B –Pollen tube : Carries males germ cells (gametes) to the female gamete situated in the ovary. C – Egg Cell (Female germ cell) : Fuses with male gamete and forms Zygote.	1 1+1 1 1 1	5
36.	**(a) (i)**  (ii) • $CH_4 + Cl_2 \xrightarrow{Sunlight} CH_3Cl + HCl$ / Chloromethane is formed; • substitution reaction **(iii)** Alkaline $KMnO_4$/ Acidified $KMnO_4$ /Acidified $K_2Cr_2O_7$ **(any two)** **(iv)** Covalent compounds: Low melting and boiling points; Poor conductors of electricity; Generally soft if solids; Generally soluble in oil or non-polar solvents Ionic Compounds: High melting and boiling points; Conduct electricity in aqueous solution and molten state.; Hard crystalline solids; Generally soluble in soluble in water/polar solvents **OR** **(b)** (i) Carbon could gain four electrons forming C^{4-} anion. But it would be difficult for the nucleus with six protons to hold on to ten electrons. Carbon could also	1 ½ ½ ½, ½ ½×4	

	lose four electrons forming C^{4+} cation. But it would require a large amount of energy to remove four electrons leaving behind a carbon cation with six protons in its nucleus. $\therefore$ It shares four electrons of the outermost shell to form covalent bond/covalent compound.	2	
	(ii) There are weak forces of attraction between the molecules of covalent compound.	1	
	(iii) (I) Covalent compounds do not form ions hence are poor conductors.	1	
	(II) Carbon-carbon single bond is very strong and stable.	1	5
	SECTION E		
37.	(a) Live wire- Red Neutral wire- Black	½ ½	
	(b) Power, P = 1 kW = 1 × 1000 W = 1000 W Voltage, V = 220 V Current drawn I =? $P = V \times I$ $I = \frac{1000\ W}{220\ V} = 4{\cdot}54$ A Current rating should be of 5A.	½ ½	
	(c) (i) • The earth wire provides a low resistance conducting path for the current which ensures that any leakage of current to flow to the metallic body of the appliances, keeps its potential to that of the earth. • The user will not get an electric shock. **OR**	1 1	
	(c) (ii) • Fuse wire • Earth wire • A fuse in a circuit prevents damage to the circuit due to overloading. • Earth wire prevents electric shock due to leakage of current.	½ ½ ½ ½	4
38.	(a) $2\ NaCl + 2\ H_2O \xrightarrow{\text{electricity}} 2\ NaOH + H_2 + Cl_2$ (b) Uses of NaOH : Degreasing metals/ Soaps and Detergents/ paper making/ artificial fibres/ preparation of bleach Uses of H_2: As fuel/ Margarine/ In preparation of ammonia for fertilizers/preparation of HCl Uses of Cl_2 : Disinfectant/ PVC/ water treatment/ in swimming pools/ CFC's/ preparation of bleach/ preparation of HCl/ pesticides **(Any two uses of anyone product)**	1 ½,½	

	(c) (i) A – $NaHCO_3$/ Sodium Hydrogen Carbonate/Baking soda B – Na_2CO_3 / Sodium Carbonate $2\,NaHCO_3 \xrightarrow{heat} Na_2CO_3 + H_2O + CO_2$ **OR** (c) (ii) • The fixed number of water molecules present in one formula unit of a salt. • $CuSO_4.5H_2O$/Copper Sulphate pentahydrate/Blue vitriol • $CaSO_4.2H_2O$/Gypsum/Calcium sulphate dihydrate • $Na_2CO_3.10H_2O$/Washing Soda/Sodium carbonate decahydrate • $FeSO_4.7H_2O$/ Green Vitriol/Ferrous sulphate heptahydrate • $CaSO_4$. ½ H_2O /Calcium Sulphate hemihydrate/ POP **(Any other two examples)**	½ ½ 1 1 ½,½	4
39.	(a) Photosynthesis A process by which green plants capture sunlight and convert it to chemical energy with the help of chlorophyll / Process by which carbon dioxide and water is converted into carbohydrates in the presence of sunlight chlorophyll and water. (b) $6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2 + 6H_2O$ (c) (i) • Absorption of light energy by chlorophyll • Conversion of light energy to chemical energy. • Reduction of carbon dioxide to carbohydrates. • Desert plants take up CO_2 at night and prepare intermediate, which is acted upon by the energy absorbed by the chlorophyll during the day. **OR** (c) (ii) (I) Decrease the rate of photosynthesis due to low amount of sunlight. (II) Decreases the rate of photosynthesis due to reduced gaseous exchange. .	½ ½ 1 2 1 1	4