MARKING SCHEME
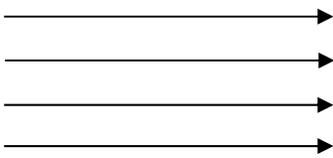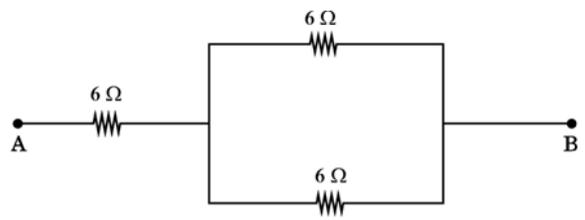## Secondary School Examination, 2024
SCIENCE (Subject Code–086)
[Paper Code: 31/1/2]

**Maximum Marks: 80**

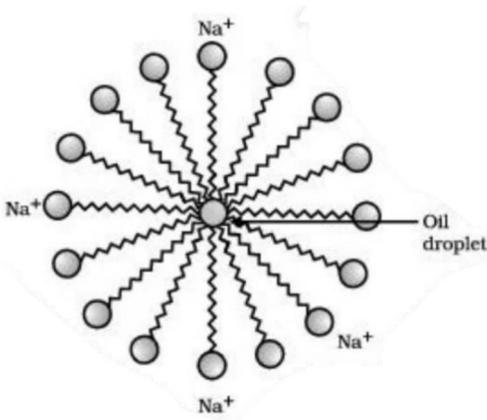| Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(c) / $2\,AgBr \longrightarrow 2\,Ag + Br_2$	1	1
2	(c) /amphoteric	1	1
3	(d) / Na_2CO_3	1	1
4	(d) /Butyne, C_4H_6	1	1
5	(c) /Mercury and Bromine	1	1
6	(d) / MnO_2 is reduced and HCl is oxidised	1	1
7	(b) / $2\,NaOH + Zn \longrightarrow Na_2ZnO_2 + H_2$	1	1
8	(d) / Features will remain the same even if the protein changes.	1	1
9	(c) /Neuromuscular junction	1	1
10	(d) / (i) and (iv)	1	1
11	(c) / (ii) and (iii)	1	1
12	(d) / Plasmodium	1	1
13	(c) /At twice the focal length of the lens	1	1
14	(d) /Retina	1	1
15	(a) /	1	1
16	(c) /Tiger, grass, snake, frog	1	1
17	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
18	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
19	(b) / Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).	1	1
20	(a) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1	1
	SECTION B		
21	(i) If they intersect then at the point of intersection, there would be two directions of magnetic field or compass needle would point towards two directions, which is not possible.	1	
	(ii) Uniform magnetic field is represented by equidistant parallel straight lines	½	

		½	
			2
22	(A) When two 6 Ω resistances are connected in parallel and the third resistance of 6Ω is connected in series combinations to this, then equivalent resistance will be 9 Ω /	1	
	$6\,\Omega$ ... A ... $6\,\Omega$ ... B ... $6\,\Omega$ ... $6\,\Omega$		
	[Award marks for writing the statement or drawing the diagram]		
	$$\frac{1}{R_P} = \frac{1}{6\,\Omega} + \frac{1}{6\,\Omega}$$ $$\therefore\ R_P = 3\,\Omega$$ $$R_S = 6 + 3 = 9\Omega$$	1	
	OR		
	(B) Equivalent resistance $= R_1 + R_2 = 1\,\Omega + 2\,\Omega = 3\,\Omega$	½	
	$$I = \frac{V^{\,7}}{R}$$ $$= \frac{6\,V}{1\,\Omega + 2\,\Omega} = \frac{6\,V}{3\,\Omega} = 2\,A$$	½	
	Electric power, $P = I^2 R$	½	
	$= (2A)^2 \times 2\,\Omega = 4 \times 2\ W = 8\ W$	½	2

23		1½	
	Lateral displacement labelling	½	2
24	(A) Medulla – Hindbrain Function– Control blood pressure/salivation/vomiting or any other Cerebrum – Forebrain Function–Thinking/intelligence/memory (any other) **OR** (B)Auxins • When tendril of pea plant comes in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as part of the tendril away from it. This causes the tendril to circle around the object and cling to it.	½ ½ ½ ½ 1 1	2
25	Kidney ⟶ Ureter ⟶ Urinary bladder ⟶ Urethra • Reabsorption of nutrients/amino acids, glucose and water will not take place	1 1	2

26	(i) $3BaCl_2$ (aq) $+ Al_2(SO_4)_3$ (aq) ⟶ $3BaSO_4$ (s) $+ 2 AlCl_3$ (aq)
	                Equation
	                Balancing
	(ii) $2\,Al(s)\,+\,3\,H_2O(g)\,\longrightarrow\,Al_2O_3(s)\,+\,3\,H_2\,(g)$
	
	                Equation
	                Balancing
		½
		½
		
		½
		½
			2

	SECTION C		

27	(i) The taste of tomato juice will be slightly **sour**;
	    The pH 4.6 indicates that tomato juice is **an acid** and acids are sour in taste.
	
	(ii) Acids that give **more H$^+$ ions / H$_3$O$^+$** are Strong Acids
	    Bases that give **less OH$^-$ ions** are Weak Bases.
	
	(iii) Living animals can survive within a **pH range of 7·0 to 7·8**. So, if the pH of river water becomes low due to **acid rain (pH < 5·6)**, then survival of aquatic animals becomes difficult.
		½
		½
		
		½
		½
		
		1
			
			3

28	(i) Change in colour: The solution will become green in colour.
	
	        $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4 + Cu(s)$
	            Blue Green
	           (or any other reaction which shows change in colour)
	    (ii)
	            Change in temperature: The temperature will increase.
	
	        $NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l) + Heat$
	           (or any other reaction which shows change in temperature)
	
	    (iii) Formation of precipitate: Yellow precipitate of PbI$_2$ is formed.
	
	        $Pb(NO_3)_2 (aq) + 2\,KI(aq) \longrightarrow PbI_2(s) + 2\,KNO_3(aq)$
	                       Yellow
	      (or any other reaction which shows formation of precipitate)
		½
		
		½
		
		½
		
		½
		
		½
		
		½
			
			3

29	Reflex action is a **sudden/spontaneous/immediate** action **in response to** the **environment/stimulus** e.g. sneezing.
	
	    Stimulus → Receptors (Nose) Sensory neuron
	  Response ← Effector ← Motor neuron ← Spinal cord ←
	          (Muscles) (Relay neuron)
	  (any other example)
		1
		
		2
			
			3

30	(i) Leaves with green (Chlorophyll) and non-green patches
	           (white or yellow patches)
	    e.g. croton/money plant/ any other
	
	    (ii) Leaf becomes colorless;
		½
		
		½
		
		½	

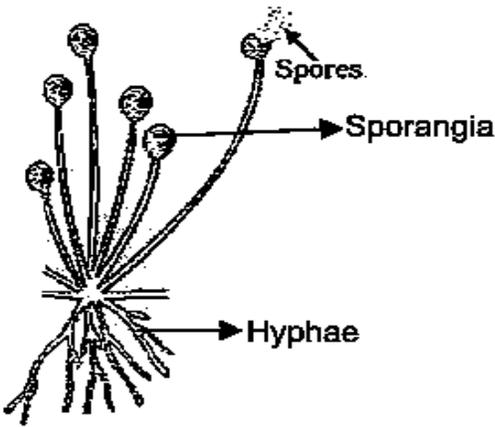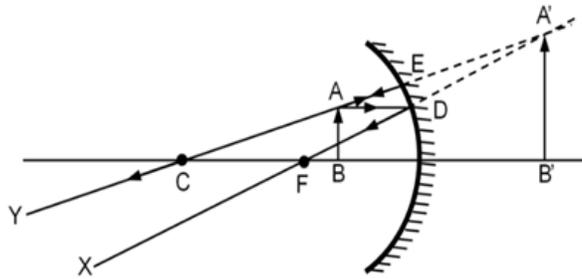|			
	The solution becomes green	½	
	(iii) Starch. Chlorophyll helps the plant to absorb energy of the sunlight for the process of photosynthesis	½ ½	3

31	**(A)**
	 ● Number of **plants/organisms** of **first trophic level** will **increase.**
	 ● Number of **lions/ third trophic level** will **decrease.**
	
	   ● No
	   ● As the organisms of that level will **find alternative foods** and will **not starve** to death / food web is more stable where other animals as prey may be available.
	  OR **(B)**
	   ● Gas 'X' is **Ozone**
	   ● Ozone **shields** the surface of the earth from **ultra-violet (UV) radiations** from the sun.
	   ● CFCs (Chlorofluorocarbons)
	   ● Succeeded in forging an agreement to freeze CFC production at 1986 levels / Manufacturing of CFC free refrigerators
		1
		 1
		
		 ½
		
		 ½
		
		 1
		 1
		
		 ½
		 ½
			3

32	
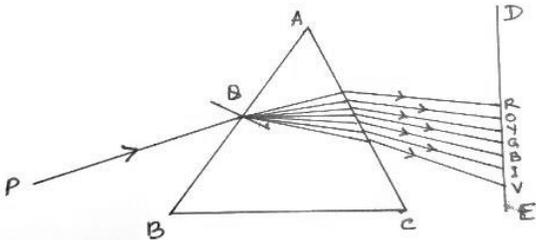	
	   ● Phenomenon: Dispersion of light
	   ● Cause : Different colours of white light bend through different angles with respect to incident ray./ Different colours of white light have different wavelength therefore bend by different angles.
	   ● Refractive index of glass is highest for violet colour.
	   ● Justification :For same $\angle i$ the $\angle r$ is minimum for the violet light. $\left(\dfrac{Sin\ i}{Sin\ r}\right)$ *or* refractive index *is highest*
		1
		
		 ½
		
		 ½
		
		 ½
		 ½
			3

33	(i) ● Electric fuse and Earth wire (ii) $I = P/V$	½+½ ½	

	$= \dfrac{200\cancel{0}\ \text{W}}{22\cancel{0}\ \text{V}} = 9\cdot 09\ \text{A}$		½	
	Since, current drawn by the oven is greater than the rated value of current, (9·09A > 5A), the fuse wire melts/ the electric oven stops working.		1	3
SECTION-D				
34	(A) (i)Functional Group: A hetero atom or group of atoms attached to the carbon chain, which gives specific properties to the carbon compounds. (I) Ketone (II) Carboxylic acid (ii)Ethanoic acid is formed $C_2H_5OH \xrightarrow[\text{Acidified } K_2Cr_2O_7+\ \text{Heat}]{} CH_3COOH$ • oxygen is added to ethanol and converts /oxidises ethanol to ethanoic acid. (iii) $\ CH_3COOH\ +\ NaOH\ \longrightarrow\ CH_3COONa\ +\ H_2O$ **OR** (B) (i) Soaps are prepared by heating an ester (animal fat / vegetable oil) with a base such as sodium hydroxide. $CH_3COOC_2H_5 \xrightarrow{\ NaOH\ } CH_3COONa\ +\ C_2H_5OH$ Sodium ethanoate (ii) Ionic (hydrophilic) end of the soap interacts with water while the carbon chain(hydrophobic) interacts with oil. Thus micelles are formed. Emulsion is formed in the water. Soap micelles pull out the dirt and oil in water.		1 ½ ½ ½ 1 ½ 1 1 1 2	

		1	
			5

35	(A) (i)		
	• Electric power : Rate at which electrical energy is dissipated or consumed / Rate of supplying energy to maintain the flow of current through a circuit.	1	
	• $P = \dfrac{V^2}{R}$	1	

(ii)   (a)   (1 unit = 1kWh)

$$\text{Power, P} = \frac{Electrical\ energy\ consumed}{Time}$$ ½

$$= \frac{11\text{kWh}}{5\text{h}} = 2.2\text{kW } \textbf{or } 2200\ \text{W}$$ ½

(b) $I = \dfrac{P}{V}$ ½

$$= \frac{2200}{220} = 10\text{A}$$ ½

(c) $R = \dfrac{V^2}{P}$ ½

$$= \frac{(220)^2}{2200} = 22\ \Omega$$ ½

(Alternate formula can be used)

OR

	(B)
	
	(i) $R = \rho \dfrac{l}{A}$
	
	$$\rho = \dfrac{R \times A}{l}$$
	
	$$= Ohm \times \dfrac{(metre)^2}{metre}$$
	
	$$=\ \ ohm\ meter\ /\ \Omega m$$
	
	(ii) Here $l = 3$ m, $A = 4 \times 10^{-7}$ m^2, R $= 60\ \Omega$
	
	$$\rho\ =\ \dfrac{R \times A}{l}$$
	$$=\dfrac{60 \times 4 \times 10^{-7}}{3}$$
	$$= 80 \times 10^{-7}\ \Omega m$$
	
	(iii)
	  • Resistivity will not change.
	  • because Resistivity does not depend on the dimension of the conductor / It only depends on the nature of the material.
		1
		
		1
		
		1
		
		1
		1	

			5

36	(A) (i)
	• Chemical Method/Oral pills
	  Side effects: Change the hormonal balance of the body.
	
	  • Barrier method / Loop / Copper–T
	  Side effects: Irritation in uterus.
	
	  • Surgical method / Fallopian tube in female is blocked;
	    Side effects – may cause infections.
	
	(ii)
	(a) Fertilized egg/zygote gets implanted in the lining of uterus and starts dividing.
	
	(b) If the egg is not fertilized, the thick and spongy lining of the uterus breaks and comes out through the vagina as blood and mucous.
	
	<center>**OR**</center>
		½
		½
		
		½
		½
		
		½
		½
		
		1
		
		1	

	(B) (i) (a) Reproductive part – Sporangia (b) Non-reproductive part – Hypha/Hyphae. • Dry slice of bread does not provide moisture and nutrients necessary for the germination and multiplication of Rhizopus. (ii) • Budding: • Hydra uses regenerative cells for reproduction. A bud develops as an outgrowth due to repeated cell division at one specific site and develop into tiny individuals. On maturation, these buds detach from the parent and become new individuals. ***Alternate answer:*** • Regeneration: • It is carried out by specialised cells. If hydra is cut or broken into many pieces, many of these pieces grow into separate individuals. **[Note: Award marks for either of the processes and its explanation]**	1 ½ ½ 1 1 1 	5
	SECTION E		
37	(i) • Mirror A. • as the object is placed beyond the centre of curvature of the mirror. (ii) Same size/ Real / Inverted (Any two) (iii) (A) Nature-Virtual and erect Size-magnified	½ ½ ½ + ½ ½ ½	

(Deduct ½ mark if direction of rays are not marked)

		1

OR

(iii) (B) Here $f = -12$ cm, $u = -18$ cm, $v = ?$

Mirror formula $\dfrac{1}{f} = \dfrac{1}{v} + \dfrac{1}{u}$ or $\dfrac{1}{v} = \dfrac{1}{f} - \dfrac{1}{u}$

$$\dfrac{1}{v} = \dfrac{1}{-12} - \dfrac{1}{-18}$$

$v = -36$cm

In front of the mirror at a distance of 36 cm from the pole of the mirror.

½
½

1

4

38

(i)

- In F_1 generation, all plants were tall / No short plants were observed   ½

- No medium height plants / No halfway characteristics were observed / Only dominant parental traits were seen and not the mixture of the two.   ½

(ii)

Dominant trait	Recessive trait
Single copy of dominant trait is enough to get it expressed/always expressed	Only expressed when present in pair.

1

(Any other point)

(iii) (A)

- Self-pollination / Self-fertilisation/ Selfing of F_1 plants   ½
- Ratio – Round Yellow : Wrinkled Green
          9   :   1   ½
- Traits are inherited independently.   1

	OR (iii) (B) If pea plants with yellow seeds are crossed with plants of green seeds, it is found that in F_1 generation all the plants have yellow seeds. When F_1 plants are self-pollinated, it is found that in F_2 generation, plants with yellow seeds and plants with green seeds are obtained. This shows that both the traits are inherited but only one trait is visible in F_1 progeny while the other remains unexpressed. **[Note: Award marks if explained by taking one characteristic / Or explained the same diagrammatically]**	2	4

39	(i) Cathode – Pure copper
	
	        Anode – Impure copper
	
	(ii) Acidified Copper Sulphate; $CuSO_4$
	
	(iii) (A)
	• Pure copper from the anode dissolves into electrolyte and an equivalent amount of pure metal from the electrolyte is deposited on cathode /
	
	        At anode : $Cu \longrightarrow Cu^{++} + 2e^-$
	
	        At cathode : $Cu^{++} + 2e^- \longrightarrow Cu$
	                                                    Pure
	
	• The soluble impurities go into the solution whereas insoluble impurities settle down at the bottom of the anode.
	
	[Note: Award marks if explained with a suitable labelled diagram]
	OR
	(iii) (B)
	In Beaker A : • The blue colour of the solution fades (or becomes colourless)
	
	                        • Reason – Zn is more reactive than copper
	
	In Beaker B: • No change in colour.
	
	                        • Reason – Silver is less reactive than Copper
		½
		
		½
		
		½ + ½
		
		1
		
		1
		
		½
		
		½
		
		½
		
		½
			4

*****