Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2024
SUBJECT NAME SCIENCE (086) (Q.P. CODE 31/2/2)

General Instructions: -

1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC."
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.
4	The Marking scheme carries only suggested value points for the answers These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after delibration and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓)while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note "Extra Question".

10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 0 – 80 (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- Leaving answer or part thereof unassessed in an answer book. Giving more marks for an answer than assigned to it. Wrong totaling of marks awarded on an answer. Wrong transfer of marks from the inside pages of the answer book to the title page. Wrong question wise totaling on the title page. Wrong totaling of marks of the two columns on the title page. Wrong grand total. Marks in words and figures not tallying/not same. Wrong transfer of marks from the answer book to online award list. Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the “Guidelines for Spot Evaluation” before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME

Secondary School Examination, 2024

SCIENCE (Subject Code–086)

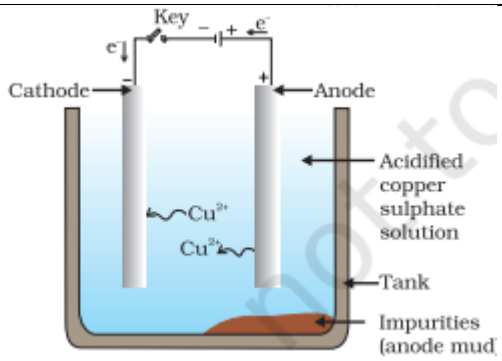
[Paper Code: 31/2/2]

Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(A) /(a) and (b)	1	1
2	(D)/ 4	1	1
3	(B)/ Burning of coal	1	1
4	(B)/ Al_2O_3	1	1
5	(D) /Bronze	1	1
6	(A)/5.1	1	1
7	(D)/ is exothermic reaction and pH of the solution formed is more than 7.	1	1
8	(B)/ Lifted ribs and flattened diaphragm	1	1
9	(A) /Pituitary	1	1
10	(C) /(b) and (c)	1	1
11	(D)/ Rhizopus	1	1
12	(C) /Tt and tt	1	1
13	(B) /direction of current flowing through it.	1	1
14	(C) /ohm.metre	1	1
15	(C)/ 2 Ω	1	1
16	(A)/ (a) and (b)	1	1
17	(D)/ (A) is false, but (R) is true.	1	1
18	(B)/ Both (A) and (R) are true but (R) is ***not*** the correct explanation of (A).	1	1
19	(C) / (A) is true, but (R) is false.	1	1
20	(C)/ A is true, but R is false	1	1
	SECTION B		
21	(a) • When a single reactant breaks down to give simpler products. $2\ FeSO_4(s) \xrightarrow{Heat} Fe_2O_3(s)\ +\ SO_2(g) +\ SO_3(g)$ OR (b)Balanced chemical equation is one in which the total number of atoms of each element remains same for reactants and products. • Mass can neither be created nor destroyed in the chemical reaction./ To satisfy law of conservation of mass.	1 1 1 1	2

22	(a) • Test Tube B • Blue-black (b) Starch is digested by saliva in test tube A, so no change in colour . **Alternate answer** Saliva contains enzyme which converts starch solution to sugar, so no change in colour.	½ ½ 1	2
23	• Egg cell/Ovum and sperm • Egg cell | Sperm Large in size | Small in size Non-motile | Motile Spherical in shape | Elongated **(any two)**	½ , ½ ½ , ½	2
24	(a) Laws of Refraction of light : (i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane. (ii) The ratio of the sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. **Note:** If a student writes $\frac{\sin i}{Sin\ r} = constant$ instead of statement, award ½ mark only) **OR** (b) Absolute refractive index of a medium is the ratio of speed of light in vacuum to the speed of light in the medium. Given: $c = 3 \times 10^8$m/s; $n_m = 1{\cdot}5$; $v_m = ?$ Absolute refractive index of a medium (n_m) $= \frac{speed\ of\ light\ in\ vacuum}{speed\ of\ light\ in\ medium} = \frac{c}{v_m}$ $v_m = \frac{c}{n_m} = 2 \times 10^8$m/s	1 1 1 ½ ½	2

25	$R_S = R_1 + R_2 + R_3$ $= 1 + 2 + 3 = 6\ \Omega$ $I = \frac{V}{R}$ $= \frac{2V}{6\Omega} = \frac{1}{3}A$ $V = IR$ $= \frac{1}{3}A \times 3(\Omega) = 1\ V$	½ ½ ½ ½	2
26	• Non-biodegradable substances • **Two ways:** (i) They are inert and persist in the environment for long time and cause pollution. (ii) Cause Biological magnification (iii) Affect the fertility of soil (any two) (or any other)	1 ½ , ½	2
	SECTION C		
27	(a) (i) To facilitate efficient exchange of gases. (ii) It has high affinity for oxygen. (iii) Lack of oxygen does not oxidise glucose completely and forms a 3-Carbon molecule or lactic acid. **OR** (b) (i) • Peristaltic movements • Muscles contract rhythmically in order to push the food forward in a regulated manner to be digested properly. (ii) • Gall bladder • Two roles: ➢ Emulsification of fats ➢ Makes the acidic medium alkaline.	1 1 1 ½ 1 ½ ½ ½	3
28	(a) • Pollen grains will not be transferred to the stigma and Hence fertilisation will not take place. • Ovule • Zygote develops into an embryo.	1 ½ ½	

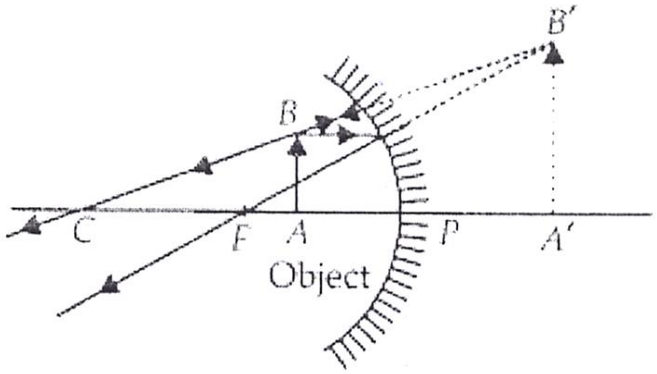
	(b) Testis – Anther Ovary – Ovary	½ ½	3
29	(a) Observations: • Formation of bubbles at both the electrodes. • These bubbles displace water in both the test tubes. • Volume of gas collected at Cathode is twice the volume of gas collected at anode. (Any two) (b) Cathode : Anode: H_2: O_2 1: 8	1,1 1	3
30	 Diagram- Refer Figure 3·12 page 52 NCERT 2 Labellings : Electrodes and Electrolyte. • When a current is passed through aqueous solution of $CuSO_4$, the pure metal from the anode dissolves in the electrolyte ($CuSO_4$ solution) and equivalent amount of pure copper from $CuSO_4$ solution is deposited on the cathode. **Alternate answer:** At anode: Cu -----→Cu^{2+} +$2e^-$ At Cathode: Cu^{2+} +$2e^-$ -----→Cu	1 1 1	3
31	(a) Here f = –12 cm, u = – 8 cm, ν = ? Mirror formula $\frac{1}{\nu}+\frac{1}{u}=\frac{1}{f}$	½ ½	

$\therefore \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-12\text{ cm}} - \frac{1}{-8\text{ cm}}$

$= +\frac{1}{24\ cm}$

$v = +24$ cm 1

Image is formed at 24 cm behind the mirror.



1

Note: Deduct ½ mark if direction of rays is not shown.

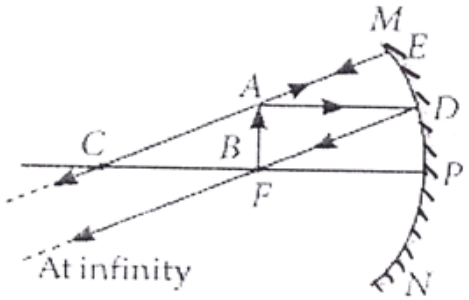
OR

(b)(i) Object is placed at 30 cm from the mirror. ½

Note: Award marks if expressed in the form of calculations.

Reason: Since magnification is -1, Image distance(v)= object distance(u) ½

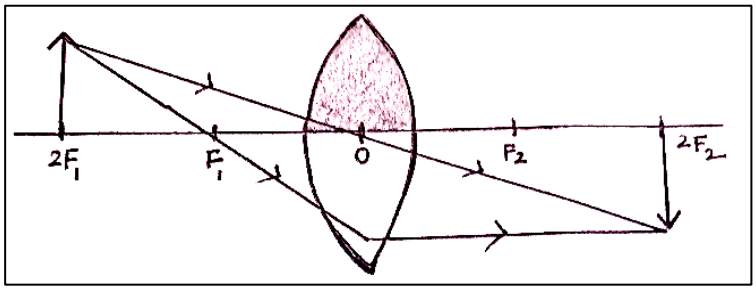
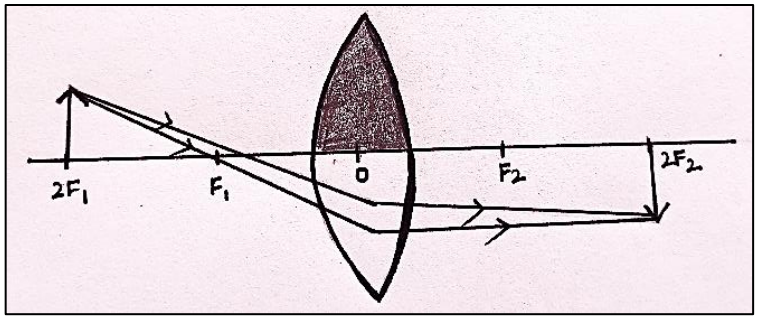
(ii) Image is formed at infinity. 1



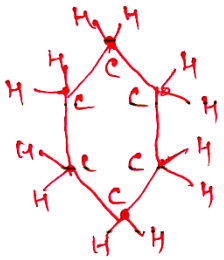
1

Note: Deduct ½ mark if direction of rays is not shown

3

32	(a) • Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor. • Direction of force vertically downwards/Into the page (b) Electron will experience force in vertically upward direction/ will deflect out of the page. • **Reason:** Direction of flow of electrons is opposite to the direction of current in AB.	1 ½ ½ 1	3
33	Phenomenon – Biological Magnification /Biomagnification • Pesticides are washed down into the soil and water bodies. • From the soil pesticides are absorbed by crop plants along with water and minerals and enter the food chain. • These chemicals are non-biodegradable and get accumulated progressively at each trophic level. • As human beings occupy the top level in any food chain, the maximum concentration of these chemicals gets accumulated in our bodies.	1 ½ ½ ½ ½	3
	SECTION D		
34	(a)   **Note: Any one of the above drawn ray diagrams should be marked.**	1	

	When the upper half of lens is covered: • Position of image: at 2F on the other side of the lens • Nature of image: Real and inverted • **Observable difference in the image, if the lens is uncovered** The brightness of the image will increase • **Reason:** More number of rays will pass through the lens to form the image. (b) Here u = – 30 cm, f = –15 cm, v = ? $$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$ $$\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$$ $$= \frac{1}{-15} + \frac{1}{-30}$$ $$v = -10\ cm$$	½ ½ ½ ½ ½ ½ 1	5
35	(a) (i) • Carbon cannot form C^{4+} cations because removal of 4 electrons from a carbon atom would require a large amount of energy and it cannot form C^{4-} anion because it would be difficult for the nucleus with 6 protons to hold 10 electrons. • Thus it shares electrons to form covalent compounds. (ii) • A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain / series of compounds having same functional group and similar chemical properties. • CH_3CHO, C_2H_5CHO **(any other consecutive members)** (iii) Structure of cyclohexane (C_6H_{12})	1 1 1 ½, ½	



1

OR

(b)

(i) Ethanol – C_2H_5OH ½, ½

(ii)

(1) $2\ C_2H_5OH\ +\ 2Na \longrightarrow 2\ C_2H_5ONa\ +\ H_2$ ½, ½

Sodium Ethoxide

(2) $C_2H_5OH \xrightarrow{Excess\ Conc.\ H_2SO_4\ ,443\ K} CH_2 = CH_2 + H_2O$ ½, ½

Ethene

(3) $C_2H_5OH + CH_3COOH \xrightarrow{Acid\ Catalyst} CH_3COOC_2H_5 + H_2O$ ½, ½

Ester

(4) $C_2H_5OH \xrightarrow{Acidified\ K_2Cr_2O_7} CH_3COOH$ ½, ½

Ethanoic acid

NOTE: Name of the product for each reaction is given in bold letters under the reaction.

5

36 (a) (i)

Hormonal coordination in Plants	**Hormonal coordination in Animals**
1) By simple diffusion	Transported through blood to the target organ
2) No specialised glands involved.	Hormone released by Endocrine glands.

1,1

(ii) (1) Cerebrum/forebrain,
(2) cerebellum/hindbrain
(3) medulla/ hindbrain
(4) hypothalamus/forebrain.

½ x 4

(iii) Brain – Bony box/skull/cranium/fluid filled balloon in skull, ½

Spinal cord – Backbone/Vertebral column. ½

OR

	(b) (i)Plant growth movements in response to stimuli in a particular direction / directional movements due to light, gravity etc. (1) Plant growth inhibitor: Abscisic Acid (2) Promotes cell division – Cytokinins (ii) When the tendrils come in contact with any support, auxins move away from the point of contact of the support. More growth occurs on the side away from the support. As a result, unequal growth occurs on its two sides and thus tendrils coil/ circle around the support. • Auxins	1 ½ ½ 2 1	5
	SECTION E		
37	(a) • Higher resistivity than pure metals • Do not oxidise (burn) at high temperature. (b) • Higher resistivity than pure metals • Low melting point. (c) • Heating effect of electric current • When high current flows in the circuit accidently, the fuse wire melts and breaks the circuit . **OR** (c) P = 1100 W; V = 220 V, I = ? P = VI $I = \frac{P}{V} = \frac{1100\ W}{220\ V}$= 5A • No effect on the fuse of 5A rating.	½ , ½ ½ , ½ 1 1 ½ ½ 1	4
38	(a) Acid – HCl, Base – NaOH (b) Cation Ca^{2+} Anion SO_4^{2-},	½, ½ ½ ,½	

	(c) Salts having same cations but different anions belong to the same family of salts. e.g. sodium chloride (NaCl) and Washing Soda/sodium carbonate (Na_2CO_3) both have Na^+ as cation. **OR** c) • A scale for measuring hydrogen ion (H^+) concentration in a solution is called pH scale. • Potassium Sulphate / K_2SO_4 • pH = 7	2 1 ½ ½	4
39	(a) All cut pieces of the two planaria will form a complete organism. (b) Hydra (c) Specialised cells proliferate to make a large number of cells. This mass of cells change to make different cell types and tissues. These changes take place in an organised sequence and is called development. **OR** (c) Regeneration: Specialised cells proliferate to form new cells which multiply and form a a new individual Fragmentation: Each piece/fragment grows by cell-to-cell division to form a new organism.	1 1 2 1,1	4

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