Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination, 2023
Marking Scheme – Science (SUBJECT CODE -086)
(PAPER CODE –31/4/2)

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 **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 a reply.
    - 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. 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.

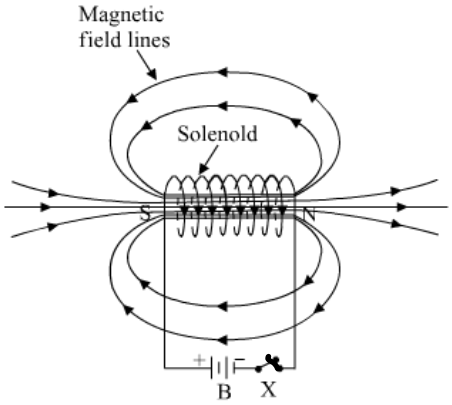
18. The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

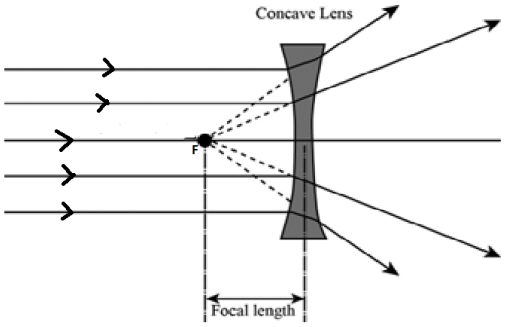
MARKING SCHEME
Secondary School Examination, 2023
SCIENCE (Subject Code–086)
[Paper Code:31/4/2]

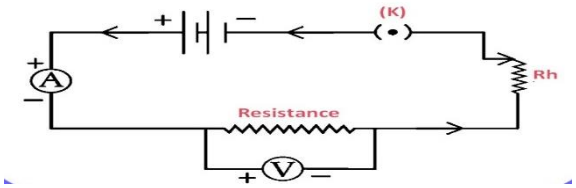
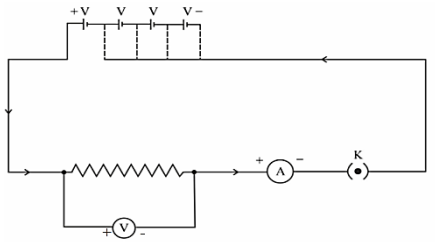
Maximum Marks: 80

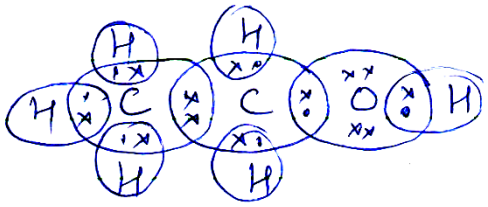
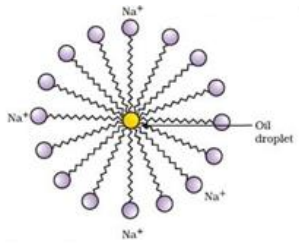
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1.	(c)	1	1
2.	(c)	1	1
3.	(b)	1	1
4.	(d)	1	1
5.	(b)	1	1
6.	(b)	1	1
7.	(c)	1	1
8.	(d)	1	1
9.	(a)	1	1
10.	(c)	1	1
11.	(b)	1	1
12.	(b)	1	1
13.	(d)	1	1
14.	(b)	1	1
15.	(c)	1	1
16.	(c)	1	1
17.	(b)	1	1
18.	(c)	1	1
19.	(d)	1	1
20.	(a)	1	1
	SECTION B		
21	(i) It shields the surface of the earth from harmful ultraviolet radiations of the Sun. (ii) It was due to CFCs (Chlorofluorocarbons) which are used as refrigerants/ fire extinguishers / aerosols.	1 1	2
22	(A) (i) Myopia / Short Sightedness (ii) • Excessive curvature of eye lens • Elongation of eye ball (iii) Concave lens /Diverging Lens **OR** (B) • Size of particles in the atmosphere is smaller than the wavelength of visible light, so they scatter light of shorter wavelengths i.e. blue. • In space, there is no scattering of light due to absence of particles. (no atmosphere)	½ ½ ½ ½ 1 1	2
23	• The plant kept in dark is unable to carry out photosynthesis and due to absence of oxygen it cannot respire. • But the plant kept in light is able to photosynthesize converting CO_2 into oxygen which it can use for respiration.	1 1	2
24	• The bile juice makes the food alkaline so that pancreatic enzymes can act	1	

	on it. • It breaks down large globules of fat into smaller globules / Emulsification of fat takes place.	1	2
25	• Adrenaline • Three responses:- (1) It increases the heartbeat. (2) Blood to the digestive system is reduced. (3) Breathing rate increases . (4) Blood to the skin reduced. **(Any three points)**	½ ½ × 3	 2
26	(A) (i) • Copper (II) chloride / Copper chloride / Cupric chloride / $CuCl_2$ • colour- blue-green. (ii) $CuO + 2HCl \rightarrow CuCl_2 + H_2O$ **OR** (B) X : Sodium Chloride / NaCl Y : Hydrogen /H_2 Z : Chlorine / Cl_2 B : Bleaching powder / $CaOCl_2$	½ ½ 1 ½ ½ ½ ½	 2
	SECTION C		
27	• <table><tr><th>Biodegradable</th><th>Non-biodegradable</th></tr><tr><td>Biodegradable wastes can be broken down by biological processes.</td><td>Non-biodegradable wastes cannot be broken down by biological processes.</td></tr></table> • Impact of accumulated biodegradable wastes: (i) Foul smell (ii) Breeding place for carriers of diseases **(or any other)** • Impact of accumulated non-biodegradable wastes: (i) Biological Magnification (ii) Affect soil fertility. **(or any other)**	1 ½ ½ ½ ½	 3
28	(A) (i) Alternating current can be transmitted over long distances without much loss of electric energy. (ii) Household supply – Alternating current (AC) Battery of Dry cell – Direct current (DC) (iii) It melts and breaks the circuit when a current of higher value than its rating flows through it.	1 ½ ½ 1	

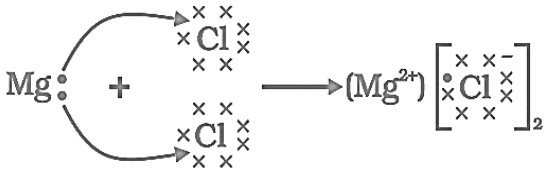
	OR (B) •  **[Deduct ½ mark if direction of current or magnetic field is not marked]** • Maximum at A Magnetic field lines are crowded. / Magnetic field adds up due to 'n' number of turns of a solenoid. • Minimum at B Magnetic field lines are far apart.	1 ½ ½ ½ ½	3
29	<table><tr><th>Concave lens</th><th>Convex lens</th></tr><tr><td>• Diminished image / m<1</td><td>• Magnified image / m>1</td></tr><tr><td>• v < u / image distance < object distance</td><td>• v > u / image distance > object distance</td></tr></table> • Myopia / Short Sightedness – diverging lens / concave lens – brings image back to retina • Hypermetropia / Far Sightedness – converging lens / convex lens – brings image back to retina	½ ½ ½ ½ ½ ½	3
30	(A) (i) Convex lens / Converging lens (ii) Power, P = +2D $f(m) = \frac{1}{P}$ $f = \frac{1}{2} = 0{\cdot}5 \text{ m} = 50\text{cm}$ u = -100cm $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ $\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{50} - \frac{1}{100} = \frac{1}{100}$ v = 100 cm = 1 m	1 ½ ½ ½ ½	

	Alternate answer only for image distance Since object is at 2f, image will be formed at 2f. Therefore, image distance is 100 cm. as f= 50 cm, u=1m or 100 cm = 2f ∴u=v=1m **OR** (B) (i) It is a point on the principal axis of a diverging lens from where the rays parallel to principal axis appear to diverge. (ii) The distance between the optical centre and the principal focus of the lens.  	1 1 1	3
31	(A) (i) Food enters through a specific spot with the help of movement of cilia. (ii) (a) Creates an acidic medium which facilitates the action of enzyme / kills microorganisms ingested with the food. (b) Digestion of proteins (c) Mixing the food thoroughly with digestive juices. / pushes food forward by peristalsis. (d) Conversion of starch into sugar **OR** (B) (i) Blood goes through the heart twice during each cycle. (ii) • To prevent oxygenated and deoxygenated blood from mixing for efficient supply of oxygen to the body. • It helps birds and mammals who have high energy needs and constantly use energy to maintain their body temperature.	1 ½ ½ ½ ½ 1 1 1	3
32	(i) Acidified water has more ions than pure water. (ii) KOH (s) $\xrightarrow{H_2O}$ K^+ (aq) + OH^-(aq) (iii) The process is highly exothermic / may cause excessive heating /heat is released and may cause harm / mixture may splash out	1 1 1	3
33	(i) • To increase the conductivity of water • Hydrogen – cathode Oxygen – anode • Anode : Cathode 1 : 2 /Volume of hydrogen liberated at cathode is twice that of oxygen liberated at anode.	½ ½, ½ ½	

	(ii) • White silver chloride turns grey • Decomposition reaction / Photolytic Decomposition	½ ½	3
	SECTION D		
34	(i) Current flowing through a conductor is directly proportional to the potential difference. / Vα I / I α V   **(Any one diagram)** (ii)Since ammeter is connected in series, it should not increase the resistance of the circuit. / should allow maximum current to flow through the circuit. (iii) • Series combination - Graph A Less slope and more resistance • Parallel combination - Graph B More slope and less resistance	1 1 1 ½ ½ ½ ½	5
35	(i) The two modes of asexual reproduction observed in hydra are: • Budding: A bud develops as an outgrowth. These buds develop into tiny individuals. When fully matured it detaches from the parent body and become new independent individual. • Regeneration: Hydra can be cut into any number of pieces and each piece grows into a complete organism. (ii)• Definition: When any vegetative part of plants like root, stem or leaf is used to grow new plants. • Advantages: - 1. Plants can bear flowers and fruits earlier than those produced from seeds. 2. It enables the propagation of plants such as banana, orange, rose and jasmine which have lost the capacity to produce seeds. 3. The plants produced are genetically similar enough to the parent plant to have all the characteristics. **(Any two)**	½ , 1 ½ , 1 1 ½, ½	5
36	(A) (i) Covalent compounds do not have free ions / electrons (ii) • It does not form C^{4+} cation, as the removal of four valence electrons will require a huge amount of energy. • Carbon does not form C^{4-} anion as the nucleus with six protons will not be able to hold ten electrons due to its small size.	1 1 1	

	(iii) 	1	
	(iv) (a) Oxygen / O (b) Chlorine / Cl	½ ½	
	OR		
	(B) (i) • The molecules of soap are Sodium or potassium salts of long chain carboxylic acids / $RCOO^-Na^+$.	1	
	• The ionic end of soap interacts with water while the carbon chain interacts with oily dirt. The soap molecules thus form structures called micelles where one end of the molecule is towards the oil droplet while the ionic end faces outside. This forms an emulsion in water. The soap micelles thus helps in pulling out dirt in water and we can wash our clothes clean.	2	
		1	
	(ii) Detergents do not form insoluble precipitates (scum) with calcium and magnesium ions present in hard water.	1	5
	SECTION E		
37	(i) Refractive index of diamond = $\frac{Speed\ of\ light\ in\ vacuum}{Speed\ of\ light\ in\ diamond}$	½	
	Speed of light in diamond = $\frac{3\times10^8\ m/s}{2\cdot42} = 1\cdot23\times10^8$ m/s	½	
	(ii) $\angle r$ in carbon disulphide < $\angle r$ in glass < $\angle r$ in water	1	
	(iii) (A) (a) • Glass	½	
	• The speed of light in water is more than the speed of light in glass. / Refractive index of glass is more than the refractive index of water.	½	
	(b) Light will enter from water to glass without bending (undeviated / straight) because in this case $\angle i = 0$; $\angle r = 0$.	1	
	OR		
	(iii) (B) $n_{glass} = \frac{3}{2}$		

	$n_{water} = \frac{4}{3}$ $v_{glass} = 2 \times 10^8 m/s$ $n_{glass} = \frac{speed\ of\ light\ in\ vacuum(c)}{speed\ of\ light glass(v_g)}$ $c = n_{glass} \times v_{glass}$ $= \frac{3}{2} \times 2 \times 10^8 m/s$ $= 3 \times 10^8 m/s$ $v_{water} = \frac{c}{n_{water}} = \frac{3 \times 10^8 m/s}{\frac{4}{3}}$ $= \frac{9}{4} \times 10^8$ m/s **or** 2.25×10^8 m/s	1 1	4
38	(i) Sexual reproduction involves the fusion of male and female gametes, which combines to the characters of both parents and cause variation. (ii) **F_1 generation**: • In F_1 generation only the dominant traits are expressed. • It refers to the offspring/ plants resulting immediately from a cross between the first set of parents. **F_2 generation**: • In F_2 generation both dominant and recessive traits are expressed. • It refers to the offspring/plants resulting from a cross among the plants of F_1 generation. **[Any one]** (iii) (A) Because if a niche of population of organisms is altered, the whole population could be wiped out. However, if variation is present in this population they have some chance of survival. **[Alternate answer]** If there is a population of bacteria living in temperate waters and if water temperature were to be increased by global warming, most of the bacteria would die, but a few variants resistant to heat would survive and grow further. Thus, variations are useful for survival of species over time. **OR** (iii) (B) • Wrinkled, yellow Round, green • If two or more traits are involved, their genes are independently inherited irrespective of the combination present in parents.	1 1 2 ½ ½ 1	4

39	(i)  (ii) • They are hard solids • They are soluble in water • They conduct electricity in aqueous solution or molten state **[Any other]** **[Any two]** (iii) (A) • Sodium atom has one electron in its outermost shell • It attains its nearest noble gas configuration by losing this electron forming Na^+ ion / **Na** $\rightarrow$ **$Na^+ + e^-$** 2,8,1 2,8 stable **OR** (iii) (B) (i) Because movement of ions in the solid is not possible due to their rigid structure. (ii) H_2 gas is liberated at cathode.	1 ½, ½ 1 1 1 1	4