

Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Supplementary Examination, July- 2023
SUBJECT NAME: SCIENCE SUBJECT CODE- 086 PAPER CODE 31(B)

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 deliberation 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($\sqrt{\quad}$) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (\checkmark) 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).
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- Giving more marks for an answer than assigned to it. <ul style="list-style-type: none"> ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page.

	<p>Wrong question wise totaling on the title page.</p> <ul style="list-style-type: none"> ● Leaving answer or part thereof unassessed in an answer book. ● ● 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 un assessed 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 Supplementary Examination, 2023
SCIENCE (Subject Code–086)
[Paper Code: 31/B]

Maximum Marks : 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
SECTION—A			
1	(d)	1	1
2	(c)	1	1
3	(c)	1	1
4	(a)	1	1
5	(b)	1	1
6	(c)	1	1
7	(a)	1	1
8	(b)	1	1
9	(d)	1	1
10	(d)	1	1
11	(c)	1	1
12	(b)	1	1
13	(a)	1	1
14	(a)	1	1
15	(d)	1	1
16	(d)	1	1
17	(b)	1	1
18	(a)	1	1
19	(c)	1	1
20	(a)	1	1
SECTION— B			
21	(a) (i) When zinc is added to the aqueous solution of copper sulphate, zinc sulphate is formed and blue colour of the solution disappears / $\text{Zn} + \text{CuSO}_4(\text{aq}) \longrightarrow \text{ZnSO}_4(\text{aq}) + \text{Cu}$ (any other example)	1	

	<p>or $C(s) + O_2(g) \rightarrow CO_2(g)$ (or any other example)</p> <p>(ii) Calcium carbonate $\xrightarrow{\text{heat}}$ Calcium oxide + Carbon dioxide</p> <p>or $CaCO_3(s) \xrightarrow{\text{heat}} CaO(s) + CO_2(g)$ (or any other example)</p>	1							
		1	3						
28	<p>(a) pH paper becomes red in colour - conc. H_2SO_4</p> <p>pH paper becomes blue in colour - conc. NaOH solution</p> <p>pH paper becomes green in colour - conc. Na_2SO_4 solution.</p> <p>(b) Conc. solution of NaOH and conc. H_2SO_4</p> <p>(c) $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$</p> <p>(Do not deduct marks if equation is not balanced)</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p>	3						
29	<p>(a) Three events during photosynthesis</p> <p>(i) Absorption of light energy by chlorophyll</p> <p>(ii) Conversion of light energy into chemical energy and splitting of water molecules into hydrogen and oxygen.</p> <p>(iii) Reduction of CO_2 into carbohydrates.</p> <p style="text-align: center;">OR</p> <p>(b) • The colourless fluid present in the intercellular spaces containing some amount of plasma, proteins and blood cells.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Lymph</td> <td>Blood Plasma</td> </tr> <tr> <td>Colourless</td> <td>Coloured</td> </tr> <tr> <td>Less proteins</td> <td>More proteins</td> </tr> </tbody> </table> <p style="text-align: right;">(any one difference)</p> <p>• Two functions of lymph :-</p> <p>(i) Carries digested and absorbed fat from the intestine.</p> <p>(ii) Drains excess fluid from extra cellular space back into the fluid.</p>	Lymph	Blood Plasma	Colourless	Coloured	Less proteins	More proteins	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3
Lymph	Blood Plasma								
Colourless	Coloured								
Less proteins	More proteins								
30	<p>(a) magnification = $\frac{v}{u}$</p> $= \frac{+36}{-18}$ $m = -2$ <p>(b) Lens formula : $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$</p> $f = \frac{-18 \text{ cm} \times 36 \text{ cm}}{-18 \text{ cm} - 36 \text{ cm}} = \frac{18 \times 36 \text{ cm}}{-18 \text{ cm} - 36 \text{ cm}} = \frac{18 \times 36}{54} \text{ cm}$ $f = 12 \text{ cm}$	<p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p>	3						
31	<p>(a)</p> <p>(i) Centre of the reflecting surface of a spherical mirror</p> <p>(ii) Centre of the sphere of which mirror was a part</p>								

	<p>(iii) Straight line passing through pole and centre of curvature of spherical mirror</p> <p>(iv) Point on principal axis where the reflected rays meet / appear to meet.</p> <p>(b) Focal length = $\frac{-60 \text{ cm}}{2} = -30 \text{ cm}$</p> <p>Because the object is placed at the centre of curvature.</p>	<p>4 x ½</p> <p>½</p> <p>½</p>	<p>3</p>
32	<p>(a)</p> <ul style="list-style-type: none"> The potential difference V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains constant / $V \propto I$ <p>Factors:</p> <ul style="list-style-type: none"> Length of conductor. Area of cross – section of conductor If length is doubled, cross-sectional area is halved. <p>$R \propto \frac{l}{A}$</p> <p>So, resistance becomes 4 times</p> <p>Resistance of new wire = 4R</p> <p style="text-align: center;">OR</p> <p>(b) (i) Formula for</p> <p>Equivalent resistance in series : $R_s = R_1 + R_2 + R_3$</p> <p>Equivalent resistance in parallel : $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$</p> <p>(ii)</p> <p>(1) Each device can draw current as per need</p> <p>(2) Separate ‘ON/OFF’ switch for every device can be put</p> <p>(3) Total resistance of the combination decreases hence larger current can be drawn from the source.</p> <p>(4) If one device fails, other devices keep on working</p> <p style="text-align: right;">(any two)</p>	<p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p> <p>2 x ½</p>	<p>3</p>
33	<ul style="list-style-type: none"> All the organisms (biotic components) in an area interacting together with the non living (abiotic) components of the environment forms an ecosystem. Two artificial ecosystems – Garden / pond / aquarium (any two) (or any other) Natural ecosystems are self-sustaining and have decomposers as their cleaning agents whereas the man-made systems do not have them. 	<p>1</p> <p>½ + ½</p> <p>1</p>	<p>3</p>
SECTION—D			
34	<p>(a) • Methane – CH₄ , Ethane - C₂H₆</p> <p>• C_nH_{2n+2}</p>	<p>½ + ½</p> <p>½</p>	

	<ul style="list-style-type: none"> • 14 u (b) • Ethanol, C₂H₅OH / CH₃CH₂OH • $C_2H_5OH \xrightarrow[443K]{H_2SO_4(conc)} C_2H_4 + H_2O$ • Ethene • Conc. H₂SO₄ – Dehydrating agent <p style="text-align: center;">OR</p> <p>(a) i. $C_2H_5OH \xrightarrow[or\ Alk\ KMnO_4+heat]{Acidified\ K_2Cr_2O_7+heat} CH_3COOH$</p> <p>ii. $C_2H_4 + H_2 \xrightarrow{Ni\ catalyst} C_2H_6$</p> <p>(b)</p> <p>i. When ethanol is burnt in oxygen then water , carbon dioxide and heat is produced.</p> <p style="text-align: center;">$C_2H_5OH + 3O_2 \longrightarrow 3H_2O + 2CO_2 + heat$ (any other example)</p> <p>ii. When chlorine reacts with methane in the presence of sunlight, chloromethane is formed.</p> <p style="text-align: center;">$CH_4 + Cl_2 \xrightarrow{light} CH_3Cl + HCl$ (any other example)</p> <p>iii. Reaction in which an ester reacts with sodium hydroxide to form soap.</p> <p style="text-align: center;">$CH_3COC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$</p> <p style="text-align: right;">(any other example)</p> <p style="text-align: center;">(Do not deduct marks for unbalanced equation.)</p>	<p style="text-align: center;">½</p> <p style="text-align: center;">½ + ½</p> <p style="text-align: center;">1</p> <p style="text-align: center;">½</p> <p style="text-align: center;">½</p> <p style="text-align: center;">1</p>	5				
35	<p>(a)</p> <ul style="list-style-type: none"> • The ability of an organism to give rise to new organisms from their cut or broken body parts /pieces. • Specialised cells . • Planaria / Hydra (any one example) <p>(b) (i) To transport sperms to urethra</p> <p>(ii) To produce sperms / secretion of Testosterone.</p> <p>(iii) To make transport of sperms easier / provide nutrition to the sperms.</p> <p style="text-align: center;">OR</p> <p>(a)</p> <ul style="list-style-type: none"> • Pollination: Transfer of pollen from anther to the stigma. • Types: Self -Pollination and Cross -Pollination • <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Self -Pollination</th> <th style="width: 50%; text-align: center;">Cross -Pollination</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Transfer of pollen occurs in same flower.</td> <td style="padding: 5px;">Transfer of pollen from one flower to another flower.</td> </tr> </tbody> </table> <p style="text-align: right;">(any other difference)</p>	Self -Pollination	Cross -Pollination	Transfer of pollen occurs in same flower.	Transfer of pollen from one flower to another flower.	<p style="text-align: center;">1</p> <p style="text-align: center;">½</p> <p style="text-align: center;">½</p> <p style="text-align: center;">1</p> <p style="text-align: center;">½ + ½</p> <p style="text-align: center;">1</p>	
Self -Pollination	Cross -Pollination						
Transfer of pollen occurs in same flower.	Transfer of pollen from one flower to another flower.						

	(b) The pollen produces a tube which travels through the style and reaches the ovary.	1	
	(c) (i) Ovary develops into a fruit. (ii) Ovule develops into a seed.	½ ½	5
36	<p>(a)</p> <ul style="list-style-type: none"> Solenoid –A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder. Inside the solenoid. Parallel straight magnetic field lines. <p>(b)</p> <ul style="list-style-type: none"> Fleming’s Left Hand Rule: stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular to each other. 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. / <div style="text-align: center;"> </div> <ul style="list-style-type: none"> Upwards. 	1 1 1 1 1	5
SECTION - E			
37	<p>(a) The refractive index of a medium with respect to air or vacuum / Absolute refractive index of a medium = $\frac{\text{speed of light in air(vacuum)}}{\text{speed of light in medium}}$</p> <p>(b) (i) water (ii) carbon disulphide</p> <p>(c) (i)</p> $n_g = \frac{3}{2}; n_w = \frac{4}{3}; v_w = 2.25 \times 10^8 \text{ m/s}; c = ?; v_g = ?$ <p>(I) $n_w = \frac{c}{v_w}$</p> $\frac{4}{3} = \frac{c}{2.25 \times 10^8 \text{ m/s}}$ $c = 3 \times 10^8 \text{ m/s}$ <p>(II) $v_g = \frac{c}{n_g}$</p> $= \frac{3 \times 10^8 \text{ m/s}}{3/2} = 2 \times 10^8 \text{ m/s}$ <p style="text-align: center;">OR</p> <p>(ii)</p> <p>Refractive index of water w.r.t. glass = $\frac{\text{speed of light in glass}}{\text{speed of light in water}}$</p>	1 ½ + ½ ½ ½ ½ ½	

	<p>Absolute refractive index of a medium = $\frac{\text{speed of light in vacuum}}{\text{speed of light in the medium}}$</p> <p>$\therefore$ speed of light in glass = $\frac{c}{\text{Absolute refractive index of glass}} = \frac{c}{3/2} = \frac{2c}{3}$</p> <p>speed of light in water = $\frac{c}{\text{Absolute refractive index of water}} = \frac{c}{4/3} = \frac{3c}{4}$</p> <p>$\therefore$ Refractive index of water w. r. t. glass = $\frac{2c/3}{3c/4} = \frac{8}{9}$</p>	1/2							
38	<p>(a) • Electronic configuration of sodium Na (11) = 2, 8, 1</p> <p>• one electron</p> <p>(b) • Electronic configuration of chlorine Cl (17) = 2, 8, 7</p> <p>• Argon</p> <p>(c) (i)</p> <p>$\text{Mg} \rightarrow \text{Mg}^{2+} + 2e$ <small>2,8,2 Magnesium ion</small></p> <p>$\text{O} + 2e \rightarrow \text{O}^{2-}$ <small>2,6 Oxygen ion</small></p> <p></p> <p style="text-align: center;">OR</p> <p>(ii) (I) Cation : Na⁺ [Sodium ion] Anion : Cl⁻ [Chloride ion] (II) Cation : K⁺ [Potassium ion] Anion : NO₃⁻ [Nitrate ion]</p>	1/2 1/2 1/2 1/2 1/2 1/2 1	4						
39	<p>(a) • Capillaries</p> <p>• To bring blood in contact with cells / Exchange of material between the blood and surrounding tissues.</p> <p>(b) To prevent blood loss by clotting of the blood at point of injury.</p> <p>(c) (i)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Artery</th> <th style="width: 50%;">Vein</th> </tr> </thead> <tbody> <tr> <td>(i) Thick walled</td> <td>Thin walled</td> </tr> <tr> <td>(ii) Valves absent</td> <td>Valves present</td> </tr> </tbody> </table> <p style="text-align: right;">(any other difference)</p> <p style="text-align: center;">OR</p> <p>(ii) In one complete cycle of blood circulation, the blood passes through the heart twice. The deoxygenated blood enters right atrium of the heart from the body and oxygenated blood enters left atrium of the heart from the lungs to complete one cycle.</p>	Artery	Vein	(i) Thick walled	Thin walled	(ii) Valves absent	Valves present	1/2 1/2 1 1+1 2	4
Artery	Vein								
(i) Thick walled	Thin walled								
(ii) Valves absent	Valves present								

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