

**Strictly Confidential: (For Internal and Restricted use only)**  
**Secondary School Compartmental Examination July 2019**  
**Marking Scheme**  
**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. **Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. 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 marks be awarded to them.**
3. 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. 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.
4. Evaluators will mark( √ ) wherever answer is correct. For wrong answer 'X' be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
5. 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.
6. 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
7. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
8. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-80 has to be used. Please do not hesitate to award full marks if the answer deserves it.
10. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 / 25 answer books per day.
11. 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 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.
  - 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.

12. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
13. 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.
14. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
15. 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.
16. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

Q.No.	Value Points / Expected Answer	Marks	Total
<b>SECTION – ‘A’</b>			
1	Controlling pollution / Afforestation/ Checking of air pollution/ Land pollution by excessive use of fertilizers. ( Any two)	½ , ½	1
2	1000 joules	1	1
<b>SECTION – ‘B’</b>			
3	<p>i.      CaCO<sub>3</sub> (s) <math>\xrightarrow{\text{Heat}}</math> CaO (s) + H<sub>2</sub>O(l)</p> <p>ii.     2 H<sub>2</sub>O (l) <math>\xrightarrow{\text{Electricity}}</math> 2 H<sub>2</sub>(g) + O<sub>2</sub> (g)</p>	1	
		1	2
4	<ul style="list-style-type: none"> <li>Current = Wattage / Voltage ; <math>I = \frac{P}{V}</math></li> </ul> $= \frac{2000W}{220 V}$ $= 9 A > 5A$ <p>The fuse will melt due to overloading.</p>	1	
		1	2
5	<ul style="list-style-type: none"> <li>Wind energy farms can be establishes only at those places where wind blows for the greater part of the year.</li> <li>Minimum speed of wind- 15 km/ h</li> <li>Backup facility is needed when wind is not available.</li> <li>Large area required for establishment of farms.</li> <li>High level of maintenance is needed.</li> </ul> <p>( Or any other )</p> <p align="right">(any four)</p> <p align="center">OR</p> <ul style="list-style-type: none"> <li>Nuclear Fission</li> <li>Uranium / Plutonium</li> <li><u>Advantages:</u> <ol style="list-style-type: none"> <li>Comparatively high energy generation.</li> <li>Air pollution comparatively much less.</li> <li>Less space required for storage.</li> </ol> </li> </ul> <p>( Or any other )</p> <p align="right">(any two)</p>	½ X 4	
		½ ½	
		½ X 2	2
<b>SECTION – ‘C’</b>			
6	<p>i. NaOH (aq) + CH<sub>3</sub>COOH (aq)<math>\longrightarrow</math>CH<sub>3</sub>COONa (aq) + H<sub>2</sub>O</p> <p align="center">Neutralisation reaction / Double displacement reaction</p> <p>ii. C<sub>2</sub>H<sub>5</sub>OH(l) + 3O<sub>2</sub>(g)<math>\longrightarrow</math> 2 CO<sub>2</sub> + 3H<sub>2</sub>O + Heat</p> <p align="center">Combustion reaction</p>	1 ½	
		1 ½	3

7	<ul style="list-style-type: none"> <li>• <u>Hydrogenation</u> : Addition of hydrogen to an unsaturated hydrocarbon in the presence of nickel as catalyst to give saturated hydrocarbon.</li> <li>• <u>Industrial application</u> : Vegetable oils can be converted into vegetable ghee. / Vegetable oil + Hydrogen <math>\xrightarrow[\text{Heat}]{\text{Ni catalyst}}</math> Vegetable Ghee OR</li> <li>• <u>Homologous Series</u> : A series of carbon compounds in which successive members differ by- CH<sub>2</sub> group.</li> <li>• <u>Two Characteristics</u> : i. Members represented by same general formula. ii. All members have similar chemical properties <ul style="list-style-type: none"> <li>• C<sub>2</sub>H<sub>2</sub> , C<sub>3</sub>H<sub>4</sub>; Both have same general formula– C<sub>n</sub>H<sub>2n-2</sub></li> </ul> </li> </ul>	2   1  1  $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}, \frac{1}{2}$	3								
8	i. Electronic configuration of X= 2,8,4 Valency = 4 ii. Silicon/ Si iii. Non -metal	$\frac{1}{2}$ $\frac{1}{2}$ 1 1	3								
9	<table border="1"> <thead> <tr> <th>Autotrophic nutrition</th> <th>Heterotrophic nutrition</th> </tr> </thead> <tbody> <tr> <td>i. Organisms make their own food.</td> <td>i. Organisms dependent on other living organisms for food.</td> </tr> <tr> <td>ii. Raw materials used to prepare food are CO<sub>2</sub> and H<sub>2</sub>O.</td> <td>ii. Readymade organic food is used.</td> </tr> <tr> <td>iii. Sunlight and chlorophyll is essential.</td> <td>iii. Sunlight and chlorophyll is not required.</td> </tr> </tbody> </table> <p style="text-align: center;"><b>OR</b></p> (i) So that cool air is warmed and moistened with mucus. (ii) To ensure that the air passage does not collapse when there is no air in it. (iii) Rate of breathing in aquatic organisms is much faster than terrestrial organisms as the amount of dissolved oxygen is fairly low as compared to the amount of oxygen in air.	Autotrophic nutrition	Heterotrophic nutrition	i. Organisms make their own food.	i. Organisms dependent on other living organisms for food.	ii. Raw materials used to prepare food are CO <sub>2</sub> and H <sub>2</sub> O.	ii. Readymade organic food is used.	iii. Sunlight and chlorophyll is essential.	iii. Sunlight and chlorophyll is not required.	1  1  1  1  1  1	3
Autotrophic nutrition	Heterotrophic nutrition										
i. Organisms make their own food.	i. Organisms dependent on other living organisms for food.										
ii. Raw materials used to prepare food are CO <sub>2</sub> and H <sub>2</sub> O.	ii. Readymade organic food is used.										
iii. Sunlight and chlorophyll is essential.	iii. Sunlight and chlorophyll is not required.										
10	Loss of water in the form of water vapour from the aerial parts of a plant. <u>Importance</u> : - i. It helps in the absorption of water from the soil. ii. It helps in the upward movement of water and minerals in the plant. iii. It helps in temperature regulation / gives cooling effect to the plant. (Any two)	1       1,1	3								

11	<p><u>Fossils</u> : These are the preserved remains or impressions of prehistoric animals and plants.</p> <p><u>Evolutionary Relationship</u> :</p> <ul style="list-style-type: none"> <li>The lower strata /oldest rocks show the presence of animals such as invertebrates with a simpler body design and structure. More recent rocks show the fossilized remains of some dinosaurs and horse like creatures showing a comparatively more complex body design and organization .</li> <li>Feathers were used for insulation in cold weather by dinosaurs but not for flying. On the other hand birds later have adapted the feathers for flight. This means that birds are very closely related to reptiles.</li> </ul> <p>( Give full credit for any of the above answers)</p>	1  1  1	3
12.	<p>Atmospheric refraction- It is the change in the direction of propagation of light rays passing through atmosphere due to variation of density of different layers of air.</p> <p>The stars are point-sized sources of light as they are very distant. As the path of rays of light coming from the star goes on varying slightly and the physical conditions of the earth's atmosphere are not stationary ,the apparent position of the star fluctuates.</p> <p>The amount of light entering the eye flickers and the star sometimes appear brighter and sometimes dim.</p>	1  ½  ½ + ½  ½	3
13	<ul style="list-style-type: none"> <li>Myopia Two causes – Elongation of eye ball;</li> <li>Excessive curvature of eye lens</li> <li><math>f = -\frac{100}{4.5}</math> cm = -22.2 cm, diverging</li> </ul>	½ ½ + ½  1 + ½	3
14	<p>Electromagnetic induction – A phenomenon /process in which a changing magnetic field in a conductor / coil induces current in another conductor/coil.</p> <ul style="list-style-type: none"> <li>Experiment <ul style="list-style-type: none"> <li>(i) Take a coil of wire say 'AB' having a large number of turns and connect its ends to a galvanometer.</li> <li>(ii) Take a strong bar magnet and move its north pole towards one end say 'B' of the coil.</li> <li>(iii) The momentary deflection in the needle of the galvanometer to one side say right indicates the presence of current in the coil, which comes to a zero position when the motion of the magnet stops.</li> <li>(iv) The galvanometer needle is deflected towards the left when the magnet is withdrawn, Repetition of the process shows that a current is set up in a closed loop when an external magnetic field passing through the loop increases or decreases.</li> </ul> </li> </ul>	1       ½ X4	3

	<p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>Two safety devices- (i) Electric fuse (ii) Earth Wire</li> <li>Short Circuiting occurs when live wire and neutral wire come in direct contact and due to zero resistance, suddenly an excessive current flows.</li> <li>It can be prevented by using good quality electric wire in electrical wirings.</li> </ul>	$\frac{1}{2} + \frac{1}{2}$  1  1	3
15	<p>Forests Provide : (Any four)</p> <ul style="list-style-type: none"> <li>(i) Food and shelters to animals.</li> <li>(ii) Protection to wildlife.</li> <li>(iii) Improve the water holding capacity of soil / prevents soil erosion.</li> <li>(iv) Help in recharging ground water level.</li> <li>(v) Regulate water cycle.</li> <li>(vi) Maintain the level of <math>\text{CO}_2</math> and <math>\text{O}_2</math> in the atmosphere.</li> <li>(vii) Provide raw materials for various industries such as timber, papers etc.</li> </ul> <p>Two activities that damage forests :- (Any two)</p> <ul style="list-style-type: none"> <li>(i) Construction of big dams.</li> <li>(ii) Deforestation.</li> <li>(iii) Construction of roads and bridges (or any other)</li> </ul>	$\frac{1}{2} \times 4$  $\frac{1}{2} \times 2$	3
<b>SECTION – ‘D’</b>			
16	<ul style="list-style-type: none"> <li>(i) Sodium hydroxide and hydrochloric acid Neutral salt</li> <li>(ii) Copper hydroxide and sulphuric acid Acidic salt.</li> <li>(iii) Calcium hydroxide and nitric acid Acidic salt.</li> <li>(iv) Potassium hydroxide and nitric acid Neutral salt.</li> <li>(v) Sodium hydroxide and carbonic acid basic salt.</li> </ul>	1 X5	5
17	<p>(a) Reactivity series of metals- It is an arrangement of metals in decreasing order of their reactivity. A more reactive metal displaces a less reactive metal from its salt solution.</p> <p>(b) Zinc is more reactive than copper and displaces copper from copper sulphate solution to form zinc sulphate and copper metal. In this process zinc gets dissolved and holes are created.</p> $\text{Zn(s)} + \text{CuSO}_4(\text{aq}) \longrightarrow \text{ZnSO}_4 + \text{Cu(s)}$ <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>Carbonate ore-<math>\text{CO}_2</math> gas is produced when ore reacts with HCl</li> <li>Metallurgical processes –</li> <li>(i) Calcination- Heating the ore strongly in the absence of air</li> </ul> $\text{Metal carbonate} \xrightarrow{\text{Calcination}} \text{Metal oxide} + \text{CO}_2$	1  1  1  1   1+1  1  1	

	(ii) Reduction with carbon- Metal oxide + Carbon → Metal +CO	1	5											
18	<p>a) Hormones :</p> <p>These are the chemicals present in the plants for growth and development . / chemicals secreted by endocrine glands in animals for growth , development and other metabolic activities.</p> <p>b) Names and functions of hormones : -</p> <table><tr><td></td><td>Name</td><td>Function</td></tr><tr><td>i. Pituitary</td><td>Growth Hormone</td><td>To regulate growth and development of the body.</td></tr><tr><td>ii. Thyroid</td><td>Thyroxine</td><td>To regulate carbohydrate, protein and fat metabolism.</td></tr><tr><td>iii. Pancreas</td><td>Insulin</td><td>To regulate /decrease the blood sugar level.</td></tr></table> <p>c) Response to adrenaline in the human body</p> <p>i. The heart beat increases.</p> <p>ii. Blood is diverted to skeletal muscles.</p> <p>iii. Breathing rate increases. (Any one)</p> <p style="text-align: center;">OR</p> <p>i. Auxins ii. Gibberellins</p> <p>iii. Cytokinin iv. Abscic Acid</p> <p><u>Functions of Auxins: -</u></p> <p>i. Bring about cell elongation.</p> <p>ii. Accelerate growth.</p> <p>iii. Responsible for tropisms. (Any one)</p> <p><u>Functions of Gibberellins : -</u></p> <p>iv. Growth of the stem</p> <p>v. Stem elongation (Any one)</p> <p><u>Function of Cytokinins :-</u></p> <p>Promote cell division</p>		Name	Function	i. Pituitary	Growth Hormone	To regulate growth and development of the body.	ii. Thyroid	Thyroxine	To regulate carbohydrate, protein and fat metabolism.	iii. Pancreas	Insulin	To regulate /decrease the blood sugar level.	1  1/2, 1/2  1/2, 1/2  1/2, 1/2  
	Name	Function												
i. Pituitary	Growth Hormone	To regulate growth and development of the body.												
ii. Thyroid	Thyroxine	To regulate carbohydrate, protein and fat metabolism.												
iii. Pancreas	Insulin	To regulate /decrease the blood sugar level.												

	Name	Function		
	1. Stigma	Pollen grains land on it and germinate.	$\frac{1}{2}$ , $\frac{1}{2}$ $\frac{1}{2}$ , $\frac{1}{2}$	
	2. Style	Pollen tube grows through it and provide nutrients.		
	3. Ovary	Contains ovules with each ovule having an egg cell/ Fusion of male germ cell with the egg cell takes place.	$\frac{1}{2}$ , $\frac{1}{2}$	
	<p>After the pollen lands on the stigma , a tube called pollen tube carrying male germ cell grows out of the pollen grains, travels the style and reaches the ovary. Fertilisation takes place to form a zygote which divides many times to form an embryo within the ovule. The ovule develops a tough coat and becomes a seed and the ovary grows rapidly to form a fruit.</p>		$1\frac{1}{2}$	5
20	<p>(a) Refraction of light. The phenomenon in which a light travelling obliquely from one transparent medium to another changes the direction of propagation of light in the second medium . Higher is the refractive index, less is the speed of light in that medium.</p> $n_{21} = \frac{\text{speed of light in medium 1}}{\text{speed of light in medium 2}} = \frac{v_1}{v_2}$ $n_{dw} = 1.8 \ ; \ n_{\text{water}} = 1.33 \ , \ n_{\text{diamond}} = ?$ $n_{dw} = \frac{n_d}{n_w}$ $n_d = n_{dw} \times n_w$ $= 1.8 \times 1.33$ $= 2.4$ <p>OR</p> <p>(a) Virtual, erect, diminished and laterally inverted</p> <p>(b) Here <math>f = 10 \text{ cm}</math>, <math>u = -20 \text{ cm}</math>, <math>v = ?</math></p> <p>Mirror formula <math>\frac{1}{v} + \frac{1}{u} = \frac{1}{f}</math></p> $\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{10 \text{ cm}} - \frac{1}{-20 \text{ cm}} = \frac{2+1}{20 \text{ cm}}$ $v = 6.67 \text{ cm}$		1 1 1 $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2} \times 4$ $\frac{1}{2}$ $\frac{1}{2}$ 1	



	Nature of image - Virtual Position of image - Formed behind the mirror	$\frac{1}{2}$ $\frac{1}{2}$	5
21	<p>(a)</p> <ul style="list-style-type: none"> <li>Electric current is the rate of flow of electric charge through a conductor.</li> <li>SI Unit-ampere(A)</li> <li>Ohm's Law- The current flowing through a conductor is directly proportional to the potential difference applied across its terminals provided the physical conditions of the conductor(Temperature, size etc) remain unchanged.</li> </ul> <p>(b) Resistance in Series, <math>R_s = R + R = 2R</math></p> <p>Resistance in parallel , <math>R_p = \frac{R \times R}{R+R} = \frac{R}{2}</math></p> $\frac{R_s}{R_p} = \frac{2R}{R/2} = 4$	1 1 1 $\frac{1}{2}$ $\frac{1}{2}$ 1	5
<b>SECTION – ‘E’</b>			
22.	<ul style="list-style-type: none"> <li>Red litmus will remain red in water and dilute HCl , but it will turn blue in sodium hydroxide solution- so NaOH is distinguished.</li> <li>When solid sodium hydrogen carbonate is added to water and dilute HCl, only HCl produces brisk effervescence so HCl is distinguished from water.</li> </ul>	1 1	2
23	<ul style="list-style-type: none"> <li>Substance A – Sodium Carbonate/<math>\text{Na}_2\text{CO}_3</math> or</li> <li>Sodium hydrogen carbonate/ <math>\text{NaHCO}_3</math></li> <li>Odour of acetic acid</li> <li>Blue litmus turns red</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>No change in the test tubes in which copper and iron strips are placed.</li> <li>The beakers in which zinc and aluminium strips are added – Light green colour of iron sulphate fades away and grey deposit is found.</li> </ul>	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1	2
24	<p><u>Two observations :</u></p> <ol style="list-style-type: none"> <li>Epidermis with a single layer of cells without intercellular spaces.</li> <li>Minute apertures can be seen called stomata which are embedded in the epidermal cells.</li> <li>Each stoma is surrounded by two bean shaped cells called guard cells.</li> </ol> <p>( Any two)</p>	1 X 2	

	<p style="text-align: center;">OR</p> <p>Testa , Tegmen and Micropyle are wrongly included in the list.  <u>Reason :</u>            1) Testa is the outer seed coat.            2) Tegmen is the inner seed coat.            3) Micropyle is a pore through which seeds absorb water.            ( Any two)</p>	1	
25	<p>Two observations :            i. Elongation of Nucleus.            ii. Division of cytoplasm occurs            iii. The parent cell divides into two daughter cells.            ( Any two)</p>	$\frac{1}{2} \times 2$	2
26	<p>Precautions :            • Point of incidence should be taken approximately in the middle.            • Angle i should be between <math>20^\circ</math> and <math>60^\circ</math>.            • Distance between the two pins should be 6 – 8 cm.            • The tips of the pins ( not the heads) in contact with the paper should be in a straight line.            • The tip of the pencil should be sharp.            ( Any four)</p> <p style="text-align: center;">OR</p> <p>• First of all he selects a well illuminated distant object through the window of the school laboratory.            • Then he holds the concave mirror in such a manner that its reflecting side is towards the object.            • Now he adjusts the position of the mirror in such a way so as to obtain a clear image of the object on a white wall / vertical screen.            • Finally he measures the distance between the mirror and the screen which is the focal length of the mirror.</p>	$\frac{1}{2} \times 4$	
27	<p>i) Least count = <math>\frac{0.5 \text{ V} - 0}{20} = 0.025 \text{ V}</math></p> <p>ii) Potential difference across the resistor  <math>= 1.0 \text{ V} + 12 \times 0.025 \text{ V}</math>  <math>= 1.0 \text{ V} + 0.30 \text{ V}</math>  <math>= 1.3 \text{ V}</math></p>	1	
		1	2