Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination
March 2019
Marking Scheme– SCIENCE (SUBJECT CODE 086)
(PAPER CODE–31/5/3)

General Instructions: -

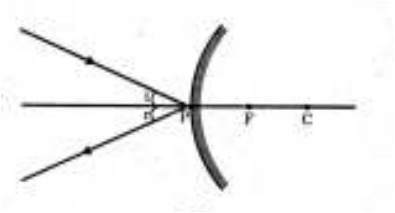
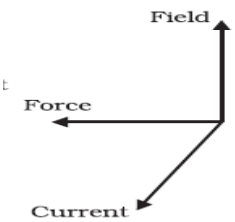
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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. 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.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
8. A full scale of marks 1 to 80 has to be used. Please do not hesitate to award full marks if the answer deserves it.
9. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 25 answer books per day.
10. 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.

11. 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.
12. 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.

13. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
14. 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.
15. 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.

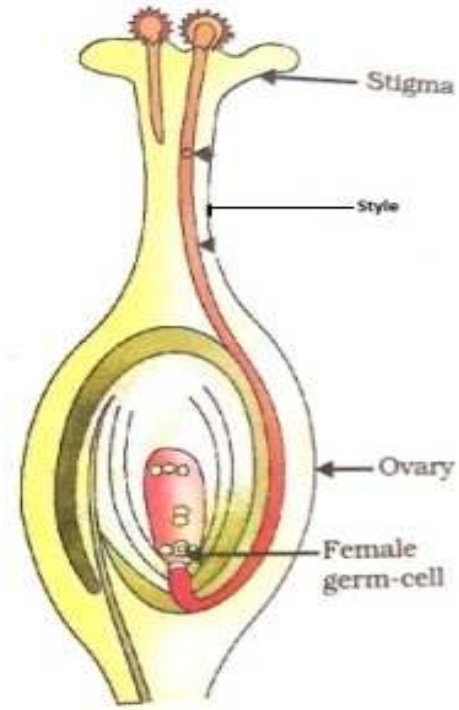
SET 31 / 5 / 3

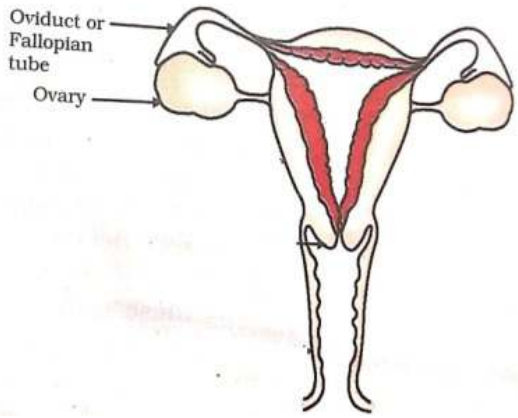
Q.No.	Value point/ Expected answer	Value	Total marks
1.	Section-A R= $\frac{V}{I}$ =$\frac{5}{0.2}$ =2.5 Ω	 ½ ½	 1
2.	• Storage and disposal of spent or used fuel.		1
3.	Section-B  • Correct ray diagram • labelling of ∠iand∠r	 1 ½ x2=1	 2
4.	Principle : When current carrying coil is placed in a magnetic field ,it experiences force as per Fleming's left hand rule. **Fleming's left hand rule**: According to Fleming's left hand rule, stretch the thumb, forefinger and middle finger so 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 the direction of force acting on the conductor.  atement or for the diagram)	1 1	 2
5.	• Formic acid / Methanoic acid HCOOH • Putting a solution of weak /mild base like baking soda.	½ ½ 1	

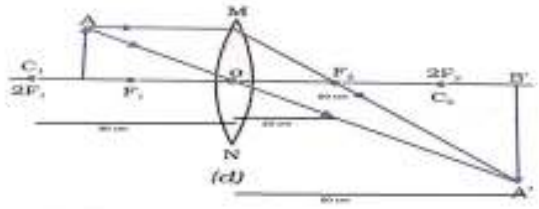
	Or (a) • Acid + Phenolphthalein----------->Colourless Base+ Phenolphthalein----------> Pink colour (b) • Acid + Methyl Orange ----------> Red Base + Methyl Orange ----------> Yellow	½ ½ ½ ½	2
6.	Section-C The series of living organisms taking part at various biotic level forms a food chain. (i) An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers (ii) The energy that is captured by the autotrophs does not revert back to the solar input. (iii) The energy which is passed to the herbivores does not come back to the autotrophs. (iv) As it moves progressively through the various trophic levels it is no longer available to the previous level [Any two] or (a) Since interference will create disturbances in the protected area (National Park) / To maintain the selfsustainability in the protected area (v) Reuse of materials is better than recycling because the process of recycling use some energy, in the reuse strategy things are used of again and again	1 1+1 1 1+1	3
7.	Dam is a barrier built across a river or a stream for storage of water. Advantage: i. Storage of adequate water for irrigation. ii. Generation of electricity Ill effects : i. Social problems ii. Economic problems iii. Environmental problems (any two ill effects)	1 ½ ½ ½ x2=1	3
8.	• Xylem vessels and Xylem tracheids • At the roots, cells in contact with the soil actively take up ions. • Creates a difference in concentration of ions • So water moves up. (b) Since plants do not move and have large proportion of dead cells in many tissues Thus plants have low energy needs.	1 1 1	3

9.	Control and coordination of functioning of various systems is under the direct Control of nervous system. It is the nervous system which governs the way, a particular organ has to work .This control is achieved by complex network of neurons which carry signals in the form of electric impulse, to and from the brain. The hormonal system on the other hand co-ordinates the functioning of nervous system. The hormonal system has indirect control on various functions. It tells a system to either slow down or pace according to the situation. Nervous and hormonal systems are complimentary to each other thus we can say that nervous and hormonal system perform their function of control and coordination together . (award marks according to the appropriate correct answer)		3
10.	• The branch of biology which deals with the study of heredity and variation. • The decrease in the number of surviving tigers is a cause of concern because fewer number of tigers impose extensive inbreeding among themselves, this limits the appearance of variation and put the species at a disadvantage if there are changes in the environment. Since the tigers fail to cope with the environmental changes, they may become extinct.	1 2	3
11.	(a) Observations: • Colour changes from green to white • Formation of reddish brown Ferric oxide (Fe_2O_3)/evolution of SO_2/SO_3 gas. (b) Decomposition reaction (c) $2FeSO_4 \xrightarrow{Heat}$ Fe_2O_3 + SO_2 + SO_3 Ferric oxide Sulphur dioxide Sulphur trioxide Or (a) When copper is heated in air, oxidation takes place (b) CuO/Copper oxide (c) $2\ Cu + O_2 \longrightarrow 2\ CuO$ (d) On passing hydrogen gas over the heated material	½ ½ 1 1 1 ½ 1 ½	3
12.	• A -----Cl_2(Chlorine gas) • B------$CaOCl_2$ (Calcium oxychloride) • $2NaCl + 2H_2O$------→$2NaOH + Cl_2 + H_2$ $Cl_2 + Ca(OH)_2$ -----→$CaOCl_2 + H_2O$	½ ½ 1 1	3
13.	• Carbonate ore Zinc Carbonate • Calcination $ZnCO_3 \xrightarrow[\text{In limited supply of air}]{Heated} ZnO + CO_2$ • Reduction:	½ ½ ½ ½ ½	

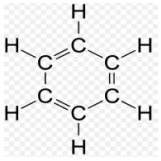
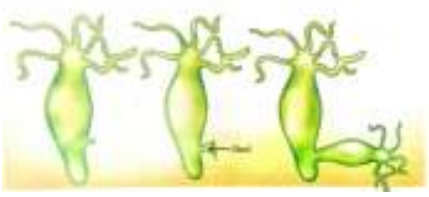
	$ZnO + C \longrightarrow Zn + CO$	½	3
14.	$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$ $\frac{1}{u} = \frac{1}{20} + \frac{1}{30}$ u = -60cm (without unit (cm) deduct ½ mark) $m = \frac{-v}{u}$ $m = -[\frac{-30}{-60}]$ $m = -\frac{1}{2}$ $\frac{h_2}{h_1} = m$ $h_2 = h_1 \times m$ $h_2 = 4 \times [\frac{-1}{2}]$ $h_2 = -2$ cm or $m = \frac{v}{u}$ $m = -\frac{2}{3}$ $-\frac{2}{3} = \frac{v}{-12}$ v = 8 cm $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ $\frac{1}{f} = \frac{1}{8} - \frac{1}{-12}$ $\frac{1}{f} = \frac{1}{8} + \frac{1}{12}$ $\frac{1}{f} = \frac{5}{24}$	½ 1 ½ 1 ½ 1 ½ ½	

	$f = \frac{24}{5}$ = 4.8 cm	½	3
15.	• Closeness (crowding) of magnetic field lines is directly related to the strength of the magnetic field. • Strength of magnetic field at point 'A' (Pole) is more than at point 'B'. • If the student redraws the diagram and mark the arrows correctly (N to S).	1 1 1	3
16.	Section –D (a) 1. Pollen is transferred from anther/stamen of one flower to another flower. — Cross Pollination 1. Transfer of pollen from anther/stamen to the stigma of the same flower. — Self Pollination • Site of fertilization – Ovary • Product of fertilization – Zygote (b)  Correct diagram Correct labelling	1 ½ ½ 1 ½ x 4	

	OR (a)  Correct diagram i. Ovary ii. Oviduct or fallopian tube (b) Syphillis and Gonnorhoea (c) Chemicals or materials required to avoid pregnancy (i) Controlling human population (ii) To maintain good reproductive health (iii) Maintain gaps between successive birth } any two	1 ½ + ½ 1 1 ½ x 2	5
17.	(a) When the gametes from male and female parent combine during sexual reproduction to form zygote, they contribute equal amount of DNA(half each). The normal body cells of human contain 46 chromosomes each. Human sperm cells and egg cells both have 23 chromosomes .So the combination of these 23 chromosomes from male and female each during sexual reproduction ensures equal genetic contribution to progeny (23+23 = 46). (b) • Animals have a vast diversity in structures, they probably do not have a common ancestry because common ancestry may greatly limit the extent of diversity. • Many of these diverse animals are inhabiting the same habitat , the evolution by geographical isolation and speciation is not likely to happen.	3 1 1	5
18.	f= 20 cm, u = -30 cm (a)		

	(i) $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ $\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$ $\frac{1}{v} = \frac{1}{20} + \frac{1}{-30}$ $\frac{1}{v} = \frac{1}{60}$ v= 60 cm (ii) Real, inverted and magnified (iii) $m = \frac{v}{u}$ $m = \frac{60}{-30}$ m = -2 h' = m x h h' = -2 x 5 h' = -10 cm 	½ ½ 1½ ½ ½ ½ 1	5
19.	(A) • $R = R_1 + R_2$ $R = 1\Omega + 2\Omega$ $R = 3\Omega$ • $V = IR$ $I = V/R$ $I = \frac{6\,V}{3\Omega} = 2$ Ampere or 2 A • $P = I^2 R$ $= 2x2x2$ $= 8$ W (B) $P = V^2/R$ $P = \frac{4x4}{2}$ P = 8 W	½ ½ 1 1 1 1	

	OR (i) P = 40 W V = 220 V P = VI I = $\frac{P}{V} = \frac{40\ W}{220\ V}$ = 0.18 A (ii) R = $\frac{V^2}{R}$ = $\frac{220\ X\ 220}{40}$ = 1210 Ω (iii) P = 25 W V = 220V P = VI I = $\frac{P}{V}$ = $\frac{25}{220}$ = 0.113 A (iv) R = V^2/R = $\frac{220\ X\ 220}{25}$ = 1936 Ω (v) Yes there is a change in current and resistance	1 1 1 1 1	5
20.	(a) Element with smallest atomic radius -------- Fluorine /F (b) Element with maximum valency--------- Carbon /C (c) Element which is metalloid --------- Boron /B (d) Element which is most electropositive -------- Lithium /Li (e) CO and CO_2	1 1 1 1 1	5
21.	(a) • Carbon cannot form C^{4+} ions as very high energy is required to remove 4 electrons • Carbon cannot gain 4 electrons to form C^{4-} ions as 6 protons cannot hold 10 electrons (i) Co-valent compounds are bad conductor of electricity as they do not have free electrons. (ii) Due to weak forces of attraction between the molecules, thus less energy is required for breaking the bonds	1 1 1 1	

	(b) 	1	
	Or		
	(a) Isomers are those compounds which have the same molecular formula but different structural formula.	1	
	(b) • Propanal ---------- CH_3CH_2CHO • Propanone ---------- CH_3COCH_3	1+1	
	(c) (i) $CH_3CH_2OH \xrightarrow[\text{Conc. } H_2SO_4]{443\ K} H_2C{=}CH_2 + H_2O$	1+1	
	(ii) $CH_3CH_2OH \xrightarrow[\text{Heat}]{\text{Alkaline } KMnO_4} CH_3CH_2COOH + H_2O$		5
22.	Section –E (c) (20 cm, 20 cm) and (inverted and inverted)	1	
	Reason: Only real and inverted image can be obtained on the screen and in both cases image is formed at the principal focus.	1	2
23.	38 mA, 3.2 V	1+1	
	Or (i) $V \propto I$	1	
	(ii) at 2.5 V , Current will be 0.25 A	1	2
24.			
	Correct Diagram and Labelling	½ +1½	
	OR		
			
	Diagram Process – Budding	1 1	2
25.	• Safranin is used to stain/colour the material for better view.	1	

	• Glycerine prevents the leaf peel from getting it dried.	1	2
26.	The solution turns i. green to colourless ii. black coating is formed on Zinc. Reason: Zinc is more reactive than iron so it displaces the iron from its salt solution.	 ½ + ½ 1	 2
27.	• No change/As acid turns blue litmus to red, so there is a need of blue litmus paper. To get the blue litmus dip the red litmus paper into a basic solution and get blue colour. OR (i) Sodium hydrogen carbonate ($NaHCO_3$) or Sodium Carbonate (Na_2CO_3) (ii) $2CH_3COOH + Na_2CO_3 \rightarrow 2\ CH_3COONa + H_2O + CO_2$ or $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$ (iii) Liberated CO_2 is passed through lime water, which is turned to milky.	2 ½ 1 ½	 2