

For office use only

For office use only

Paper-3 SCIENCE

Maximum time: 3 Hrs.

Maximum mark: 50.

(To be filled by candidate)

Name of examination

Medium of examination

Roll number

--	--	--	--	--	--	--

Invigilator's signature

Important Instructions to Candidates

- Candidates must read the following instructions carefully.
- Violation of any instruction may result in penalties including deduction of marks, cancellation of the answer booklet, or disqualification from the examination.
- Write your **Roll Number** and other required details **only in the space provided** on the cover page of the booklet.
- **Do NOT write your name, school name, class, mobile number, or any identification mark** anywhere inside the answer booklet.
- The answers must be written **only in English**, as authorised for this examination.
- Answers written in any other language will **not be evaluated**.
- Candidates must **write only within the printed margins** of each page.
- Any writing outside the margins **will not be evaluated**.
- Do NOT write:
 - Irrelevant matter
 - Religious verses
 - Personal requests
 - Threatening language
- Such content may lead to disciplinary action.

Rough work should be done **only in the space provided** at the end of the booklet or provided paper.

Do not detach or tear any pages.

Any unused or blank pages must be **neatly crossed out**.

This question paper contains two sections: Section A and Section B, containing eight questions. Question 1 in Section A and Question 5 in Section B are compulsory. Candidates are required to attempt **any three** of the remaining questions, ensuring that **at least one question is selected from each section**. Each question consists of **four sub-parts**, namely **(a), (b), (c), and (d)**, carrying **2, 2, 3, and 3 marks** respectively. Candidates are advised to read the questions carefully and respond to **all sub-parts** within the questions attempted, adhering strictly to the prescribed marks and maintaining clarity and precision in their answers in accordance with the expected SSE standards.

Clearly mention:

- Section (A or B)
- Question Number

Answers without proper numbering may not be considered.

No extra sheets will be provided. Candidates must finish the answers within the booklet.

This page intentionally left blank.....

SECTION A

Q1.

a) Two cyclists start from the same point. Cyclist A moves at a constant speed of 6 m/s. Cyclist B starts 20 seconds later but moves at 8 m/s.

(i) Find the time taken by B to catch up with A.

(ii) If both continue moving, find the distance from the starting point where B overtakes A.

(iii) Explain why relative velocity is the most efficient method to solve this problem.

b) A mixture contains **sawdust, common salt, crushed glass, and camphor**.

Design the **most efficient sequence** of separation steps **AND justify the order chosen**, explaining what mistake many students commonly make while separating mixtures of solids.

c) A boy places an object in front of a plane mirror. The distance between the boy and the image seen by him is 3.4 m.

(i) How far is he standing from the mirror?

(ii) He now walks 40 cm closer. What is the new distance between him and the image?

(iii) Explain why the rate at which the image approaches him is **double** the rate at which he approaches the mirror.

d) A student says melting of ice is a chemical change because:

-New substances (water) form

-Energy is absorbed

-The process is irreversible in daily life

Evaluate and scientifically **refute or accept** each point.

Justify why students often confuse **state change** with **chemical change**, giving one real-world example.

Q2.

a) Two sound waves in air have frequencies 300 Hz and 600 Hz.

(i) Which wave has the longer wavelength?

(ii) If both propagate with the same speed, explain why bats prefer higher-frequency sounds for navigation even though they have shorter wavelengths.

(iii) Using your reasoning, suggest one advantage and one disadvantage of ultrasound.

b) An element Y has atomic number 9.

(i) Predict which noble gas configuration it tries to achieve.

(ii) Explain why Y cannot form Y_2 like oxygen forms O_2 , even though both need electrons.

(iii) Draw the electron-dot diagram for the most stable compound formed by Y with another element of your choice (justify your choice).

c) A wooden plank rests on sand. Its weight is 200 N.

(i) When placed horizontally, it sinks 2 cm.

(ii) When placed vertically on the same sand, it sinks more.

Explain using calculations why the **same weight** causes different sinking depths, and why this does **not** violate the law of gravitation.

- d)** Graphite conducts electricity but diamond does not, although both are carbon.
- (i) Explain using bonding why this occurs.
 - (ii) Predict what will happen to the conductivity of diamond if extremely high temperatures break some covalent bonds.
 - (iii) Justify why this prediction is scientifically valid despite never being done in a school lab.

Q3.

- a)** A 12 V battery is connected to two bulbs: one of 4 Ω and one of 6 Ω , in series.
- (i) Find total current.
 - (ii) Which bulb glows brighter?
 - (iii) Explain why students using “lower resistance = brighter bulb” may get confused in parallel vs series circuits.
- b)** A colourless solution turns phenolphthalein faint pink but turmeric bright red.
- (i) Identify the nature of the solution.
 - (ii) Why is the conclusion tricky when relying on only one indicator?
 - (iii) Propose a more reliable testing method for such borderline cases.
- c)** Explain why:
 “Cars need friction to move forward, but friction also opposes motion”
 Use diagrams and reasoning to show how the **same force** can both help and hinder motion depending on direction and context.
- d)** A student claims:
 “Respiration is simply combustion happening at a lower temperature.”
 Evaluate this statement under:
- (i) Site of reaction
 - (ii) Control of energy
 - (iii) Dependence on enzymes
 - (iv) Risk of explosion
- Explain whether the student’s statement is scientifically correct, partially correct, Or entirely incorrect.

Q4.

- a)** Water has a high specific heat capacity.
 Explain how this **single property** helps in:
- (i) Coastal climate regulation
 - (ii) Maintaining stable body temperature in humans
 - (iii) Preventing sudden death of fish during temperature fluctuations in ponds
- b)** A metal spoon placed in boiling water becomes hot due to conduction, but the air above the water becomes warm due to convection AND radiation.
 Explain how **all three** heat-transfer modes are simultaneously present in a kitchen scenario.

c) If ice is compressed with very high pressure, it can convert to a form denser than water.

(i) Will such ice float or sink?

(ii) What does this suggest about the common rule “ice floats on water”?

(iii) Provide ONE biological consequence if normal ice behaved like high-pressure ice.

d) Many students think “a longer effort arm reduces the weight.”

Explain why this is incorrect, using the principle of moments, and show what quantity actually reduces when the effort arm is increased.

SECTION B

Q5.

a) Explain why plant cells can survive temporary water shortage better than animal cells, linking all these terms:

- Vacuole*
- Turgor pressure*
- Cell wall*
- Plasmolysis*

Use a diagram to support your explanation.

*b) Explain how the following work **together** during fat digestion:*

- (i) Bile*
- (ii) Pancreatic lipase*
- (iii) Small intestine villi*
- (iv) Lymphatic system*

*Show the **pathway** of a fat droplet from entry into the intestine until it enters the bloodstream.*

*c) Hydra and yeast both show budding, yet their budding processes do **not** produce genetically identical individuals in some real cases.*

Explain how mutations and environmental factors challenge the usual definition of “identical offspring” in asexual reproduction.

*d) Explain why **removing snakes** from an ecosystem may eventually reduce the population of grasshoppers, even though snakes do not eat grass. Use food-chain logic only.*

Q6.

a) A farmer wants to improve soil fertility but also prevent crop disease. Explain with reasoning:

- (i) Which microorganisms will help*
- (ii) Which will harm*
- (iii) Why using antibiotics in soil can be dangerous*
- (iv) Why not all bacteria in soil should be destroyed*

b) During the day, plants release oxygen and take in carbon dioxide. But they also respire constantly.

Explain why opening all greenhouse vents at night is necessary for plant health, using concepts of:

- *Gas exchange*
- *Accumulation toxicity*
- *Oxygen deficit*
- *Stomatal behaviour*

- c) Explain why the pulse rate increases during exercise by connecting the following terms:
- Oxygen demand
 - Carbon dioxide accumulation
 - Heart output
 - Vessel dilation
 - Muscle activity
- d) Give a scientific explanation for why adolescents may experience sudden mood changes even when nothing stressful has happened.

Q7.

- a) A city bans plastic bags and replaces them with “biodegradable plastic.” Explain why biodegradable does **not** always mean environmentally safe. Give two risks that still remain.
- b) A vaccinated child still gets the disease but with very mild symptoms. Explain:
- (i) How this is possible
 - (ii) Why this actually proves the vaccine worked
 - (iii) What role memory cells play
- c) Explain why penguins cannot live in deserts even though they have strong insulation, and why camels cannot live in Antarctica even though they conserve water well.
- d) Explain why external appearance alone is insufficient for classifying organisms. Give an example of two organisms that look similar but are genetically very different.

Q8.

- a) A farmer repeatedly grows wheat on the same plot. Explain scientifically why yield decreases over time, even with good irrigation.
- b) A boy with healthy eyes cannot see clearly underwater without goggles. Explain using refraction and refractive index.
- c) Cross-pollination increases genetic variation, but it also has disadvantages. Explain two advantages and two disadvantages.
- d) Explain why protecting only large animals (tigers, elephants) is not enough. Give one example of a small organism whose loss could collapse part of an ecosystem.

FOR ROUGH WORK

Do not write on this page. Please keep it neat and unsoiled

	Mark (Examiner -1)	Mark (Examiner-2)
SECTION – A		
SECTION – B		
Total		