Olearno

OLEARNO

SCIENCE

Time allowed : 3 hours ***Maximum Marks : 80***

GENERAL INSTRUCTIONS :

Read the following instructions carefully and follow them :

1. *This question paper contains 39 questions. All questions are compulsory.*
2. *Question paper is divided into sections as per official board curriculum.*
3. *The question paper has MCQs, VSAs, SAs, LAs and C/S-BQs. Marks are given against each question.*
4. *There are case based questions (CBQs) with three sub-questions and are of 4 marks each.*
5. *Divide your answer sheet into sections as per question paper. It is compulsory to answer each question in its respective section. Do not mix answers of one section into the other section.*
6. *Instructions are given with each section and question, wherever necessary.*
7. *Kindly note that a separate question paper has been provided for visually impaired candidates.*
8. *There is no overall choice in the question paper. However, an internal choice has been provided in few questions. Only one of the choices in such questions must be attempted.*

SECTION – A

1. The blood cells that carry oxygen are **1**

(A) Platelets **(B)** Red blood corpuscles

(C) White blood corpuscles **(D)** Lymphocytes

2. A gardener observes that a plant loses water rapidly through its leaves. The guard cells around its stomata lose water and shrink. Which response follows from the described mechanism? **1**

(A) The stomatal pores open wider.

(B) The stomatal pores remain unchanged.

(C) The leaf begins absorbing water through the stomata.

(D) The stomatal pores close.

3. A frightening event triggers the secretion of adrenaline into the blood. Assume target tissues respond as described in the source. Which consequence follows for the heartbeat? **1**

(A) The heartbeat slows **(B)** The heartbeat is unaffected

(C) The heartbeat becomes faster **(D)** The heartbeat stops temporarily

4. The text gives examples of hormones that promote growth or cell division. Select the correct combination. **1**

(A) 1 only **(B)** 1, 2 and 3

(C) 2 and 3 only **(D)** 1 and 3 only

5. A cell copies its DNA. It then forms additional cellular apparatus and separates the two DNA copies so that each resulting cell receives one copy and apparatus. What is the predicted result? **1**

(A) One cell with both DNA copies and no apparatus

(B) Two cells, each with one DNA copy and cellular apparatus

(C) Two DNA copies outside any cell

(D) One cell that has lost its DNA

6. A heat wave occurs in a bacterial population containing inherited differences in heat tolerance. Which change is most likely as the heat wave selects among variants? **1**

(A) Heat-sensitive bacteria become more likely to survive

(B) All inherited variation immediately disappears

(C) Survival becomes unrelated to heat tolerance

(D) Heat-tolerant bacteria become more likely to survive

7. In an aquarium, an organism gets its food by feeding on another consumer. How should it be classified by its way of obtaining sustenance? **1**

(A) Consumer **(B)** Producer

(C) Abiotic component **(D)** Decomposer

Directions : Question numbers 8 on Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below :

(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

8. Assertion: A variation that is harmful to an individual can never be relevant to the survival of a species. **1**
Reason: Variations may help some individuals survive when a niche changes.

(A) Both assertion and reason are correct and reason is the correct explanation for the assertion

(B) Both assertion and reason are correct but reason is NOT the correct explanation for the assertion

(C) Assertion is correct but reason is wrong

(D) Assertion is wrong but reason is correct

9. Assertion: Sexual reproduction can generate greater diversity than asexual reproduction. **1**
Reason: Asexual reproduction can produce minor differences through DNA-copying inaccuracies.

(A) Both assertion and reason are correct and reason is the correct explanation for the assertion

(B) Both assertion and reason are correct but reason is NOT the correct explanation for the assertion

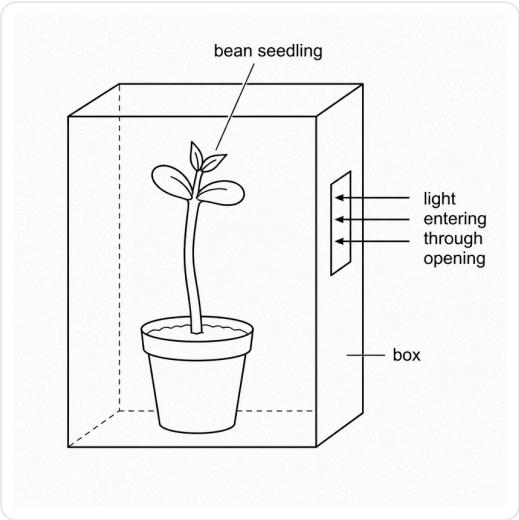
(C) Assertion is correct but reason is wrong

(D) Assertion is wrong but reason is correct

10. Aamir notices that the bladder expands as urine collects and that the person then feels an urge to urinate. Which change triggers the urge, and what feature helps the person usually control it? **2**

11. A growing bean seedling is in the arrangement shown. The table records the direction of its new growth after two days in that arrangement and after the opening is moved to the opposite side. The seedling continues growing in both conditions. **2**

Position of light opening	New shoot growth	New root growth
Left side	Towards the left	Away from the left
Right side	Towards the right	Away from the right



12. A pond has frogs, aquatic plants, insects, water and soil. A record lists the plants as living components and the water and soil as non-living components. **2**

13. Two explanations are offered for how a mature Spirogyra filament can give rise to new individuals. Jia says that the filament breaks into pieces and each fragment grows. Rohan says the process requires specialised cells to proliferate and then form different tissues, as in regeneration. **3**

(a) Which explanation describes the process in Spirogyra? (1)

(b) Explain the process and distinguish it from the other explanation. (2)

14. (a) State how variations may affect individuals' advantages in an environment. (1) **3**

(b) State how this can affect their chances of survival. (1)

(c) Give the example involving bacteria and a heat wave. (1)

15. Jatin studies how the human respiratory system protects the lungs. Air passes through the nostrils and throat before reaching the lungs. Fine hairs and mucus line the nasal passage, while cilia in the upper respiratory tract help remove germs, dust and other harmful particles. The delicate gas-exchange surfaces lie deeper in the lungs, where oxygen enters the blood and carbon dioxide leaves it. Tobacco smoke can damage cilia, allowing more harmful particles to reach the lungs. **4**

(a) State the role of the fine hairs and mucus in Jatin's nasal passage. (1)

(b) What do the cilia help remove from the upper respiratory tract? (1)

(c) If Jatin's cilia are damaged by tobacco smoke, predict how this may affect the lungs and explain why. (2)

16. Jasleen touches a hot pan and withdraws her hand before she has time to think about the pain. The sensory information also continues toward her brain. **5**

(a) Identify where the reflex arc is formed. (1)

(b) Explain how the reflex pathway allows Jasleen's hand to move away quickly. (2)

(c) State the effect of the pathway on her hand muscles. (1)

(d) State what happens to the sensory information after the rapid response begins. (1)

SECTION – B

17. The symbol (aq) in a chemical equation indicates the **1**

(A) Solid state **(B)** Liquid state

(C) Gaseous state **(D)** Aqueous state

18. A copper(II) oxide sample reacts with hydrogen and produces copper and water. Which pair correctly identifies the substance reduced and the substance oxidised? **1**

(A) Hydrogen reduced; copper(II) oxide oxidised **(B)** Copper reduced; water oxidised

(C) Copper(II) oxide oxidised; hydrogen reduced **(D)** Copper(II) oxide reduced; hydrogen oxidised

19. As hydronium ion concentration increases, the pH value **1**

(A) Increases **(B)** Decreases

(C) Remains at 7 **(D)** Becomes neutral

20. Aarav adds dilute hydrochloric acid to a metal and observes a gas. Which test and result would identify the gas described in the chapter? **1**

(A) Bring a burning candle near a collected sample; the gas burns.

(B) Pass the gas through lime water; it turns milky.

(C) Touch the gas with wet blue litmus; it turns red.

(D) Add phenolphthalein to the gas; it turns pink.

21. A metal oxide belongs to a low-reactivity metal. It is heated strongly without adding a reducing agent. What may result according to the described extraction method? **1**

(A) The oxide must form a carbonate. **(B)** The metal must be deposited by electrolysis.

(C) The metal may be obtained from the oxide. **(D)** The oxide must be converted to a sulphide.

22. A sample of copper is heated in air. Which product should form on its surface? **1**

(A) White copper oxide **(B)** Black copper(II) oxide

(C) Copper hydroxide **(D)** Copper chloride

23. Ethanol is chosen as a solvent for a preparation of tincture iodine. Which property explains why it can serve this purpose? **1**

(A) It is a strong carboxylic acid **(B)** It reacts with iodine to release hydrogen

(C) It is insoluble in water **(D)** It is a good solvent

24. Assertion: Vegetable oils generally have long unsaturated carbon chains. **1**
Reason: Hydrogenation of vegetable oils is carried out using a nickel catalyst.

(A) Both assertion and reason are correct and reason is the correct explanation for the assertion

(B) Both assertion and reason are correct but reason is NOT the correct explanation for the assertion

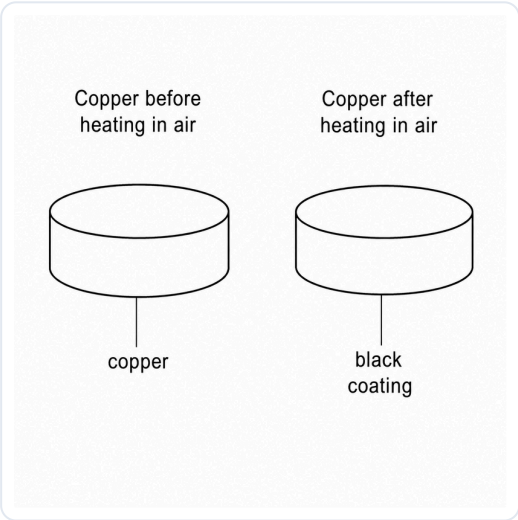
(C) Assertion is correct but reason is wrong

(D) Assertion is wrong but reason is correct

25. In the reaction $ZnO + C \rightarrow Zn + CO$, zinc oxide loses oxygen and carbon gains oxygen. **2**
(a) Identify the substance reduced. (1)
(b) Identify the substance oxidised. (1)

26. (a) State what a glowing bulb indicates. (1) **3**
(b) State what carries current through the solution. (1)
(c) Name the current-carrying particles in an acid solution. (1)

27. In the given figure, **3**



(a) Identify the dark coating. (1)
(b) State what reacts with copper during heating in air. (1)
(c) Name the reaction type and write its balanced equation. (1)

28. A clean sample of metal X displaces copper from copper(II) sulphate solution but does not displace iron from iron(II) sulphate solution. The reactivity series in decreasing order is K, Na, Ca, Mg, Al, Zn, Fe, Pb, H, Cu, Hg, Ag, Au. Lead does not react with water. **4**
(a) Identify metal X. (1)
(b) State X's position relative to iron and copper in the reactivity series. (1)
(c) Predict whether X reacts with water and give the relevant evidence from the supplied information. (2)

29. Pema is given this sequence for ethanol: ethanol → ethanoic acid. She must choose the process that makes this conversion and explain why it fits: combustion, oxidation with an oxidising agent, or hydrogenation. **5**

(a) Identify the process Pema should choose. (1)

(b) Explain why that process converts ethanol to ethanoic acid. (2)

(c) Distinguish the chosen process from combustion and hydrogenation. (2)

SECTION – C

30. An object is placed at the principal focus (F) of a concave mirror. Predict the outcome regarding the image formation. **1**

(A) A diminished real image is formed at F.

(B) An enlarged virtual image is formed behind the mirror.

(C) A same-sized real image is formed at C.

(D) The image is formed at infinity.

31. A clear sky appears blue because fine atmospheric particles scatter shorter wavelengths more strongly. If the scattering particles were absent, what would happen to the sky's appearance by this mechanism? **1**

(A) The sky would become more strongly blue.

(B) The sky would appear dark rather than blue.

(C) The sky would appear red because red scattering increases.

(D) The sky would become white because all colours scatter equally.

32. Assertion: A star's apparent position can change slightly during observation. **1**
Reason: Stars are seen as extended sources made up of many point-sized sources.

(A) Both assertion and reason are correct and reason is the correct explanation for the assertion

(B) Both assertion and reason are correct but reason is NOT the correct explanation for the assertion

(C) Assertion is correct but reason is wrong

(D) Assertion is wrong but reason is correct

33. (a) Name the three factors that affect a uniform conductor's resistance. (1) **2**
(b) Identify which factor is a characteristic property of the material. (1)

34. A current-carrying circular coil has four turns. The current in every turn has the same direction and is unchanged. The field produced by one turn at the centre is B. **2**

35. A narrow light ray strikes a plane mirror at 20° to the normal. The mirror is turned so the new angle of incidence is 33°. **3**

(a) Give the angle of reflection before the mirror is turned. (1)

(b) Give the angle of reflection after the mirror is turned. (1)

(c) State the spatial relationship required among the incident ray, the reflected ray and the normal. (1)

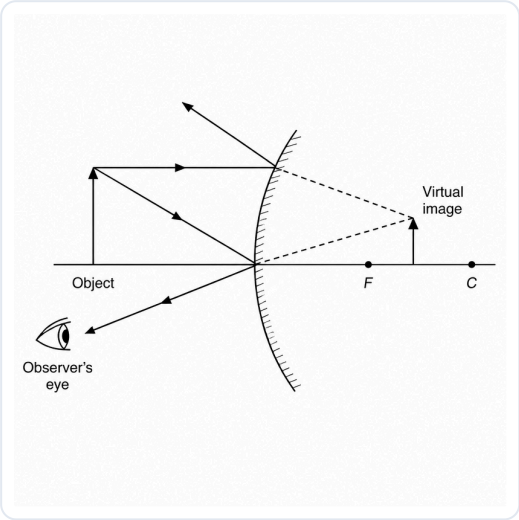
36. (a) State how the distance of planets from Earth compares with that of stars. (1) **3**
(b) State how planets appear as sources of light. (1)
(c) State what happens to the variations in light from the point-sized sources making up a planet. (1)

37. Sanjana moves a compass from one point to another along a magnetic field line outside a fixed bar magnet. The line curves between the two positions. **3**

(a) State how the compass north pole is oriented at each position. (1)

(b) Predict what happens to its direction as Sanjana follows the curved line, and explain why. (2)

38. Mihir is comparing mirrors for a vehicle's side mirror. In the given figure, a ray diagram shows light from a nearby object reflecting from a spherical mirror. The reflected rays enter the observer's eye, while their backward extensions meet behind the mirror. Mihir needs a mirror that lets the driver see traffic behind the vehicle and an area wider than a plane mirror would show. **4**



(a) Identify the mirror shown in the figure. (1)

(b) Use the ray paths to state the nature and orientation of the image. (1)

(c) Explain why this mirror meets Mihir's viewing requirement better than a plane mirror. (2)

39. Meera is checking whether the resistance of a wire depends on its length. She connects a wire to a cell, an ammeter and a plug key, then replaces it with a longer wire made of the same material and having the same cross-sectional area. The wires are kept at the same temperature, and the same cell is used each time. **5**

(a) State one action Meera should take to make the current readings comparable. (1)

(b) Compare the resistance of the longer wire with that of the shorter wire. (1)

(c) Predict how the ammeter reading changes for the longer wire. (1)

(d) Explain why this comparison tests the effect of length. (2)