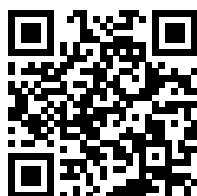


Series: AS311



SESSION – 2

Subject Code: SO

Roll No.:

Candidates must write the Roll No on the title page of the Question Paper.

Science | Level 3

Time allowed: 1.5 hours

Maximum Marks: 150

Instructions for Candidates:

1. Please verify that this question paper contains **12** printed pages and Ensure that the paper contains a total of **50** questions.
2. Use of mobile phones, smartphones, ipads during examination is **STRICTLY PROHIBITED**.
3. On the OMR sheet, enter all required information carefully in the space provided **ONLY IN BLOCK CAPITALS** and by properly darkening the corresponding bubbles. Incomplete, incorrect, or careless entries may lead to disqualification.
4. Use only a **BLUE or BLACK BALL POINT PEN** for writing entries and filling bubbles. Pencils or other pens are not permitted.
5. **Marking Scheme:** Each question has four alternatives, only one of which is correct. Select the correct option and darken the respective bubble.
 - Each correct answer carries **3 marks**.
 - Each incorrect answer attracts a penalty of **1 mark**.
 - No marks are awarded for unanswered questions.
6. Use only the space provided in the question paper for rough work.
7. Candidates must remain in the examination hall until the exam is officially over. Early exit is not allowed.
8. Do not make stray marks, symbols, or extra writing on the OMR sheet. Fill only the designated bubbles neatly.
9. Since OMR sheets are machine evaluated, changes in entries are **strictly not allowed**.
10. Avoid scratching, overwriting, or erasing, as these may result in wrong evaluation.
11. **DO NOT write anything on the back side** of the OMR sheet.

Multiple Choice Questions

1. Match the columns:

Column-I	Column-II
1. Law of definite proportions	(p) Antoine Lavoisier
2. Law of multiple proportions	(q) Gay Lussac
3. Law of conservation of mass	(r) Dalton
4. Law of gaseous volumes	(s) Joseph Proust

(A) 1–(s), 2–(r), 3–(p), 4–(q)

(B) 1–(p), 2–(r), 3–(s), 4–(q)

(C) 1–(r), 2–(p), 3–(s), 4–(q)

(D) 1–(q), 2–(s), 3–(r), 4–(p)

2. If we consider that $\frac{1}{6}$, in place of $\frac{1}{12}$, mass of carbon atom is taken to be the relative atomic mass unit, the mass of one mole of a substance will

(A) decrease twice

(B) increase two fold

(C) remain unchanged

(D) be a function of the molecular mass of the substance

3. How many moles of magnesium phosphate, $\text{Mg}_3(\text{PO}_4)_2$ will contain 0.25 mole of oxygen atoms?

(A) 1.25×10^{-2}

(B) 2.5×10^{-2}

(C) 0.02

(D) 3.125×10^{-2}

4. Volume occupied by one molecule of water (density = 1 g cm^{-3}) is:

(A) $9.0 \times 10^{-23} \text{ cm}^3$

(B) $6.023 \times 10^{-23} \text{ cm}^3$

(C) $3.0 \times 10^{-23} \text{ cm}^3$

(D) $5.5 \times 10^{-23} \text{ cm}^3$

5. Bohr's theory can be applied to which of the following ions?

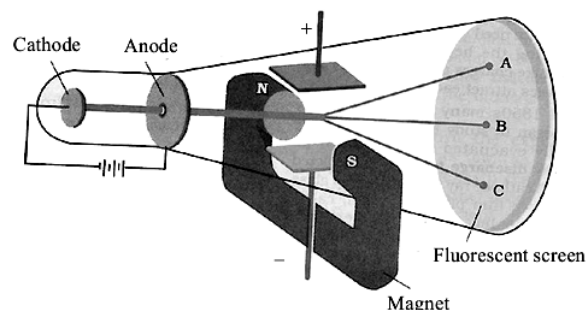
(A) Na^+

(B) Be^{2+}

(C) Li^+

(D) Li^{2+}

6. On the basis of the figure given below, which of the following statement(s) is/are correct?



(i) At point B, when only electric field is applied.

(ii) At point C, when both electric and magnetic field is applied.

(iii) At point B, when both electric and magnetic fields are balanced.

(iv) At point C, when only magnetic field is applied.

Which of the following is/are correct?

(A) (i) and (ii)



- (B) only (iii)
 (C) (iii) and (iv)
 (D) (i) and (iii)

7. Match the chemical substances given in Column (A) with their appropriate application given in Column (B).

Column (A)	Column (B)
(P) Bleaching powder	(i) Preparation of glass
(Q) Baking soda	(ii) Production of H_2 and Cl_2
(R) Washing soda	(iii) Decolourisation
(S) Sodium chloride	(iv) Antacid

- (A) P–(ii), Q–(i), R–(iv), S–(iii)
 (B) P–(iii), Q–(ii), R–(iv), S–(i)
 (C) P–(iii), Q–(iv), R–(i), S–(ii)
 (D) P–(ii), Q–(iv), R–(i), S–(iii)

8. 2 mL each of concentrated HCl, HNO_3 , and a mixture of concentrated HCl and concentrated HNO_3 in the ratio of 3:1 were taken in test tubes labelled as P, Q, and R. A small piece of metal was put in each test tube. No change occurred in test tubes P and Q but the metal got dissolved in test tube R respectively. The metal could be

- (A) Al
 (B) Au
 (C) Cu
 (D) Pt

9. In which of the following chemical equations do the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

- (A) $2H_2(l) + O_2(l) \rightarrow 2H_2O(g)$
 (B) $2H_2(g) + O_2(l) \rightarrow 2H_2O(l)$
 (C) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
 (D) $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

10. Examine the figures and state whether each statement is True (T) or False (F).

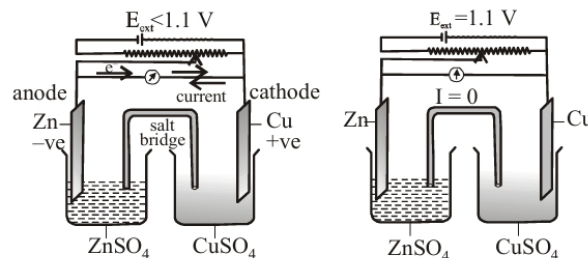


Figure -1

Figure -2

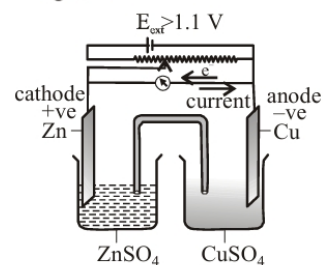


Figure -3

- (i) Figure 1 represents electrochemical and Figure 3 represents electrolytic cell.
 (ii) Figure 2 represents electrolytic and Figure 3 represents electrochemical cell.
 (iii) Figure 2 represents a cell which is not working, i.e., no current flows through the cell.
 (iv) Energy conversion shown in Figure 1 is chemical to electrical whereas energy conversion shown in Figure 2 is electrical to chemical.

Which of the following is the correct coding for the statements above?

- (A) TFTT
 (B) TTTT
 (C) TFFT
 (D) FTFF



11. Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed?

- (i) It is an endothermic reaction.
- (ii) It is an exothermic reaction.
- (iii) The pH of the resulting solution will be more than seven.
- (iv) The pH of the resulting solution will be less than seven.

- (A) (i) and (ii)
- (B) (ii) and (iii)
- (C) (i) and (iv)
- (D) (iii) and (iv)

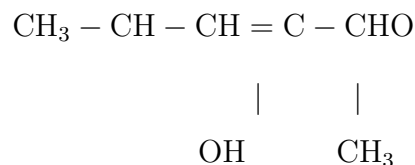
12. When a lead storage battery is discharged

- (A) SO_2 is evolved
- (B) Lead sulphate is consumed
- (C) Lead is formed
- (D) Sulphuric acid is consumed

13. In a sample of ethyl ethanoate ($\text{CH}_3\text{COOC}_2\text{H}_5$), the two oxygen atoms have the same number of electrons but different number of neutrons. Which of the following is the correct reason for it?

- (A) One of the oxygen atoms has gained electrons
- (B) The two oxygen atoms are isotopes
- (C) The two oxygen atoms are isobars
- (D) One of the oxygen atoms has gained two neutrons

14. The IUPAC name of



- (A) 4-Hydroxy-1-methylpentanal
- (B) 4-Hydroxy-2-methylpent-2-en-1-al
- (C) 2-Hydroxy-4-methylpent-3-en-5-al
- (D) 2-Hydroxy-3-methylpent-2-en-5-al

15. In the preparation of alkanes from hydrogenation of alkenes and alkynes, finely divided catalysts are used. Which of the following statement(s) is/are correct regarding these catalysts?

- (i) Platinum and palladium catalyse the reaction at room temperature.
- (ii) Nickel catalyses the reaction at relatively higher temperature and pressure.
- (iii) Platinum and palladium catalyse the reaction at higher temperature.

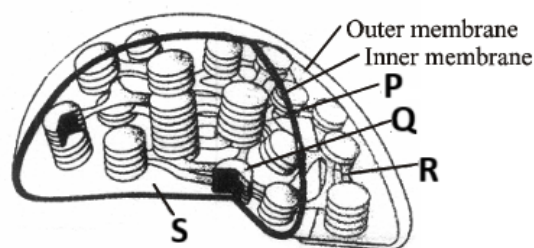
- (A) (i) and (iii)
- (B) (i) and (ii)
- (C) (ii) and (iii)
- (D) (i) only

16. Ethyl alcohol is heated with conc. H_2SO_4 . The product formed is:

- (A) $\text{H}_3\text{C} - \text{C} - \text{OC}_2\text{H}_5 = \text{O}$
- (B) C_2H_6
- (C) C_2H_4
- (D) C_2H_2



17. A key of a mechanical piano is struck gently and then struck again but much harder this time. In the second case
- Sound will be louder but pitch will not be different.
 - Sound will be louder but pitch will be lower.
 - Sound will be louder and pitch will also be higher.
 - Both loudness and pitch will remain unaffected.
18. Find out the correct sentence:
- Cross between plants of two species is called intervarietal hybridisation.
 - Cross between two varieties is called interspecific hybridisation.
 - Hybridisation means crossing between genetically dissimilar plants.
 - Introducing genes of desired character into a plant gives genetically modified crop.
- (i) and (iv)
 - (ii) and (iv)
 - (i) and (iii)
 - (iii) and (iv)
19. Which one of the following is not a major activity for improving crop yield?
- Crop variety improvement.
 - Crop protection management.
 - Crop production improvement.
 - Crop transportation management.
20. Contractile vacuole takes part in
- Absorption of water
 - Osmoregulation
 - Excretion
 - Both (B) and (C)
21. The movement of legs and hands while running or walking is due to
- Contraction of smooth muscles which pulls the tendon to move the bones.
 - Contraction of skeletal muscles which pulls the tendon to move the bones.
 - Contraction of skeletal muscles which pulls the ligament to move the bones.
 - Contraction of smooth muscles which pulls the ligament to move the bones.
22. Commercial fibres like jute and flax are derived from
- Xylem
 - Collenchyma
 - Surface hair
 - Phloem
23. Which of the following organelles is directly connected to the outer membrane of the nucleus in a eukaryotic cell?
- Mitochondrion
 - Lysosome
 - Golgi apparatus
 - Endoplasmic reticulum
24. Which of the following options correctly match P, Q, R, and S indicated in the given sectional view of chloroplasts?



- P – Thylakoid, Q – Stromal lamella, R – Stroma, S – Granum
- P – Granum, Q – Thylakoid, R – Stromal lamella, S – Stroma



(C) P – Thylakoid, Q – Granum, R – Stromal lamella, S – Stroma

(D) P – Granum, Q – Thylakoid, R – Stroma, S – Stromal lamella

25. Which of the following class is being correctly described by given statements (i–iv)?

- (i) All living members of this class are ectoparasites on some fishes.
- (ii) They have a sucking and circular mouth without jaws.
- (iii) Circulation is of closed type.
- (iv) They are marine but migrate for spawning to fresh water. After spawning, within a few days they die.

- (A) Cyclostomata
- (B) Chondrichthyes
- (C) Osteichthyes
- (D) Amphibia

26. Which of the following class is being described by the given statements (i–iv)?

- (i) They are found in a variety of habitats—polar ice caps, deserts, mountains, forests, grasslands and dark caves.
- (ii) Most unique mammalian characteristic is the presence of mammary glands by which the young ones are nourished.
- (iii) Heart is four-chambered.
- (iv) Sexes are separate and fertilization is internal.

- (A) Reptilia
- (B) Aves
- (C) Mammalia
- (D) Amphibia

27. Which of the following statement(s) is/are correct for class Amphibia?

- (i) Body is divisible into head and trunk.
- (ii) Respiration is through gills only.
- (iii) The heart is two-chambered, i.e., one auricle and one ventricle.
- (iv) Fertilization is internal.

- (A) Only (i)
- (B) Only (ii)
- (C) (i), (ii) and (iii)
- (D) All of these

28. After taking a long deep breath, we do not respire for some seconds due to

- (A) more CO₂ in blood
- (B) more O₂ in blood
- (C) less CO₂ in blood
- (D) less O₂ in blood

29. A large proportion of oxygen is left unused in the human blood even after its uptake by the body tissues. This O₂

- (A) helps in releasing more O₂ to the epithelium tissues.
- (B) acts as a reserve during muscular exercise.
- (C) raises the pCO₂ of blood to 75 mm of Hg.
- (D) is enough to keep oxyhaemoglobin saturation at 96%.

30. During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric charge?

- (A) First positive, then negative and again back to positive.
- (B) First negative, then positive and again back to negative.



- (C) First positive, then negative and continue to be negative.
- (D) First negative, then positive and continue to be positive.
31. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system?
- (A) Hypothalamus activates the parasympathetic division of brain.
- (B) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal cortex.
- (C) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla.
- (D) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse.
32. Vectors can be defined as
- (A) animals that carry the infecting agents from a sick person to another healthy person
- (B) microorganisms which cause many diseases
- (C) infected person
- (D) diseased plants
33. Choose the wrong statement
- (A) High blood pressure is caused by excessive weight and lack of exercise.
- (B) Cancers can be caused by genetic abnormalities.
- (C) Peptic ulcers are caused by eating acidic food.
- (D) Acne is not caused by staphylococci.
34. The resistance R of a wire is given by the relation
- $$R = \frac{\rho \ell}{\pi r^2}.$$
- Percentage error in the measurement of ρ , ℓ and r is 1%, 2% and 3% respectively. Then the percentage error in the measurement of R is
- (A) 6
- (B) 9
- (C) 8
- (D) 10
35. A point traversed half of the distance with a velocity v_0 . The half of the remaining part of the distance was covered with velocity v_1 and the second half of the remaining part by v_2 . The mean velocity of the point, averaged over the whole time of motion, is
- (A) $\frac{v_0 + v_1 + v_2}{3}$
- (B) $\frac{2v_0 + v_1 + v_2}{3}$
- (C) $\frac{v_0 + 2v_1 + 2v_2}{3}$
- (D) $\frac{2v_0(v_1 + v_2)}{2v_0 + v_1 + v_2}$
36. Let A, B, C, D be points on a vertical line such that $AB = BC = CD$. If a body is released from position A, the times of descent through AB, BC, and CD are in the ratio
- (A) $1 : \sqrt{3} - \sqrt{2} : \sqrt{3} + \sqrt{2}$
- (B) $1 : \sqrt{2} - 1 : \sqrt{3} - \sqrt{2}$
- (C) $1 : \sqrt{2} - 1 : \sqrt{3}$
- (D) $1 : \sqrt{2} : \sqrt{3} - 1$



37. Consider the following statement: When jumping from some height, you should bend your knees as you come to rest, instead of keeping your legs stiff. Which of the following relations can be useful in explaining the statement? Where symbols have their usual meanings.

- (A) $\Delta \vec{p}_1 = -\Delta \vec{p}_2$
- (B) $\Delta E = \Delta(\text{PE} + \text{KE}) = 0$
- (C) $\vec{F} \Delta t = m \Delta \vec{v}$
- (D) $\Delta x \propto \Delta F$

38. Given, ${}^a\mu_g = \frac{3}{2}$, ${}^a\mu_w = \frac{4}{3}$, if a convex lens of focal length 10 cm is placed in water, then its focal length in water is

- (A) equal to 40 cm
- (B) equal to 20 cm
- (C) equal to 10 cm
- (D) None of these

39. If an alternating current is flowing in a spring, then the spring will be changing

- (A) in a straight line
- (B) periodically
- (C) elliptically
- (D) first (c) then (a)

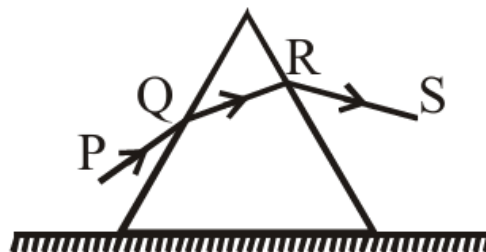
40. The rain drops are in spherical shape due to

- (A) residual pressure
- (B) thrust on drop
- (C) surface tension
- (D) viscosity

41. When a bus suddenly takes a turn, the passengers are thrown outwards because of

- (A) speed of motion
- (B) inertia of motion
- (C) acceleration of motion
- (D) None of these

42. An equilateral prism is placed on a horizontal surface. A ray PQ is incident onto it. For minimum deviation



- (A) PQ is horizontal
- (B) QR is horizontal
- (C) RS is horizontal
- (D) any one will be horizontal

43. An eye specialist prescribes spectacles having a combination of a convex lens of focal length 40 cm in contact with a concave lens of focal length 25 cm. The power of this lens combination in diopter is

- (A) +1.5
- (B) -1.5
- (C) +6.67
- (D) -6.67

44. A boat is sent across a river with a velocity of 8 km h^{-1} . If the resultant velocity of the boat is 10 km h^{-1} , then the velocity of the river is

- (A) 12.8 km h^{-1}
- (B) 6 km h^{-1}
- (C) 8 km h^{-1}
- (D) 10 km h^{-1}



45. The effective acceleration of a body when thrown upwards with acceleration a is
- (A) $(g + a)$
 - (B) $(g - a)$
 - (C) $\sqrt{g^2 + a^2}$
 - (D) $(g - a^2/g)$
46. At time $t = 0$, a particle starts moving along the x -axis. If its kinetic energy increases uniformly with time t , the net force acting on it must be proportional to
- (A) $\sqrt{t}$
 - (B) constant
 - (C) t
 - (D) $\frac{1}{\sqrt{t}}$
47. If suddenly the gravitational force of attraction between Earth and a satellite revolving around it becomes zero, then the satellite will
- (A) continue to move in its orbit with the same velocity
 - (B) move tangentially to the original orbit with the same velocity
 - (C) become stationary in its orbit
 - (D) move towards the Earth
48. When a ray of light enters a glass slab from air,
- (A) its wavelength decreases
 - (B) its wavelength increases
 - (C) its frequency decreases
 - (D) neither its wavelength nor its frequency changes
49. An electric fan and a heater are marked as 100 W, 220 V and 1000 W, 220 V respectively. The resistance of the heater is
- (A) equal to that of the fan
 - (B) lesser than that of the fan
 - (C) greater than that of the fan
 - (D) zero
50. An iron sphere of mass 10 kg has the same diameter as an aluminium sphere of mass 3.5 kg. Both spheres are dropped simultaneously from a tower. When they are 10 m above the ground, they have the same
- (A) acceleration
 - (B) momenta
 - (C) potential energy
 - (D) kinetic energy



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ScienceX Olympiad — Post-Exam Add-On Page

Make this page useful for reflection, family engagement, and classroom reuse.

1) Reflection & Self-Assessment

My Performance Tracker

- Questions I found **easy**:

- Questions I found **tough**:

- One concept to revise:

Confidence Rating:

- ☐ Fully confident ☐ Partly confident ☐ Guessed the answer

2) Challenge Your Parent / Friend

Pick **any 3 questions** from this paper and ask your parent/sibling/friend to solve them.

Q. No.	Solved? (Y/N)	Time Taken	Who explained better?

3) Teacher's Corner

Teachers can reuse this paper for continued learning:

- Select 5 questions for a **weekly quiz**.
- Discuss the **most missed** question in class.
- Post one “**Question of the Week**” on the noticeboard.

4) Next Steps for Students

-
- File this paper in your **ScienceX Portfolio**. Reattempt it in **2 weeks** and compare scores.
 - Submit your best written explanation (any one question) to your teacher or ScienceX.
 - Top student explanations may feature in the **ScienceX Young Innovators Journal**.