

Sample Paper

4

Time : 90 Minutes

Max. Marks : 35

General Instructions

1. The Question Paper contains three sections.
2. Section A has 25 questions. Attempt any 20 questions.
3. Section B has 24 questions. Attempt any 20 questions.
4. Section C has 6 questions. Attempt any 5 questions.
5. All questions carry equal marks.
6. There is no negative marking.

SECTION-A

This section consists of 25 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, **ONLY** first 20 will be considered for evaluation.

1. A D-carbohydrate is:
(a) Always dextrorotatory
(b) Always laevorotatory
(c) Always the mirror of the corresponding L-carbohydrate
(d) None of these.
2. Concentrated nitric acid, upon long standing, turns yellow brown due to the formation of
(a) NO (b) NO₂ (c) N₂O (d) N₂O₄
3. Ammonia on catalytic oxidation gives an oxide from which nitric acid is obtained. The oxide is :
(a) N₂O₃ (b) NO (c) NO₂ (d) N₂O₅
4. Which is the least stable form of glucose ?
(a) α-D-Glucose (b) β-D-Glucose (c) Open chain structure (d) All are equally stable
5. The best method for the conversion of an alcohol into an alkyl chloride is by treating the alcohol with
(a) PCl₅ (b) dry HCl in the presence of anhydrous ZnCl₂
(c) SOCl₂ in presence of pyridine (d) none of these
6. Nitrogen forms N₂, but phosphorus is converted into P₄ from P, the reason is
(a) Triple bond is present between phosphorus atom (b) p_π – p_π bonding is strong
(c) p_π – p_π bonding is weak (d) Multiple bond is formed easily
7. Example of molecular solid is :
(a) SO₂(s) (b) SiC (c) C (graphite) (d) NaCl
8. Colligative properties of the solution depend on
(a) Nature of solute (b) Nature of solvent
(c) Number of particles present in the solution (d) Number of moles of solvent only
9. CsCl crystallises in body centred cubic lattice. If 'a' is its edge length then which of the following expressions is correct?
(a) $r_{\text{Cs}^+} + r_{\text{Cl}^-} = 3a$ (b) $r_{\text{Cs}^+} + r_{\text{Cl}^-} = \frac{3a}{2}$ (c) $r_{\text{Cs}^+} + r_{\text{Cl}^-} = \frac{\sqrt{3}}{2}a$ (d) $r_{\text{Cs}^+} + r_{\text{Cl}^-} = \sqrt{3}a$

10. Benzene hexachloride is
 (a) 1, 2, 3, 4, 5, 6-hexachlorocyclohexane (b) 1, 1, 1, 6, 6, 6-hexachlorocyclohexane
 (c) 1, 6-phenyl-1, 6-chlorohexane (d) 1, 1-phenyl-6, 6-chlorohexane
11. The two forms of D-glucopyranose obtained from the solution of D-glucose are better called
 (a) isomers (b) anomers (c) epimers (d) enantiomers
12. Which of the following reactions is an example of nucleophilic substitution reaction?
 (a) $2\text{RX} + 2\text{Na} \rightarrow \text{R-R} + 2\text{NaX}$ (b) $\text{RX} + \text{H}_2 \rightarrow \text{RH} + \text{HX}$
 (c) $\text{RX} + \text{Mg} \rightarrow \text{RMgX}$ (d) $\text{RX} + \text{KOH} \rightarrow \text{ROH} + \text{KX}$
13. Fluorine exhibits an oxidation state of only -1 because
 (a) it can readily accept an electron (b) it is very strongly electronegative
 (c) it is a non-metal (d) it belongs to halogen family
14. When phenol is treated with excess bromine water, it gives:
 (a) *m*-bromophenol (b) *o*- and *p*-bromophenol
 (c) 2, 4-dibromophenol (d) 2, 4, 6-tribromophenol
15. Which of the following conditions favours the existence of a substance in the solid state?
 (a) High temperature (b) Low temperature
 (c) High thermal energy (d) Weak cohesive forces
16. How many alcohols with molecular formula $\text{C}_4\text{H}_{10}\text{O}$ are chiral in nature?
 (a) 1 (b) 2 (c) 3 (d) 4
17. Pressure cooker reduces cooking time because
 (a) the heat is more easily distributed
 (b) the higher pressure tenderizes the food
 (c) the boiling point of the water inside is elevated
 (d) a larger flame is used
18. IUPAC name of the compound $\text{CH}_3 - \text{CH} - \text{OCH}_3$ is.

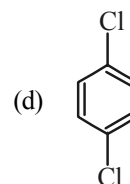
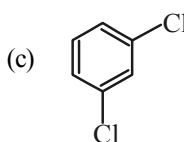
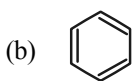
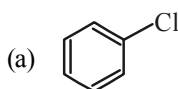
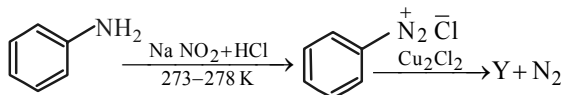
$$\begin{array}{c} | \\ \text{CH}_3 \end{array}$$

 (a) 1-methoxy-1methylethane (b) 2-methoxy-2-methylethane
 (c) 2-methoxypropane (d) isopropylmethyl ether
19. In case of hydride of oxygen family, which of the following physical property change regularly on moving down the group.
 (a) Melting point (b) Thermal stability
 (c) Boiling point (d) Critical temperature
20. Which one is the absolutely specific term?
 (a) A diastereomer (b) An epimer
 (c) An anomer (d) None of the three.
21. The compound which contains all the four 1° , 2° , 3° and 4° carbon atoms is
 (a) 2, 3-dimethylpentane (b) 3-chloro-2, 3-dimethylpentane
 (c) 2, 3, 4-trimethylpentane (d) 3,3-dimethylpentane
22. Sulphur does not exist as S_2 molecule because
 (a) It is less electronegative
 (b) It has ability to exhibit catenation
 (c) It is not able to constitute $p\pi-p\pi$ bond
 (d) It has the tendency to show variable oxidation states
23. The total number of acyclic isomers including the stereoisomers with the molecular formula $\text{C}_4\text{H}_7\text{Cl}$
 (a) 11 (b) 12 (c) 9 (d) 10
24. Which of the following units is useful in relating concentration of solution with its vapour pressure?
 (a) Mole fraction (b) Parts per million (c) Mass percentage (d) Molality
25. Which of the following solutions does not change its colour on passing ozone through it?
 (a) Starch iodide solution (b) Alcoholic solution of benzidine
 (c) Acidic solution of $\text{K}_2\text{Cr}_2\text{O}_7$ (d) Acidified solution of FeSO_4

SECTION-B

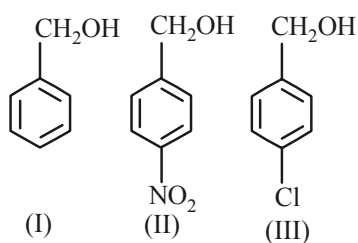
This section consists of 24 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, **ONLY** first 20 will be considered for evaluation.

26. In both DNA and RNA, heterocyclic base and phosphate ester linkages are at –
- (a) C₅' and C₁' respectively of the sugar molecule (b) C₁' and C₅' respectively of the sugar molecule
- (c) C₂' and C₅' respectively of the sugar molecule (d) C₅' and C₂' respectively of the sugar molecule
27. In the case of alkali metals, the covalent character decreases in the order:
- (a) MF > MCl > MBr > MI (b) MF > MCl > MI > MBr
- (c) MI > MBr > MCl > MF (d) MCl > MI > MBr > MF
28. Of the interhalogen AX₃ compounds, ClF₃ is most reactive but BrF₃ has higher conductance in liquid state. This is because
- (a) BrF₃ has higher molecular mass
- (b) ClF₃ is more volatile
- (c) BrF₃ dissociates into BrF₂⁺ and BrF₄⁻ most easily
- (d) Electrical conductance does not depend on concentration
29. Molarity of H₂SO₄ is 18 M. Its density is 1.8 g/mL. Hence molality is
- (a) 36 (b) 200 (c) 500 (d) 18
30. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO₃? The concentrated acid is 70% HNO₃
- (a) 90.0 g conc. HNO₃ (b) 70.0 g conc. HNO₃ (c) 54.0 g conc. HNO₃ (d) 45.0 g conc. HNO₃
31. In the following groups :
- (I) –OAc (II) –OMe (III) –OSO₂ Me (IV) –OSO₂CF₃
- the order of leaving group ability is
- (a) I > II > III > IV (b) IV > III > I > II (c) III > II > I > IV (d) II > III > IV > I
32. Which one of the following reactions of xenon compounds is not feasible?
- (a) 3XeF₄ + 6H₂O → 2Xe + XeO₃ + 12HF + 1.5O₂
- (b) 2XeF₂ + 2H₂O → 2Xe + 4HF + O₂
- (c) XeF₆ + RbF → Rb[XeF₇]
- (d) XeO₃ + 6HF → XeF₆ + 3H₂O
33. The **incorrect** statement among the following is:
- (a) α-D-glucose and β-D-glucose are anomers.
- (b) α-D-glucose and β-D-glucose are enantiomers.
- (c) Cellulose is a straight chain polysaccharide made up of only β-D-glucose units.
- (d) The penta acetate of glucose does not react with hydroxyl amine.
34. Identify the compound Y in the following reaction.

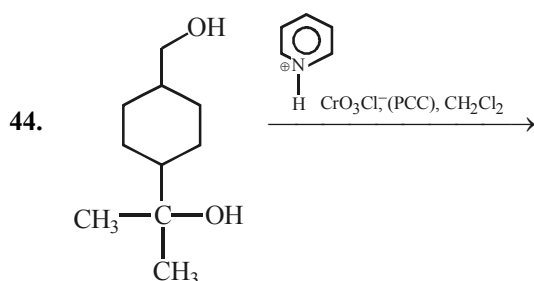


35. Elements of group- 15 form compounds in +5 oxidation state. However, bismuth forms only one well characterised compound in +5 oxidation state. The compound is
- (a) Bi₂O₅ (b) BiF₅ (c) BiCl₅ (d) Bi₂S₅

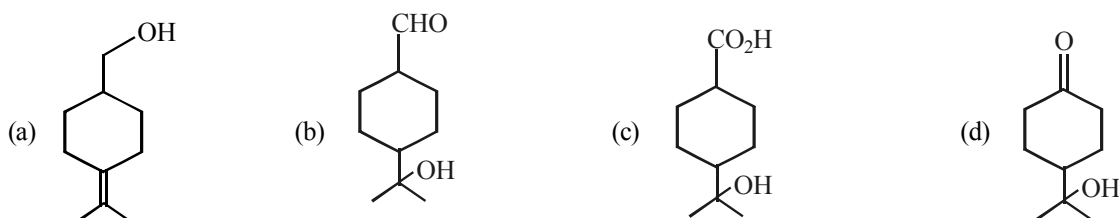
36. The number of atoms in 100 g of an *fcc* crystal with density, $d = 10 \text{ g/cm}^3$ and cell edge equal to 100 pm, is equal to
 (a) 1×10^{25} (b) 2×10^{25} (c) 3×10^{25} (d) 4×10^{25}
37. A set of compounds in which the reactivity of halogen atom in the ascending order is
 (a) chlorobenzene, vinyl chloride, chloroethane (b) chloroethane, chlorobenzene, vinyl chloride
 (c) vinyl chloride, chlorobenzene, chloroethane (d) vinyl chloride, chloroethane, chlorobenzene
38. At room temperature, HCl is a gas while HF is a low boiling liquid. This is because
 (a) H-F bond is covalent (b) H-F bond is ionic
 (c) HF has metallic bond (d) HF has hydrogen bond
39. The normal boiling point of water is 373 K. Vapour pressure of water at temperature T is 19 mm Hg. If enthalpy of vaporisation is 40.67 kJ/mol, then temperature T would be (Use : $\log 2 = 0.3$, $R : 8.3 \text{ JK}^{-1} \text{ mol}^{-1}$):
 (a) 250 K (b) 291.4 K (c) 230 K (d) 290 K
40. Mark the correct increasing order of reactivity of the following compounds with HBr/HCl.



- (a) $\text{I} < \text{II} < \text{III}$ (b) $\text{II} < \text{I} < \text{III}$ (c) $\text{II} < \text{III} < \text{I}$ (d) $\text{III} < \text{II} < \text{I}$
41. $\text{NH}_4\text{ClO}_4 + \text{HNO}_3 (\text{dil.}) \longrightarrow \text{HClO}_4 + [\text{X}]$
 $[\text{X}] \xrightarrow{\Delta} \text{Y}(\text{g})$
 [X] and [Y] are respectively –
 (a) NH_4NO_3 & N_2O (b) NH_4NO_2 & N_2 (c) HNO_3 & O_2 (d) None of these
42. The edge length of a face centered cubic cell of an ionic substance is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is
 (a) 288 pm (b) 398 pm (c) 618 pm (d) 144 pm
43. A metal 'M' reacts with nitrogen gas to give ' M_3N '. ' M_3N ' on heating at high temperature gives back 'M' and on reaction with water produces a gas 'B'. Gas 'B' reacts with aqueous solution of CuSO_4 to form a deep blue compound. 'M' and 'B' respectively are :
 (a) Li and NH_3 (b) Ba and N_2 (c) Na and NH_3 (d) Al and N_2



Product of the reaction is:



Given below are two statements labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false and R is also false.

45. **Assertion :** The bond angle in alcohols is slightly less than the tetrahedral angle.
Reason : In alcohols, the oxygen of –OH group is attached to sp^3 hybridized carbon atom.
46. **Assertion :** Atoms in S_8 molecule undergo sp^3 hybridization and contain two lone pair on each atom.
Reason : S_8 has a V-shape.
47. **Assertion :** Ethers behave as bases in the presence of mineral acids.
Reason : Due to the presence of lone pairs of electrons on oxygen.
48. **Assertion :** High concentration of nucleophile favour S_N1 mechanism.
Reason : 2° alkyl halides are more reactive than 1° alkyl halides towards S_N1 reactions.
49. **Assertion :** When a metal is treated with conc. HNO_3 it generally yields a nitrate, NO_2 and H_2O .
Reason : Conc. HNO_3 reacts with metal and first produces a metal nitrate and nascent hydrogen. The nascent hydrogen then further reduces HNO_3 to NO_2 .

SECTION-C

This section consists of 6 multiple choice questions with an overall choice to attempt **any 5**. In case more than desirable number of questions are attempted, **ONLY first 5 will be considered for evaluation**.

50. Match the columns

Column - I

- (A) $CH_2=CH-CH_2Cl$
 (B) $CH_2=CHX$
 (C) CH_3CHCl_2
 (D) CH_2ClCH_2Cl

- (a) A – (r), B – (q), C – (p), D – (s)
 (c) A – (s), B – (q), C – (p), D – (r)

Column - II

- (p) *gem*-Dichloride
 (q) Vinylic halide
 (r) *vic*-Dichloride
 (s) Allylic halide

- (b) A – (q), B – (p), C – (s), D – (r)
 (d) A – (r), B – (p), C – (s), D – (q)

51. Complete the following analogy :

A : Ideal solution :: B : Non Ideal solution

- (a) A : *n*-Heptane + *n*-Hexane :: B : $CCl_4 + SiCl_4$ (b) A : $C_2H_5Br + C_2H_5I$:: B : $HNO_3 + H_2O$
 (c) A : $C_6H_5Cl + C_6H_5Br$:: B : $C_6H_5CH_3 + C_6H_5OH$ (d) A : Chloroform + Benzene :: B : Acetone + Aniline

52. Choose the correct analogy for oxides of Nitrogen and their structure.

- (a) $N_2O : N_2O_3 : NO_2$:: linear : Angular : Planar (b) $NO_2 : N_2O : N_2O_3$:: Planar : Planar : Angular
 (c) $N_2O : N_2O_3 : NO_2$:: linear : Planar : Angular (d) $N_2O_3 : NO_2 : N_2O$:: Angular : Angular : Planar

Case Study : Read the following paragraph and answers the questions.

The word “colligative” has been adapted or taken from the Latin word “colligatus” which translates to “bound together”. A colligative property is a property of a solution that is dependent on the ratio between the total number of solute particles (in the solution) to the total number of solvent particles. Colligative properties are not dependent on the chemical nature of the solution’s components. Dilute solution containing non-volatile solute exhibit some properties which depend only on the number of solute particles present and not on the type of solute present. These properties are called colligative properties. These properties are mostly seen in dilute solutions. There are different types of colligative properties of a solution. These include, vapour pressure lowering, boiling point elevation, freezing point depression and osmotic pressure.

53. Which one of the following is a colligative property ?
- (a) Boiling point (b) Vapour pressure
(c) Osmotic pressure (d) Freezing point
54. The relative lowering of the vapour pressure is equal to the ratio between the number of
- (a) solute molecules to the solvent molecules
(b) solute molecules to the total molecules in the solution
(c) solvent molecules to the total molecules in the solution
(d) solvent molecules to the total number of ions of the solute.
55. Someone has added a non electrolyte solid to the pure liquid but forgot that among which of the two beakers he has added that solid. This problem can be solved by checking
- (a) relative lower in vapour pressure (b) elevation in boiling point
(c) depression in Freezing point (d) all above

OMR ANSWER SHEET

Sample Paper No –4

- ★ Use Blue / Black Ball pen only.
- ★ Please do not make any stray marks on the answer sheet.
- ★ Rough work must not be done on the answer sheet.
- ★ Darken one circle deeply for each question in the OMR Answer sheet, as faintly darkened / half darkened circle might be rejected.

Start time : _____ End time _____ Time taken _____

1. Name (in Block Letters)

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2. Date of Exam

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3. Candidate's Signature

SECTION-A

1.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	9.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	18.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
2.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	10.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	19.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
3.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	11.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	20.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
4.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	12.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	21.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
5.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	13.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	22.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
6.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	14.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	23.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
7.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	15.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	24.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
8.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	16.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	25.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
9.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	17.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d					

SECTION-B

26.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	34.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	42.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
27.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	35.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	43.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
28.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	36.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	44.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
29.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	37.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	45.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
30.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	38.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	46.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
31.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	39.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	47.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
32.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	40.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	48.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
33.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	41.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	49.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

SECTION-C

50.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	52.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	54.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
51.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	53.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	55.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

No. of Qns. Attempted	<input type="text"/>	Correct	<input type="text"/>	Incorrect	<input type="text"/>	Marks	<input type="text"/>
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