

Sample Paper

6

Time : 90 Minutes

Max. Marks : 35

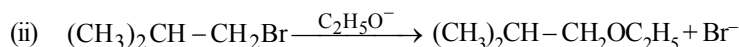
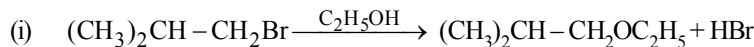
General Instructions

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

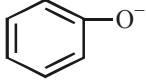
This section consists of 25 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, **ONLY** first 20 will be considered for evaluation.

1. Consider the reactions :



The mechanisms of reactions (i) and (ii) are respectively :

- (a) $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ (b) $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}1$ (c) $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}2$ (d) $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}1$
2. An azeotropic mixture of two liquids has a boiling point higher than either of them when it:
- (a) shows positive deviation from Raoult's law (b) shows negative deviation from Raoult's law
(c) shows ideal behaviour (d) is saturated
3. The oxidation state of central atom in the anion of compound NaH_2PO_2 will be
- (a) +3 (b) +5 (c) +1 (d) -3
4. The solubility of gases in liquids (water) is favoured by
- (a) increase in both pressure and temperature (b) decrease in both pressure and temperature
(c) increase in pressure and decrease in temperature (d) decrease in pressure and increase in temperature
5. The symbols D and L represent
- (a) the optical activity of compounds. (b) the relative configuration of a particular stereoisomer.
(c) the dextrorotatory nature of molecule. (d) the levorotatory nature of molecule
6. 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
7. Which reagent will you use for the following reaction?
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3 \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl} + \text{CH}_3\text{CH}_2\text{CHClCH}_3$
- (a) $\text{Cl}_2/\text{UV light}$ (b) $\text{NaCl} + \text{H}_2\text{SO}_4$
(c) Cl_2 gas in dark (d) Cl_2 gas in the presence of iron in dark
8. Which one of the following statements is wrong?
- (a) SO_2 dissolves in water and forms sulphurous acid (b) SO_2 acts as a bleaching agent
(c) SO_2 has pungent odour (d) SO_2 acts only as oxidising agent

9. Most crystals show good cleavage because their atoms, ions or molecules are
 (a) weakly bonded together (b) strongly bonded together
 (c) spherically symmetrical (d) arranged in planes
10. The unit of ebullioscopic constant is
 (a) K kg mol^{-1} or K (molality)^{-1} (b) mol kg K^{-1} or K^{-1} (molality)
 (c) $\text{kg mol}^{-1} \text{K}^{-1}$ or K^{-1} (molality) $^{-1}$ (d) K mol kg^{-1} or K (molality)
11. In face centred cubic lattice, a unit cell is shared equally by how many unit cells
 (a) 2 (b) 4 (c) 6 (d) 8
12. The major product formed when 1, 1, 1-trichloro-propane is treated with aqueous potassium hydroxide is:
 (a) Propyne (b) 1-Propanol (c) 2-Propanol (d) Propionic acid
13. α -Amino acids are
 (a) acidic due to $-\text{COOH}$ group and basic due to $-\text{NH}_2$ group
 (b) acidic due to $-\text{NH}_3^+$ group and basic due to $-\text{COO}^-$ group.
 (c) neither acidic nor basic.
 (d) none is true.
14. When $\text{CH}_3\text{CH}_2\text{CHCl}_2$ is treated with NaNH_2 , the product formed is
 (a) $\text{CH}_3-\text{CH}=\text{CH}_2$ (b) $\text{CH}_3-\text{C}\equiv\text{CH}$ (c) $\text{CH}_3\text{CH}_2\text{CH} \begin{matrix} \text{NH}_2 \\ \text{NH}_2 \end{matrix}$ (d) $\text{CH}_3\text{CH}_2\text{CH} \begin{matrix} \text{Cl} \\ \text{NH}_2 \end{matrix}$
15. Which one of the following pairs is obtained on heating ammonium dichromate?
 (a) N_2 and H_2O (b) N_2O and H_2O (c) NO and H_2O (d) NO and NO_2
16. Molecular formula of amyl alcohol is
 (a) $\text{C}_7\text{H}_{14}\text{O}$ (b) $\text{C}_6\text{H}_{13}\text{O}$ (c) $\text{C}_5\text{H}_{12}\text{O}$ (d) $\text{C}_5\text{H}_{10}\text{O}$
17. The limiting radius ratio for tetrahedral shape is:
 (a) 0 to 0.155 (b) 0.225 to 0.414 (c) 0.155 to 0.225 (d) 0.414 to 0.732
18. Which of the following compounds will react with sodium hydroxide solution in water?
 (a) $\text{C}_6\text{H}_5\text{OH}$ (b) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ (c) $(\text{CH}_3)_3\text{COH}$ (d) $\text{C}_2\text{H}_5\text{OH}$
19. Blood has been found to be isotonic with
 (a) Normal saline solution (b) Saturated NaCl solution
 (c) Saturated KCl solution (d) Saturated solution of a 1 : 1 mixture of NaCl and KCl
20. Which one of the following substituents at *para*-position is most effective in stabilizing the phenoxide  ion?
 (a) $-\text{CH}_3$ (b) $-\text{OCH}_3$ (c) $-\text{COCH}_3$ (d) $-\text{CH}_2\text{OH}$
21. Which of the following is the best description for the behaviour of bromine in the reaction given below?
 $\text{H}_2\text{O} + \text{Br}_2 \rightarrow \text{HOBr} + \text{HBr}$
 (a) Proton acceptor only (b) Both oxidized and reduced
 (c) Oxidized only (d) Reduced only
22. Glycosidic linkage is actually an :
 (a) Carbonyl bond (b) Ether bond (c) Ester bond (d) Amide bond
23. 2-Bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is
 (a) 2-ethoxypentane (b) pentene-1 (c) *trans*-2-pentene (d) *cis*-pentene-2
24. Which of the following is the correct method of preparation of methyl fluoride?
 (a) $\text{CH}_4 + \text{HF} \rightarrow$ (b) $\text{CH}_3\text{OH} + \text{HF} \rightarrow$ (c) $\text{CH}_4 + \text{F}_2 \rightarrow$ (d) $\text{CH}_3\text{Br} + \text{AgF} \rightarrow$
25. Which of the following statements is not true for halogens?
 (a) All form monobasic oxyacids (b) All are oxidizing agents
 (c) Chlorine has the highest electron-gain enthalpy (d) All but fluorine shows positive oxidation states

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. The molecular mass of a solute cannot be calculated by which of the following?

(a) $M_B = \frac{W_B \times RT}{\pi V}$ (b) $M_B = \frac{p^\circ W_B M_A}{(p^\circ - p)W_A}$ (c) $M_B = \frac{\Delta T_b W_B \times 1000}{K_b W_A}$ (d) $M_B = \frac{K_b W_B \times 1000}{\Delta T_b \times W_A}$

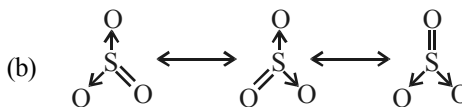
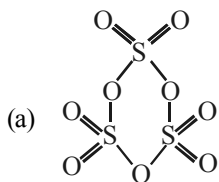
27. Which inert gas show abnormal behaviour on liquefaction

- (a) Xe (b) He (c) Ar (d) Kr

28. If one strand of DNA has the sequence ATGCTTGA, the sequence in the complimentary strand would be

- (a) TCCGAAC (b) TACGTAGT (c) TACGAACT (d) TAGCTAGT

29. In the solid state, SO_3 may have structure



- (c) a & b both (d) None of these

30. Which yields isopropyl methyl ether with little or no by products ?

- (a) $(CH_3)_2CHO^- Na^+ + CH_3I \longrightarrow$ (b) $CH_3O^- Na^+ + (CH_3)_2CHI \longrightarrow$
 (c) $(CH_3)_2CHOH + CH_3OH \xrightarrow{H_2SO_4}$ (d) All of these

31. By mixing ammonium chloride to potassium nitrite and heating, we get

- (a) Ammonium nitrate (b) $KNH_4(NO_3)_2$ (c) Nitrogen (d) Nitrogen dioxide

32. The solubility of N_2 in water at 300 K and 500 torr partial pressure is 0.01 g L^{-1} . The solubility (in g L^{-1}) at 750 torr partial pressure is :

- (a) 0.0075 (b) 0.005 (c) 0.02 (d) 0.015

33. The volume of 4 N HCl and 10 N HCl required to make 1 litre of 6 N HCl are

- (a) 0.75 litre of 10 N HCl and 0.25 litre of 4 N HCl (b) 0.50 litre of 4 N HCl and 0.50 litre of 10 N HCl
 (c) 0.67 litre of 4 N HCl and 0.33 litre of 10 N HCl (d) 0.80 litre of 4 N HCl and 0.20 litre of 10 N HCl

34. The reaction conditions leading to the best yield of C_2H_5Cl are :

- (a) $C_2H_6 (\text{excess}) + Cl_2 \xrightarrow{\text{UV light}}$ (b) $C_2H_6 + Cl_2 \xrightarrow[\text{room temperature}]{\text{dark}}$
 (c) $C_2H_6 + Cl_2 (\text{excess}) \xrightarrow{\text{UV light}}$ (d) $C_2H_6 + Cl_2 \xrightarrow{\text{UV light}}$

35. The number of bonds between sulphur and oxygen atoms in $S_2O_8^{2-}$ and the number of bonds between sulphur and sulphur atoms in rhombic sulphur, respectively, are:

- (a) 4 and 6 (b) 8 and 8 (c) 8 and 6 (d) 4 and 8

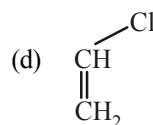
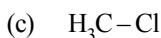
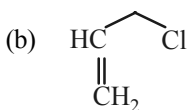
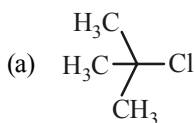
36. Glucose molecule reacts with 'X' number of molecules of phenylhydrazine to yield osazone. The value of 'X' is

- (a) four (b) one (c) two (d) three

37. On sulphonation of C_6H_5Cl

- (a) *m*-chlorobenzenesulphonic acid is formed (b) benzenesulphonic acid is formed
 (c) *o*-chlorobenzenesulphonic acid is formed (d) mixture of *o*- and *p*-chlorobenzene sulphonic acid is formed

38. Helium-oxygen mixture is used by deep sea divers in preference to nitrogen-oxygen mixture because
- Nitrogen is much less soluble in blood than helium
 - Helium is much less soluble in blood than nitrogen
 - Nitrogen is highly soluble in water
 - Due to high pressure deep under the sea nitrogen and oxygen react to give poisonous nitric oxide.
39. The radii of Na^+ and Cl^- ions are 95 pm and 181 pm respectively. The edge length of NaCl unit cell is
- 276 pm
 - 138 pm
 - 552 pm
 - 415 pm
40. Among the following compounds, which one has the shortest C – Cl bond?



41. Iodine reacts with concentrated HNO_3 to yield Y along with other products. The oxidation state of iodine in Y, is:
- 5
 - 7
 - 3
 - 1
42. A solid dissolves in water exothermically. If its saturated solution at 20°C is cooled to 0°C , then
- some solid separates out
 - some ice separates out
 - both the solid and ice separate
 - neither the solid nor the ice separates out
43. Which of the following reactions will not result in the formation of anisole?
- Phenol + dimethyl sulphate in presence of a base
 - Sodium phenoxide is treated with methyl iodide
 - Reaction of diazomethane with phenol
 - Reaction of methylmagnesium iodide with phenol
44. The number of $\text{Cl}=\text{O}$ bonds in perchloric acid is
- 2
 - 3
 - 4
 - 5

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

- Both A and R are true and R is the correct explanation of A.
- Both A and R are true but R is not the correct explanation of A.
- A is true but R is false.
- A is false and R is also false.

45. **Assertion:** An ionic compound AB_3 has fcc arrangement where 'A' present at corner. If A atoms are missing from two corners in each unit cell. The new formula of compound will be AB_4 .
Reason : No. of atom 'A' per unit cell will become $3/4$.
46. **Assertion:** A mixture of He and O_2 is used for respiration for deep sea divers.
Reason : He is soluble in blood.
47. **Assertion :** Lucas reagent [$\text{HCl} + \text{ZnCl}_2$ (anhydrous)] on reaction with tertiary alcohols immediately produces turbidity.
Reason : This is because tertiary alcohols easily form halides which are immiscible in water.
48. **Assertion:** *ter*-butyl methyl ether is not prepared by the reaction of *ter*-butyl bromide with sodium methoxide.
Reason: Sodium methoxide is a strong nucleophile.
49. **Assertion :** Both rhombic and monoclinic sulphur exist as S_8 but oxygen exists as O_2 .
Reason : Oxygen forms $p\pi-p\pi$ multiple bond due to small size and small bond length but $p\pi-p\pi$ bonding is not possible in sulphur.

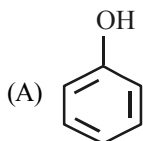
SECTION-C

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.

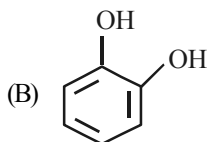
50. Match the columns

Column-I

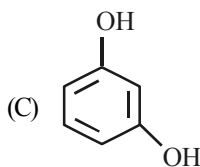
Column-II



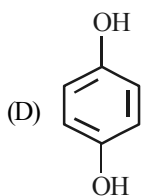
(p) Quinol



(q) Phenol



(r) Catechol



(s) Resorcinol

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

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

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

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

51. Which of the following analogies is incorrect?

(a) Iodoform : Antiseptic :: Freon-14 : CF_4

(b) $\text{CH}_3\text{-Br} + \text{AgF}$: Finkelstein reaction :: $\text{CH}_3\text{Cl} + \text{NaI}$: Swartz reaction

(c) $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[\text{Cu}_2\text{Cl}]{\text{NaNO}_2 + \text{HCl}}$: Sandmeyer's :: $\text{C}_2\text{H}_6 \xrightarrow[\text{C}_2\text{H}_5\text{Cl}]{\text{Cl}_2/\text{UV light}}$: Free radical substitution

(d) F^- : Poor leaving group :: I^- : Good leaving group

52. The number of S=O and S–OH bonds present in peroxodisulphuric acid is A and for pyrosulphuric acid its B. A and B are :

(a) A : 2, 2 :: B : 2, 2

(b) A : 2, 4 :: B : 2, 4

(c) A : 4, 2 :: B : 2, 4

(d) A : 4, 2 :: B : 4, 2

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

Solids can be classified as crystalline or amorphous on the basis of the nature of order present in the arrangement of their constituent particles. Amorphous solids behave like super cool liquids as the arrangement of constituent particles has short-range order, isotropic in nature and no sharp melting point. Crystalline solids have a characteristic shape, with the arrangement of constituent particles of long-range order, anisotropic in nature and a sharp melting point. The classification of crystalline solids is based on their property. The crystalline property depends on the nature of interactions between the constituent particles, and therefore these solids are divided into four different categories:

- Ionic solids
 - Covalent or Network solids
 - Molecular solids
 - Metallic solids
53. Which of the following statement(s) is/are correct?
- (i) Crystalline solids have definite characteristic geometrical shape.
 - (ii) Crystalline solids have long range order.
 - (iii) Sodium chloride and quartz glass are examples of crystalline solids.
 - (iv) Crystalline solids are isotropic in nature.
- (a) (i), (ii) and (iii) (b) (i), (ii) and (iv) (c) (i) and (ii) (d) (i) only
54. Crystalline solids are anisotropic in nature. What is the meaning of anisotropic in the given statement?
- (a) A regular pattern of arrangement of particles which repeats itself periodically over the entire crystal.
 - (b) Different values of some of physical properties are shown when measured along different directions in the same crystals.
 - (c) An irregular arrangement of particles over the entire crystal.
 - (d) Same values of some of physical properties are shown when measured along different directions in the same crystals.
55. Which of the following statements about amorphous solids is incorrect ?
- (a) They melt over a range of temperature.
 - (b) They are anisotropic.
 - (c) There is no orderly arrangement of particles.
 - (d) They can be compressible.

OMR ANSWER SHEET

Sample Paper No –6

- ★ 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		Correct		Incorrect		Marks	
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