Q1. The general electronic configuration of d-block elements is $(n-1)d^{1-10}ns^{1-2}$. This generalisation has several exceptions mainly due to-

(a) strong shielding of $(n-1)$ d-electrons

(b) very little energy difference between $(n-1)$ d and ns orbitals

(c) presence of unpaired electrons

(d) high energy difference between $(n-1)$ d and ns orbitals

Read the following passage carefully and answer the questions from 2-3

In an octahedral coordination entity with six ligands surrounding the metal atom/ion, there will be repulsion between the electrons in metal d orbitals and the electrons (or negative charges) of the ligands. Such a repulsion is more when the metal d orbital is directed towards the ligand than when it is away from the ligand.

Q2. In an octahedral coordination complex, which set of d orbitals experiences greater repulsion due to their orientation towards the ligands?

(a) dxy, dyz, dxz

(b) dx^2-y^2, dz^2

(c) dxy, dx^2-y^2, dz^2

(d) All d orbitals experience equal repulsion

Q3. What is the result of ligand electron-metal electron repulsions on the degeneracy of d orbitals in an octahedral complex?

(a) All d orbitals remain degenerate

(b) dxy, dyz, dxz orbitals increase in energy

(c) dx^2-y^2, dz^2 orbitals decrease in energy

(d) d orbitals split into t_{2g} (lower energy) and e_g (higher energy) sets

Q4. Which of the following solutions of KCl has the lowest value of equivalent conductance?

(a) 1 M

(b) 0.1 M

(c) 0.01 M

(d) 0.001 M

Q5. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
A.	Clemmensen reduction	1.	Conc. KOH
B.	Rosenmund reduction	2.	Zn/Hg + conc. HCl
C.	Iodoform reaction	3.	$H_2/Pd - BaSO_4$
D.	Cannizzaro reaction	4.	$NaOH + I_2$

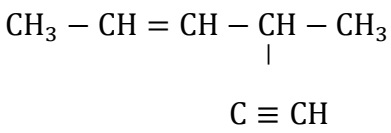
(a) A-1, B-3, C-2, D-4

(b) A-3, B-4, C-1, D-2

(c) A-2, B-3, C-4, D-1

(d) A-4, B-1, C-2, D-3

Q6. IUPAC name for the given compound is:



(a) 4-ethylpent-2-ene

(b) 1-ethylpent-3-methylbut-2-ene

(c) 3-methylhex-4-en-1-yne

(d) 4-methylhex-2-en-5-yne

Q7. The electrode potential of a hydrogen electrode dipped in solution of pH = 1 is:

(a) 0.177 V

(b) 0.00 V

(c)−0.059 V

(d) 0.59 V

Read the following passage carefully and answer the questions from 8-9

Fructose has the molecular formula $C_6H_{12}O_6$ and on the basis of its reactions it was found to contain a ketonic functional group at carbon number 2 and six carbons in straight chain as in the case of glucose. It belongs to D-series and is a laevorotatory compound. It is appropriately written as D-(–)-fructose.

Q8. In the cyclic form of fructose, the five-membered ring is formed by the reaction between the ketone group at carbon 2 and the hydroxyl group at which carbon?

(a) Carbon 3

(b) Carbon 4

(c) Carbon 5

(d) Carbon 6

Q9. Which of the following statements correctly describes the structural relationship between glucose and fructose?

(a) Both are aldohexoses with identical functional groups.

(b) Both are ketohexoses with identical functional groups.

(c) They are structural isomers with different functional groups.

(d) They are enantiomers differing in optical activity.

Q10. Match the column I with column II and mark the appropriate choice.

Column I		**Column II**	
A.	$C=O \xrightarrow{LiAlH_4}$	1.	$-COONa$
B.	$C=O \xrightarrow[\text{conc. HCl}]{Zn/Hg}$	2.	$-COOH$
C.	$C=O \xrightarrow[(ii)\ H^+]{(i)\ Ag_2O/OH^-}$	3.	CH_2

D.	$C = O \xrightarrow{NaOX}$	4.	$CH - OH$

(a) A-1, B-2, C-3, D-4

(b) A-4, B-3, C-2, D-1

(c) A-2, B-4, C-3, D-1

(d) A-3, B-1, C-2, D-4

Answer Key

S1. Ans. (b)

S2. Ans. (b)

S3. Ans. (d)

S4. Ans. (a)

S5. Ans. (c)

S6. Ans. (c)

S7. Ans. (c)

S8. Ans. (c)

S9. Ans. (c)

S10. Ans. (b)