



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech(CT-N)/SEM-3/CH(CT)-302/2011-12

2011

CHEMISTRY – II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :
10 × 1 = 10

- i) Fog is an example of colloidal system of
 - a) liquid disappearing gas
 - b) gas disappearing gas
 - c) solid disappearing gas
 - d) solid disappearing gas.
- ii) In PCl_5
 - a) the axial bonds are longer than basal bonds
 - b) the basal bonds are longer than axial bonds
 - c) all the bonds are equal
 - d) pseudorotation is not observed.



- iii) IF_7 has
- octahedral geometry
 - PBP geometry
 - TBP geometry
 - tetrahedral geometry.
- iv) Among the boron halides, the Lewis acidity order is
- $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3 > \text{BI}_3$
 - $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3 < \text{BI}_3$
 - $\text{BF}_3 > \text{BCl}_3 > \text{BBr}_3 > \text{BI}_3$
 - $\text{BF}_3 > \text{BCl}_3 < \text{BBr}_3 > \text{BI}_3$.
- v) Which one of the following is a flexidentate ligand ?
- Ethelene di amine
 - EDTA
 - NH_3
 - H_2O .
- vi) Which one of the following has a stereo chemically active lone pair ?
- XeF_2
 - XeF_4
 - XeF_6
 - XeF .
- vii) Extra stability of liophilic colloid is due to
- charge on their particles
 - a layer of medium of dispersion on their particle
 - the smaller size of the particle
 - the larger size of the particle.
- viii) The highest order of covalency is found in
- NaCl
 - CaCl_2
 - AlCl_3
 - CCl_4 .



- ix) The brown colour of bromine is due to
- a) $\pi \rightarrow \pi^*$ transition b) $\pi^* \rightarrow \sigma^*$ transition
- c) $\pi^6 \rightarrow \sigma^6$ transition d) $\pi^6 \rightarrow \pi^*$ transition.
- x) Which of the following contains both ionic and covalent bond ?
- a) NaOH b) CCl_4
- c) CsCl d) AlCl_3 .
- xi) In BrF_5 , the number of $< \text{F} - \text{Br} - \text{F}$, 90° angle is
- a) zero b) one
- c) two d) four.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) Rotational spectral lines are equispaced. Explain. $2\frac{1}{2}$
- b) How many vibrational mode do you expect for CO_2 and SO_2 ? Explain diagrammatically. $2\frac{1}{2}$
3. a) AlCl_3 forms dimer but BCl_3 not. Explain. 3
- b) Na-perchlorate is hygroscopic. Why? 2
4. a) The bond angle in H_2O is 105° but the same is H_2S is 92° . Explain. $2\frac{1}{2}$
- b) NH_3 is more basic than PH_3 . Why? $2\frac{1}{2}$
5. a) Differentiate between molecular orbital and hybrid orbital. 2
- b) Draw the bonding and antibonding orbital diagram taking two atomic S-orbitals.
(only qualitative idea) 3



GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

6. a) Define CFSE and explain the depending factors. Calculate the CFSE for the following electronic configurations :
 d^4 (h.s), d^6 (l.s), d^7 (l.s) 2 + 3 + 3
- b) What is chelate complex and inner metallic complex ? Mention one use of the above complex in analytical chemistry. 4 + 3
7. a) Draw the M.O. energy level diagram for oxygen molecule. Explain its M.O. electronic configuration, bond order and magnetic property. 7
- b) Predict the order of bond distance and explain.
 O_2 , O_2^- , $O_2^{=}$, O_2^+ . 3
- c) I_2 is violet in CCl_4 , its colour changes in pyridine. Explain. 5
8. a) What do you mean by “spinel” ? $CuFe_2O_4$ has an inverse spinel structure but $ZnFe_2O_4$ has normal spinel structure. Explain. 2 + 5
- b) Draw the Orgel energy level diagram for d^6 system. 4
- c) The aqueous solution of Co^{3+} ion is a pale pink, but it turns deep blue on acidification with conc.HCl. Explain. 4
9. a) Mention four important properties of colloid. 3
- b) Define : Gold number. Isoelectric point, zeta potential. 6
- c) What do you mean by coagulation of colloid ? 3
- d) Write down the application of “Tyndal effect”. 3