Name :	
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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 )

- - 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 <sub>5</sub>
    - 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.

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- iii) IF <sub>7</sub> has
  - a) octahedral geometry
  - b) PBP geometry
  - c) TBP geometry
  - d) tetrahedral geometry.
- iv) Among the boron halides, the Lewis acidity order is
  - a) BF  $_3$  < BCl  $_3$  < BBr  $_3$  > BI  $_3$
  - b) BF  $_3$  < BCl  $_3$  < BBr  $_3$  < BI  $_3$
  - c)  $BF_3 > BCl_3 > BBr_3 > BI_3$
  - d)  $BF_3 > BCl_3 < BBr_3 > BI_3$ .
- v) Which one of the following is a flexidentate ligand?
  - a) Ethelene di amine
- b) EDTA

c) NH<sub>3</sub>

- d) H<sub>2</sub>O.
- vi) Which one of the following has a stereo chemically active lone pair?
  - a) XeF <sub>2</sub>

b) XeF<sub>4</sub>

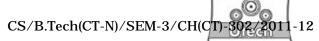
c)  $XeF_6$ 

- d) XeF.
- vii) Extra stability of liophilic colloid is due to
  - a) charge on their particles
  - b) a layer of medium of dispersion on their particle
  - c) the smaller size of the particle
  - d) the larger size of the particle.
- viii) The highest order of covalency is found in
  - a) NaCl

b) CaCl<sub>2</sub>

c) AlCl<sub>3</sub>

d) CCl<sub>4</sub>.



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 cor	ntains	both ionic and covalent	
	bond?			
	a) NaOH	b)	CCl <sub>4</sub>	
	c) CsCl	d)	$AlCl_3$ .	
xi)	In BrF $_{5}$ , the number of <	F – 1	Br - F, 90° angle is	
	a) zero	b)	one	
	c) two	d)	four.	
<b>GROUP - B</b> (Short Answer Type Questions) Answer any three of the following. $3 \times 5 = 15$				
a)	Rotational spectral lines a	re equ	uispaced. Explain. $2\frac{1}{2}$	
b)	How many vibrational mod	de do	you expect for CO $_2$ and	
	SO 2? Explain diagramati	cally.	$2\frac{1}{2}$	
a)	$AlCl_3$ forms dimer but $BC$	l <sub>3</sub> no	t. Explain.	
b)	Na-perchlorate is hygroscopic. Why?			
a)	The bond angle in $H_2O$ is $105^\circ$ but the same is $H_2S$ is			
	92°. Explain.		$oldsymbol{2}_{oldsymbol{ar{2}}}^1$	
b)	NH $_3$ is more basic than P	H <sub>3</sub> . V	Vhy? $2\frac{1}{2}$	
a)	Differentiate between me	olecu	· ·	
	orbital.		2	
b)	Draw the bonding and taking two atomic S-orbita		onding orbital diagram	

2.

3.

4.

5.

(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 cofiguration, bond order and magnetic property.
  - b) Predict the order of bond distance and explain.

 $O_2$ ,  $O_2^-$ ,  $O_2^-$ ,  $O_2^+$ .

- c)  $\rm I_2$  is violet in  $\rm CCl_4$  , its colour changes in pyridine. Explain.
- 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.
  - 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.
- 9. a) Mention four important properties of colloid.
  - b) Define: Gold number. Isoelectric point, zeta potential. 6
  - c) What do you mean by coagulation of colloid?
  - d) Write down the application of "Tyndal effect". 3

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