(c) Explain the behaviour of metal d-orbitals in a square planer complex. 3

9. (a) Write a note one Magnetic properties of lanthanide compounds. 5

(b) Discuss the coordination behaviour of actinides. 5

Or

10. (a) What is the importance of lanthanide and actinide complexes of sterically hindered β-diketones? Explain. 5

(b) Write a short notes on the organo-metallic compounds of lanthanide. 5

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

6th Semester

Course No. : BSCH - 602

(Inorganic Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Calcualte the number of formula unit of NaCl in the unit cell of Sodium Chloride. 4

(b) What is the coordination number of 'Ca' and 'Ti' in perovskite structure? 1+1`=2

(c) What is radius ratio? How it is related to coordination number. 1+3=4

Or

2. (a) Write note on :

(i) Substitutional Solid Solution 2+2=4

(ii) Interstitial Solid Solution

(b) Explain the band theory of solids. 3

(c) What are "Schottky defect" and "Frenkel defect"? Discuss in details. 3

3. (a) Arrange the following isoelectronic hexacarbonyl compounds in the order of increasing C-O stretching bands (νC_o). Explain in details. 4

$[Fe(CO)_6]^{3+}$ $[Cr(Co)_6]$ $[Mn(CO)_6]^{+}$
$[Ti(Co)_6]^{2-}$ $[V(Co)_6]^{-}$

(b) Write down the selection rules for electronic transitions. 3

(c) Discuss the electronic spectrum of aquous solution of Ti^{3+}. 3

Or

4. (a) Describe the bonding in metal-carbonyl compounds. 4

(b) What will happen if freshly prepared $[Co(NH_3)]_5 ONO]^{2+}$ is kept for long time? How IR spectroscopy can be used to study this change? 4

(c) Arrange the following complexes in the increasing orders of CN stretching frequencies.
$[V(CN)_6]^{5-}$ $[V(CN)_6]^{3-}$ $[V(CN)_6]^{4-}$

5. (a) What is chelate effect? Discuss it with a suitable example. 1+3=4

(b) Explain the terms "Labile" and "inert" taking suitable examples. 2+2=4

(c) Provide one method of synthesis for cis-platin? 2

Or

6. (a) Explain the formation of product for the following reaction : 5

$[Co(NH_3)_5 NO_2]^{+} + [Co(CN)_5]^{3-} \longrightarrow$

(b) Explain the outer sphere electron transfer mechanism taking a suitable example. Under what condition outer sphere mechanism is favourable over inner sphere mechansim? 4+1=5

7. (a) What is Zeise's salt? Describe the bonding in Zeise's salt. 5

(b) Provide the structures of the following compounds: 1x3=3

$Co_4(Co)_{12}$ $OS_4(CO)_{12}$ $Ir_4(CO)_{12}$

(c) Discuss the structure of $[Ru(PPh_3)_2(NO)_2 C^{l}]^{+}$ 2

Or

8. (a) The magnetic moment of a certain octahedral Co(II) complex is 4.0 μ_B. What is its d-electron configuration? 4

(b) Which of the followng are isolobal with CH_3? 3

$Co(CO)_3$, $Fe(CO)_3$, $Mn(CO)_5$, $Co(CO)_4$
$Ni(CO)_4$, $Fe(CO)_2Cp$