II SEM CHEMISTRY IMM QUESTIONS

Unit – I

1. **Explain the following properties of transition elements:**
   - (a) Variable oxidation states
   - (b) Acidic and basic nature of oxides
   - (c) Magnetic properties
   - (d) Catalytic properties
   - (e) Colour properties
   - (f) Complex formation
   - (g) Formation of alloys
2. **Write a note on d-block elements.**
3. **Comparative treatment of second and third transition series with their 3d analogue.**
4. **What is lanthanide contraction? Write its consequences.**
5. **How can lanthanides be separated by:**
   - (a) Ion-exchange method
   - (b) Solvent extraction method
6. **Write the differences between lanthanides and actinides.**

Unit – II

1. **Write differences between electronic conductors and electrolytic conductors.**
2. **Explain:**
   - (a) Conductance
   - (b) Specific resistance
   - (c) Specific conductance
   - (d) Equivalent conductance
   - (e) Molar conductance
3. **Kohlrausch law and its applications.**
4. **What is transport number? Explain the determination of transport number by Hittorf's method.**
5. **Debye–Hückel–Onsager equation.**
6. **Derive Nernst equation.**
7. **Explain conductometric titrations.**
8. **Explain potentiometric titrations.**

Unit – IV

1. **Draw the molecular orbital diagrams of:**

- CO, NO, NO^+, CN^-, O_2, O_2^+, O_2^{2-}, N_2, F_2

2. **Write molecular orbital theory.**
3. **What are CIP rules? Explain R and S configuration with examples.**
4. **What are colligative properties? Explain Raoult's law.**
5. **Explain osmotic pressure. Determine it by Berkeley–Hartley method.**
6. **Explain elevation of boiling point.**
7. **Derive the expression for depression of freezing point.**

Unit – III

1. **What are the similarities between lanthanides and actinides?**
2. **Explain SN^1 and SN^2 reactions with examples.**
3. **Write preparation methods of alcohols and phenols.**
4. **Explain:**
   - (a) Esterification
   - (b) Oppenaur oxidation
   - (c) Reimer–Tiemann reaction
   - (d) Schotten–Baumann reaction
   - (e) Gattermann reaction
   - (f) Williamson's synthesis
5. **Explain acidic nature of phenols.**
6. **Explain:**
   - (a) Cannizzaro reaction
   - (b) Clemmensen reduction
   - (c) MPV reduction
   - (d) Wolff–Kishner reduction
7. **Give the reactions of aldehydes and ketones with the following reagents:**
   - (a) 2,4-DNP
   - (b) RMgX
   - (c) $NaHSO_3$
   - (d) HCN