



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc. DEGREE EXAMINATION – CHEMISTRY**

**FIFTH SEMESTER – NOVEMBER 2014**

**CH 5506 - TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY**

Date : 01/11/2014

Dept. No.

Max. : 100 Marks

Time : 09:00-12:00

**PART – A**

**Answer ALL questions:**

**(10 x 2 = 20 marks)**

1. What are cluster compounds?
2. What is ferrochrome?
3. “The lanthanide elements show the common stable oxidation state of +3” – comment.
4. List out two differences between lanthanides and actinides.
5. What is polydentate ligand? Give an example.
6. What are low spin complexes?
7. What are radioactive elements?
8. Define the term ‘n/p ratio’.
9. What is energy tapping?
10. Mention any two nuclear power projects in India.

**PART – B**

**Answer any EIGHT questions:**

**(8 x 5 = 40 marks)**

11. Discuss the metallurgy of Ti.
12. Explain the biological importance of Cu.
13. Write a note on lanthanide contraction.
14. Explain the electronic spectra of lanthanide compounds.
15. Explain geometrical isomerism with examples. (two)
16. Discuss spectrochemical series.
17. What are the salient features of Pauling’s theory and explain the hybridization, geometry and magnetic properties of complex ions  $[\text{CoF}_6]^{3-}$  and  $[\text{Co}(\text{CN})_6]^{3-}$  based on Pauling’s theory.
18. Explain the liquid drop model of the nucleus.
19. Discuss the radioactive decay mechanisms.
20. 4g of radioactive element is reduced to 0.25g in 24 hours. What is the half-life of this radioactive element?
21. Give any four safety precautions observed in nuclear reactors.
22. Write a note on radio carbon dating.

**PART – C**

**Answer any FOUR questions:**

**(4 x 10 = 40 marks)**

23. (a) Discuss the halides and oxohalides of transition metals. (5)  
(b) Explain the extraction of tungsten. (5)
24. (a) How lanthanides can be separated by ion-exchange method? (5)  
(b) Explain in detail the extraction of uranium. (5)
25. (a) What is chelate effect ? (5)  
(b) Explain crystal field splitting diagram with an example. (5)
26. (a) Give a comparative account of valence bond and crystal field theories proposed for complexes. (5)  
(b) Describe optical isomerism of octahedral complexes. (5)
27. Write notes on any two of the following: (10)  
(i) Binding energy  
(ii) Geiger counters  
(iii) Radioactive series  
(iv) EAN rule
28. (a) Describe the theory of nuclear fission. (5)  
(b) Explain neutron activation analysis. (5)

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