



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

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

FIFTH SEMESTER – APRIL 2017

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

Date: 20-04-2017  
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

**PART-A**

**Answer ALL questions**

**(10x2=20 marks)**

1. What are transition elements? Why are they called so?
2. What are variable oxidation states? Give an example.
3. Write the most common oxidation state of lanthanides and actinides.
4. f-f transitions are used for fingerprinting of Ln(III) ions- Account
5. Define the term chelate effect.
6. Write the IUPAC name of the following complexes.  
a)  $[\text{CrCl}_2(\text{H}_2\text{O})_4]^+$       b)  $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_4]$
7. What is 'K' electron capture reaction. Give an example.
8. Define the term binding energy.
9. Write any two differences between nuclear fusion and nuclear fission.
10. What is critical mass?

**PART-B**

**Answer any EIGHT questions**

**(8x5=40 marks)**

11. Explain the biological importance of Mn and Cu.
12. Write short notes on the toxicity of mercury.
13. Write any five differences between the first and the other rows of transition series.
14. How are individual lanthanides separated by ion exchange chromatography?
15. Compare and contrast lanthanides and actinides.
16. Define the term effective atomic number. Calculate the EAN of the following complexes.  
(i)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (ii)  $[\text{Fe}(\text{CN})_6]^{3-}$  (iii)  $\text{Ni}(\text{CO})_4$
17. Explain how d orbitals split when they are placed in an octahedral field?
18. Write the salient features of crystal field theory.
19. Write a note on the shell model of the nucleus.

20. Write the principle and working function of Geiger – Muller counter.
21. What are nuclear reactions? How do they differ from chemical reactions?
22. Write a note on radiopharmaceuticals.

### PART-C

**Answer any FOUR questions**

**(4x10=40 marks)**

23. a) Write the extraction procedure of tungsten from its ore (5)  
b) Write a note on the toxicity of Cd. (5)
24. What is lanthanide contraction? Explain its causes and consequences.
25. How is CFT used to explain the stability and magnetic properties of coordination complexes? Give its limitations.
26. a) Write a note on spectrochemical series. (5)  
b) Write the postulates of VBT. (5)
27. Explain the following  
a) Group displacement law b) Geiger-Nuttal rule
28. a) Explain the principle and applications of isotopic labelling studies. (5)  
b) Write a note on the working principle of nuclear reactors. (5)

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