LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **APRIL 2016**

CH 5511 – TRANS ELEM. & NUCLEAR CHEMISTRY

Date: 29-04-2016   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART – A

Answer ALL questions: **(10 × 2 = 20 marks)**

1. $LiAlH_4$ explodes on heating, why?

2. Write Jammis' rule; give one of its significance.

3. Give the principle of flotation process

4. Differentiate ore from mineral, give example.

5. Why +4 oxidation state of cerium is predominant?

6. La^{3+} is paramagnetic why?

7. Write group displacement law with an example.

8. What is Auger effect? Give one of its applications

9. What are moderators, where are they used, give one example?

10. List the fuels used in nuclear reactors.

PART – B

Answer any EIGHT questions: **(8 × 5 = 40 marks)**

11. What is carborundum, give its reaction with NaOH and Cl_2?

12. Complete the following reaction

    a) $Ca_3P_2 + H_2O$ -------$\rightarrow$?

    b) $B_3N_3H_6 + H_2O$ -------$\rightarrow$?

    c) $Na_2B_4O_7 + NH_4Cl$ (on heating) -------$\rightarrow$?

13. Explain electrostatic precipitation in ore dressing.

14. What is lanthanide contraction and explain how it affects the magnetic properties of lanthanides?

15. How is Ti extracted from its ore?

16. List the applications of different isotopes in chemistry.

17. Discuss the radiolysis of water with its significance.

18. Explain the applications of ^{99m}Tc in radiopharmaceuticals.

19. Tabulate the types of nuclear reactors available in India and the fuel type used in it.

20. Draw a flow chart for the extraction of tungsten from its ore.

21. Draw Ellingham diagram and explain its significance.

22. Compare the standard reduction potential values of Fe^{3+}/Fe, Cu^+/Cu and Ni^{2+}/Ni
    (Fe: -0.45, Cu: +0.34 Ni: -0.26 V) What do you infer out of it?

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PART – C

Answer any FOUR questions: **(4 × 10 = 40 marks)**

23. a) Calculate the number of possible M-M bonds in $Mo_6X_8^{4+}$ and its bond order   (5)

    b) The magnetic properties of $W_2Cl_9^{3-}$ and $Cr_2Cl_9^{3-}$ are totally different, why?   (5)

24. a) Account for the toxicity of Cd and Hg?   (5)

    b) List various reduction methodologies adopted in the extraction process of ores.   (5)

25. a) Eu^{2+} is readily reducing water, why?   (5)

    b) The experimental magnetic moment of Gd^{3+} does not corresponds to seven

       unpaired electrons, why?   (5)

26. a) Calculate binding energy of the reaction ^6_3Li (d, n) ^7_4Be.

       [Atomic masses in amu are $^6_3Li = 6.01697$, $^7_4Be = 7.0197$, $^2_1H = 2.0147$

         and $^1_0n = 1.00899$].   (5)

    b) Explain nuclear stability in terms of n/p ratio.   (5)

27. a) Write the important steps involved in the separation of isotopes.   (5)

    b) What are fast breeder reactors? What are its merits?   (5)

28. a) Explain nuclear cross section and its importance in nuclear reaction.   (5)

    b) Explain the origin and characteristics of the absorption spectra of the

       lanthanide ions.   (5)

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