LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2024**

CH 5511 – TRANS ELEM. & NUCLEAR CHEMISTRY

Date: 07-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

Section-A

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

1. Explain the stability of higher oxidation states in the first, second, and third rows of the transition elements.
2. Mention the reasons for the formation of M-M bonds and cluster compounds. Explain the M-M bond formation with a few examples.
3. Illustrate the thermodynamic reduction processes using the Ellingham diagram. Mention its significance in metallurgy.
4. How are the ores purified by magnetic separation and electrostatic precipitation? Explain with suitable block diagrams.
5. Write a note on the electronic spectra of lanthanide compounds.
6. Discuss the stability of a nucleus using the n/p ratio and binding energies with examples.
7. Outline the electrolytic reduction in aqueous and non-aqueous solutions to get pure metals.
8. Compare and contrast nuclear reactor and fast breeder reactor with suitable nuclear reactions.

Section-B

Answer any THREE questions. **(3 × 20 = 60)**

9. Explain the formation and industrial uses of nitrides and carbides of Ti, V, Cr, and W.
10. How are the following metals extracted from their principal ore?
    (i) Titanium (ii) Tungsten
11. (a) Describe the extraction of uranium from its principal ore. (10)
    (b) Illustrate causes and consequences of lanthanide contraction suitable examples. (10)
12. Describe the following with suitable examples.
    (i) ^{238}U decay series (ii) Geiger-Nuttall rule (iii) Magic numbers
13. (a) Explain the principle involved and applications of radiocarbon dating. (8)
    (b) Discuss the components of a nuclear breeder reactor. (12)
14. How is the radioactivity measured in the following? Explain with block diagrams.
    (i) Ionization chamber (ii) Geiger counter (iii) Scintillation counter

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