# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **APRIL 2023**

**UCH 5504 – TRANSITION ELEMENTS AND NUCLEAR CHEMISTRY**

Date: 08-05-2023 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

## PART-A

**Answer ALL questions.** **(10 x 2 = 20 Marks)**

1. "Transition elements show variable oxidation states." Why?
2. What is silvering of mirror?
3. How will you concentrate sulphide ore?
4. Define pulverization.
5. State lanthanide contraction.
6. How will you prepare uranyl nitrate?
7. Calculate the number of α and β particles emitted when $_{92}U^{238}$ changes in to $_{82}Pb^{206}$.
8. What is packing fraction?
9. Differentiate fissile and fertile nuclei with an example.
10. Write the principle used in atom bomb.

## PART-B

**Answer any EIGHT questions.** **(8 x 5 = 40 Marks)**

11. Write notes on heat treatment of steel.
12. Describe the theories of passivity.
13. Explain Mac-Arther forest cyanide process.
14. State and explain Ellingham diagram.
15. Write notes on alumino thermic process.
16. How is uranium extracted from its ore?
17. Discuss the position of actinides in the periodic table.
18. State and explain group displacement law.
19. Calculate binding energy per nucleons of oxygen atom, $_{8}O^{16}$, given that mass of $_{8}O^{16}$ = 15.994910 amu, mass of neutron = 1.008665 amu, mass of proton = 1.007277 amu and mass of electron = 0.0005486 amu.
20. Explain the stability of nuclei using n/p ratio.
21. Explain proton-proton cycle mechanism of stellar energy.
22. Discuss the principle involved in carbon dating method.

## PART-C

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

23. (i). Discuss the similarities and gradation in properties of Cu, Ag and Au. (5 marks)

    (ii). State and explain electroplating with an example. (5 marks)

24. (i). What are the ores of titanium? (2 marks)

(ii). Explain the extraction of titanium from its ore. (8 marks)

25. i) Compare the properties of lanthanides and actinides. (5+5 marks)

ii) Briefly explain the separation of individual lanthanides by ion-exchange chromatography.

26. (i). Write notes on pulse radiolysis. (5 marks)

(ii). Explain liquid drop model of nucleus. (5 marks)

27. State and explain nuclear reactor with a neat diagram.

28. (i). Highlight the application of the following reagents in qualitative analysis:

a) potassium ferrocyanide b) sodium nitroprusside

(ii). Explain the working principle of scintillation counter. (5+5 marks)

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