R – 3141

Reg. No. : ....

Name : ....

Second Semester B.Sc. Degree Examination, September 2023

First Degree Programme under CBCSS

Chemistry

Complementary Course for Botany

CH 1231.3 : INORGANIC AND BIOINORGANIC CHEMISTRY

(2020 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer in **one** word to maximum **two** sentences. Each question carries **1** mark.

1. Who discovered natural radioactivity?

2. What happen for N/P ratio when a nuclide decay by α - emission?

3. What are isotopes?

4. What is meant by the term hapticity of an organometallic compound?

5. Give any two examples for organoboron compounds.

6. How many haeme units are present in a molecule of haemoglobin?

7. What is the role of chlorophyll in photosynthesis?

8. Write the IUPAC name of the complex $K_3[Fe(CN)_6]$.

9. Define coordination number.

10. Name any two trace elements in biological systems.

$(10 \times 1 = 10$ Marks$)$

SECTION – B

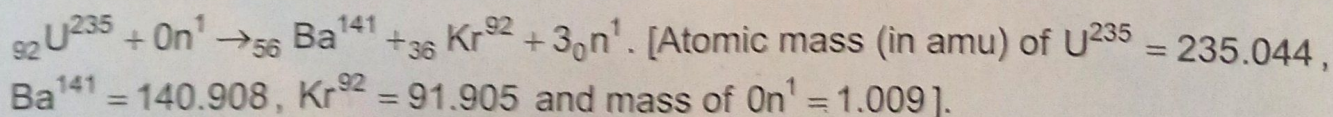Short answer type. Answer any **eight** questions. Each question carries **2** marks.

11. What is meant by artificial transmutation?

12. Distinguish between natural and artificial radioactivity.

13. What is a radioactive tracer?

14. Among the metal carbonates and metal carbonyls, which is an organometallic compound and why?

15. Give a method for the preparation of organosilicon compounds.

16. What are metalloporphyrins?

17. What are cytochromes? How they are classified?

18. What are ambidentate ligands? Explain with suitable examples.

19. Distinguish between inner orbital and outer orbital complexes.

20. Explain nitrogen fixation.

21. Explain the major applications of radioisotopes in medicine.

22. What is respiration. Explain.

$(8 \times 2 = 16$ **Marks**)

SECTION – C

Short essay type. Answer any **six** questions. Each question carries **4** marks.

23. Explain group displacement law.

24. Explain the term mass defect? Calculate energy released in the following reaction.

$_{92}U^{235} + {_0}n^1 \rightarrow {_{56}}Ba^{141} + {_{36}}Kr^{92} + 3{_0}n^1$. [Atomic mass (in amu) of $U^{235} = 235.044$, $Ba^{141} = 140.908$, $Kr^{92} = 91.905$ and mass of $0n^1 = 1.009$].

25. Explain the classification of organometallic compounds.

26. Discuss the environmental aspects of organometallic compounds.

27. Explain the structural features and functions of myoglobin.

28. Write a note on biochemistry of iron toxicity and nutrition.

29. Discuss the colour of transition metal complexes.

30. Calculate the spin only magnetic moment of $[Fe(CN)_6]^{3-}$ and $[Fe(H_2O)_6]^{3+}$.

31. What are the limitations of valence bond theory of coordination compounds?

<div align="right">(6 × 4 = 24 Marks)</div>

<div align="center">SECTION – D</div>

Answer any **two** questions. **Each** question carries **15** marks.

32. Discuss
    (a) Preparation and synthetic applications of Grignard reagents.
    (b) Application of organometallics in agriculture.

33. Explain
    (a) Structure of hemoglobin and its role in the transport of O_2 and CO_2.
    (b) Essential and trace elements in biological systems.

34. Explain
    (a) Low spin and high spin complexes.
    (b) Geometrical isomerism in octahedral complexes.

35. Explain
    (a) Nuclear stability and N/P ratio.
    (b) Modes of radioactive decay.
    (c) Rock dating.

<div align="right">(2 × 15 = 30 Marks)</div>

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