**K23P 0159**

Reg. No. : .....

Name : .....

**IV Semester M.Sc. Degree (C.B.S.S. – Reg./Supple./Imp.) Examination, April 2023**
**(2019 Admission Onwards)**
**CHEMISTRY**
**CHE 4C.11 : Inorganic Chemistry – III**

Time : 3 Hours Max. Marks : 60

SECTION – A

(Answer **all** questions in **one** word or **one** sentence. **Each** carries **one** mark.)

1. Name any two important minerals that occur in the beach sands of Kerala and write their approximate composition.
2. Give an example with structure for a non-bridged polynuclear carbonyl.
3. What are non-essential elements ?
4. State Beer Lambert law.
5. What are the experimental parameters measured in DTA and DSC ?
6. What is meant by biomineralization ?
7. Vanadium hexacarbonyl is paramagnetic. Explain.
8. Why do actinides show greater range of oxidation states than the lanthanides ? **(8×1=8)**

SECTION – B

(Answer **any 8** questions. Answer may be **two** or **three** sentences. **Each** question carries **2** marks.)

9. Comment on the structure of $[CO_2(CO)_8]$.
10. Explain the term isomer shift in Mossbauer spectroscopy.

**P.T.O.**



11. Distinguish between active and passive transport in biological system.
12. Which is a good reducing agent $Ce^{3+}$ or $Ce^{4+}$ in aqueous solution ? Justify your answer.
13. How many normal modes of vibration does water molecules have and how many of them are IR active ?
14. Distinguish between chelation therapy and chemotherapy.
15. Explain any two consequences of lanthanide contraction.
16. What is a Frost diagram ? What information do we get from this diagram ?
17. Mention any two differences between Raman spectra and IR spectra.
18. For an 18 electron complex ion, $[Fe(CN)_5(NO)]^{2-}$ what is the expected M-N-O angle ? Why ?
19. Mention any two uses of thorium.
20. How Collmann's reagent is prepared ? Explain its synthetic importance with one example. **(8×2=16)**

SECTION – C

(Short paragraph questions. Answer **any 4** questions. **Each** carries **3** marks.)

21. Explain sodium potassium pump in biological systems.
22. Give an account of the separation of lanthanide elements using ion exchange resin.
23. What is cisplatin ? Explain its use and mode of action.
24. Discuss the principle of neutron diffraction method.
25. Write briefly on different types of indicator electrodes used in potentiometry.
26. Explain how IR spectroscopy can be used to identify different bonding modes of CO in metal carbonyls.
27. Write a short note on metal phosphine complexes.
28. Briefly discuss the hydrogen cycle. **(4×3=12)**



SECTION – D

(Essay type – Answer **4** questions. **Each** carries **6** marks.)

29. A) Compare the magnetic and spectral properties of lanthanides and actinides.

OR

B) What is Ellingham diagram ? Explain the important characteristics and applications of this diagram in metallurgical process.

30. A) Write a note on metal dinitrogen complexes.

OR

B) Explain the structure and bonding in metal carbonyls.

31. A) What are ionophores ? How they are classified ? What are the distinguishing features between them ?

OR

B) Briefly outline the role of haemoglobin and myoglobin in the transportation and storage of oxygen and $CO_2$ in biological systems.

32. A) Briefly discuss about the determination of molecular structure by X ray diffraction.

OR

B) Discuss the principle of Photoelectron spectroscopy. Explain how PES is useful in quantitative analysis. **(4×6=24)**