MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…… **Name :…….**

Second Semester B.Sc. Degree Examination, June 2016

First Degree Programme under CBCSS

Complementary Course: Chemistry – II (for Botany and Zoology)

AUCH231.2a / AUCH231.2e: Inorganic and Bioinorganic Chemistry

Time: **3** Hours Max. Marks: **80**

SECTION – A

*Answer **ALL** questions in one or two sentences.*

1. Name two ozone layer depleting chemicals.
2. What is the principle of reverse osmosis ?
3. Identify the coordination number of platinum in dichlorobis (ethylenediamine) platinum (IV) chloride.
4. What is chelate effect ?
5. Mention any one application of coordination chemistry in qualitative analysis.
6. Explain the mechanism of nitrogen fixation.
7. Which among the following molecules show pure rotational spectrum ?
   i). O_2 ii). HBr iii). CO_2
8. Determine the number of normal modes vibrations in H_2O.
9. Name two non−metals which are not considered as essential elements to biological systems.
10. Give any one example for an ambidentate ligand.

(10 × 1 = 10 Marks)

SECTION – B

*Answer any **EIGHT** questions, each in a short paragraph not exceeding 50 words.*

11. What is greenhouse effect and how does it affect the climate ?
12. Explain the principle Electrodialysis. What are its merits ?

13. Give the IUPAC name of i). $K_4[Fe(CN)_6]$; and ii). $[Pt(NH_3)_5Cl]Br_3$
14. Why is it that $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$ have different magnetic nature ?
15. Draw the skeleton of a metalloporphyrin.
16. Iron is potentially toxic. Explain the biochemistry.
17. Briefly explain the role of chlorophyll in photosynthesis.
18. Arrange the different electromagnetic radiations in the order of increasing frequency.
19. Which vibrational modes of carbon dioxide molecule are IR active ?
20. What is zero point energy ?
21. Give the selection rules for pure IR transitions.
22. What are cytochromes ? Discuss their importance in biological systems.

(8 × 2 = 16 Marks)

SECTION – C

*Answer any **SIX** questions, each in a paragraph not exceeding 120 words.*

23. Discuss how the laundry detergents pollute lakes and rivers.
24. What is BOD ? Explain any one common method adopted for the measurement of BOD.
25. With the help of VB theory, explain the bonding in $[Cr(NH_3)_6]^{3+}$.
26. Explain the geometry and magnetic behaviour of $[Ni(CO)_{4]}$ and $[Ni(Cl)_4]^{2-}$.
27. Discuss the mechanism of transport, formation and degradation of hydrogen carbonate during respiration.
28. Explain carbon cycle and the sequence of events that are key to making the earth capable of sustaining life.
29. The fundamental vibrational frequency of $H^{127}I$ is 2309.5 cm^{-1}. Calculate the force constant for the stretching vibration of the $H^{127}I$ molecule.
30. Show that the pure rotational spectra of diatomic molecules give equally spaced lines.
31. Highlight the main drawbacks of valence bond theory in explaining the bonding of coordination compounds.

(6 × 4 = 24 Marks)

SECTION – D

*Answer any **TWO** questions, not exceeding four pages.*

32. i). What are the major threats by chemicals to the environmental sanctity of earth ?
    ii). Explain the various methods adopted for the treatment of industrial waste water.
33. Discuss the various structural and stereo isomerism exhibited by coordination compounds with suitable examples.
34. Compare the structural and functional features of haemoglobin and myoglobin.
35. i). Describe briefly the principle of microwave spectroscopy.
    ii). The spacing between the lines in the microwave spectrum of $H^{19}F$ is 41.9 cm^{-1}. Calculate the bond length of the $H^{19}F$ molecule.

(2 × 15 = 30 Marks)

∫*∫*∫*∫*∫*∫*∫*∫*∫*∫*∫*∫*∫*∫*∫*