MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…… **Name :…….**

Third Semester B.Sc. Degree Examination, November 2016
First Degree Programme under CBCSS
Core Course: Chemistry – II
AUCH341: Inorganic Chemistry II

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

SECTION – A

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

1. Define Lattice energy.
2. What is meant by a polar covalent bond ?
3. How many electrons are present in antibonding molecular orbitals in a NO molecule ?
4. What is the bond order of N_2 molecule ?
5. Why is PCl_5 a reactive molecule ?
6. State Geiger – Nuttal rule.
7. What is meant by leveling effect of solvent ?
8. Account for solubility of AgI in liquid NH_3.
9. Define Beer – Lambert law.
10. What are nanomaterials ?

(10 × 1 = 10 Marks)

SECTION – B

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

11. What is the dipole moment of CO_2 ? Why ?
12. Account for the paramagnetism of O_2.
13. Which has a higher boiling point; o–nitrophenol or p–nitrophenol ? Why ?

14. Which has a lower density; ice or water ? Explain.
15. What are isotones ? Give two examples.
16. Liquid NH_3 exhibits association where as liquid SO_2 does not. Explain.
17. What is the principle of Atomic Absorption Spectroscopy ?
18. What are the events that occur when a solution containing an ion is atomized through a flame ?
19. What is Atomic Force Microscopy ?
20. How are nanomaterials classified ?
21. What is meant by Top – down method of nanofabrication ?
22. What are carbon nanotubes ?

(8 × 2 = 16 Marks)

SECTION – C

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

23. Explain the shapes of (a) NH_3 molecule and (b) SF_6 molecule on the basis of VSEPR Theory.
24. How can dipole moment studies help to differentiate between
    a) ortho, meta and para – dichlorobenzene and
    b) cis and trans isomers ?
25. How does the band theory explain the electrical and thermal conductivities of metals ?
26. State Fajan's rules.
27. Explain the terms mass defect and binding energy. Given the masses of He nucleus, proton and neutron are respectively 4.003, 1.0078 and 1.0083 amu; calculate the binding energy in Joules per nucleon with regard to the He nucleus.
28. What are the different classifications of solvents ? Exemplify.
29. Give the differences between Atomic absorption spectroscopy and Flame emission spectroscopy ?
30. What is the basic principle of Scanning Tunneling Microscopy ?
31. Discuss the sol – gel process for the synthesis of nanoparticles.

(6 × 4 = 24 Marks)

SECTION – D

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

32. a) What is Born – Haber cycle ? Discuss with respect to NaCl **7 Marks**

    b) Molecular Orbital Theory explains bonding in O_2 molecule better than valence Bond Theory. Explain. **8 Marks**

33. a) Explain the role of stable and radioisotpes as tracers. **8 Marks**

    b) Give the principle behind the rock dating.

    A sample of uranium ore is found to contain 5.95 g of U^{238} and 5.15 g of Pb^{206}. Calculate the age of the ore. The half – life of U^{238} is $4.5 \times 10^{9\ yrs}$ **7 Marks**

34. a) Compare the properties of non-aqueous solvent liquid ammonia with water. **5 Marks**

    b) Write a note on solutions of metals in liq. Ammonia. **5 Marks**

    c) Complete the following:

    i). $Ba(NO)_3 + 2AgCl \xrightarrow[\text{(liq. NH3)}]{}$

    ii). $SOCl_2 + 2CH_3COOAg \xrightarrow[\text{(liq.}SO_2\text{)}]{}$

    iii). $C_6H_6 + SO_3 \xrightarrow[\text{(liq.HF)}]{}$

    iv). $HNO_3 + HF \longrightarrow$

    v). The blue colour of alkali metals in liquid ammonia is due to …… **5 Marks**

35. a) Write a brief note on the tools for measuring nanostructures **7 Marks**

    b) What are the important properties of nanomaterials ? **8 Marks**

(2 × 15 = 30 Marks)

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