



**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 ?

P.T.O.

**1560**

14. Which has a lower density; ice or water ? Explain.
15. What are isotones ? Give two examples.
16. Liquid  $\text{NH}_3$  exhibits association where as liquid  $\text{SO}_2$  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)  $\text{NH}_3$  molecule and (b)  $\text{SF}_6$  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

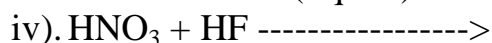
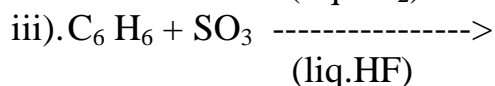
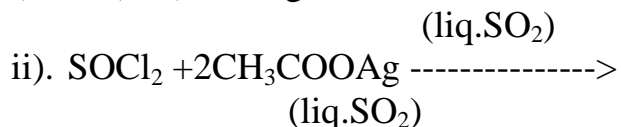
Answer any **TWO** questions, not exceeding four pages.

32. a) What is Born – Haber cycle ? Discuss with respect to NaCl **7 Marks**  
 b) Molecular Orbital Theory explains bonding in O<sub>2</sub> molecule better than valence Bond Theory. Explain. **8 Marks**

33. a) Explain the role of stable and radioisotopes 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<sup>238</sup> and 5.15 g of Pb<sup>206</sup>. Calculate the age of the ore. The half – life of U<sup>238</sup> is 4.5 x 10<sup>9</sup> 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:



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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