Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, December 2015
First Degree Programme under CBCSS
CHEMISTRY
Core Course – II
CH 1341 – Inorganic Chemistry – II
(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1. Give the shape of ClF_3 molecule.

2. Name the ions produced by the autoionisation of liquid ammonia.

3. Give an example of an aprotic non-aqueous solvent.

4. Define artificial radioactivity.

5. What is the use of nebuliser-burner system in AAS ?

6. Which type of H bonding is present in o-nitro phenol ?

7. What is a thermo-gravimetric curve ?

8. How many pentagonal and hexagonal faces are there in a C_{60} fullerene ?

9. What happens to the atomic number of an atom when a β particle is emitted ?

10. Define lattice energy of an ionic solid.

SECTION – B

Short answer type questions (Answer **not** to exceed **one** paragraph). Answer **any eight** questions. **Each** question carries **2 marks.**

11. Explain the hybridisation of carbon in benzene.

12. Which is more stable, O_2 or O_2+ ? Justify your answer based on MO theory.

13. Give the Born-Lande equation for lattice energy of an ionic compound and explain the terms involved.

14. How do you account for the abnormally high boiling points of NH_3 and H_2O as compared to the other hydrides of the respective family ?

15. What is artifical transmutation ? Illustrate with an example.

16. Calculate the binding energy in MeV of $^{40}_{20}Ca$ from the following data. Mass of ^1_1H = 1.0078 a.m.u. and mass of neutron = 1.0084 a.m.u.

17. Acetic acid acts as a stronger acid in liquid ammonia than in water. Why ?

18. What do you mean by levelling effect of a solvent ?

19. Give any two advantages of colourimetric estimation over corresponding volumetric or gravimetric estimation.

20. What is the basic difference between DTA and DSC ?

21. What are carbon nanotubes ?

22. How do you produce the flame in flame spectroscopy ?

SECTION – C

Short essay (Answer **not** to exceed **120** words) Answer **any six** questions. **Each** question carries **4 marks.**

23. Based on VSEPR theory, explain the structures of XeF_2, XeF_4 and XeF_6.

24. State and explain Fajan's rules.

25. Explain the principle and applications of neutron activation analysis.

26. How do you account for the stability of nuclei based on n/p ratio ?

27. What is ^{14}C dating ?

28. Write a note on the optical and magnetic properties of nanoparticles with examples.

29. What happens when an alkali metal is gradually added to liquid ammonia ? Comment on the colour, density and conductance of the resulting solution.

30. Write a note on the use of liquid HF as a non-aqueous solvent.

31. Distinguish between the basic principles of flame emission spectroscopy and atomic absorption spectroscopy.

SECTION – D

Long Essay

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

32. Describe the various methods for the preparation of nanoparticles.

33. Explain the principles and applications of the following

    a) Atomic force microscopy

    b) Scanning tunnelling microscopy

    c) Scanning electron microscopy.

34. Give an account of the various intermolecular induction and dispersion forces. Arrange them in the increasing order of their strength.

35. a) Sketch the molecular orbital diagram and calculate the bond order of the following hetero-nuclear diatomic molecules

    i) HF   ii) NO   iii) CO

    b) Write a note on the limitations of valence bond theory of chemical bonding.