E 2290 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2015

Second Semester

Core Course—THEORETICAL AND INORGANIC CHEMISTRY

(Common for B.Sc. Chemistry Model I, Model II
B.Sc. Petrochemicals and B.Sc. Chemistry – Environment and Water Management)

[Prior to 2013 Admissions]

Time : Three Hours Maximum Weight : 25

Section A

Answer **all** *questions.*
Each bunch of four questions carries a weight of 1.

I. 1. Give the value of '*l*' and '*m*' for an electron in 2S orbital.

2. Which is larger, K or $K^{\oplus}$?

3. Bond order in He_2 molecule is ————.

4. Hybridisation of sulphur in SF_6 is ————.

II. 5. One Curie is defined as ————.

6. Ammonia has ———— Boiling point than PH_3.

7. Half life period for the Ist order reaction is related to decay constant by the relation ————.

8. One Transuramic element is ————.

III. 9. Electronic configuration of $Cu^{\oplus}$ ion is ————.

10. No molecule is ———— magnetic.

11. The energy required to break one mole of a compound in to its constituent ions in the gaseous state is called ————.

12. Hybridisation of carbon in Ethylene is ————.

IV. 13. O-nitrophenol is more volatile than P-nitrophenol, it is due to ————.

14. Modern periodic law is defined as ————.

15. One example for spallation reaction is ————.

16. Isobars are ————.

(4 × 1 = 4)

Turn over

Section B

Answer any **five** *of the following.*
Each question carries weight of 1.

17. Write the Born-Lande equation and explain the symbols.
18. Define electron affinity. How does it vary in the halogen family ?
19. Write the M.O. electronic configuration of O_2 molecule and explain its paramagnetic behaviour.
20. Draw the structure of ClF_3 Molecule.
21. Calculate the wave length of the matter wave associated with a particle of mass 10 gm moving with a velocity 1000 cm/s.
22. Write of the two LiCl or NaCl, is more covalent explain.
23. What is Pauling's scale of electronegativity ?
24. How is N/P ratio related to nuclear stability ? Explain.

(5 × 1 = 5)

Section C

Answer any **four** *of the following.*
Each question carries weight of 2.

25. Discuss briefly on different types of weak chemical forces.
26. Illustrate metallic bonding on the basis of free electron theory.
27. Explain VSEPR theory and discuss the structure of XeF_6 molecule.
28. Outline the Postulates of Bohr theory.
29. Discuss on the Hybridisation of Phosphorous in PCl_5 molecule and explain the shape of PCl_5 molecule.
30. State and explain Heisenberg's uncertainity principle.

(4 × 2 = 8)

Section D

Answer any **two** *of the following.*
Each question carries weight of 4.

31. (a) Describe how Lattice energy can be determined from Born-Haber cycle.
    (b) How does Lattice energy affects solubility of an Ionic crystals.
32. Give an account of the MO theory and discuss the MO concept of NO molecule and CO molecule.
33. (a) What are Quantum numbers ? Explain.
    (b) Write a note on Preparation of Transuranic elements.

(2 × 4 = 8)