TB222060W **Reg. No :.....**

Name :.....

B. Sc. DEGREE (C.B.C.S.) EXAMINATION, MARCH 2023

2022 Admissions Regular & 2021 Admissions Supplementary / Improvement And 2020, 2019 And 2018 Admissions Supplementary

SEMESTER II - CORE COURSE (CHEMISTRY)

CH2B02B18 - THEORETICAL AND INORGANIC CHEMISTRY

Time : 3 Hours **Maximum Marks : 60**

Part A

I. Answer any Ten questions. Each question carries 1 mark **(10x1=10)**

1. Define orbital.
2. Calculate the frequency of first line in Balmer series.
3. Electron in the hydrogen atom excited to fifth energy level returns to third energy level. Identify the part of the electromagnetic spectrum in which this line lie.
4. Define inert pair effect.
5. Compare the size of cations with their parent atoms.
6. Define periodicity.
7. o-Nitrophenol less soluble in water. Identify the reason.
8. Select the ion with more polarising power- Ca^{2+}, Be^{2+}, Mg^{2+}.
9. Recall the rules used to predict the covalent and ionic nature of a bond.
10. Select the molecule/molecules with zero dipole moment? CH_4, CCl_4.
11. Identify the bond which is more stable than a pure covalent or a pure ionic bond.
12. Select the stronger bond out of sigma and pi.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. Memorize Aufbau principle, Pauli's exclusion principle and Hund's rule.
14. Recall the various types of Quantum numbers.
15. Based on Bohr atom model, construct equations to calculate the radius of orbit and energy of electron in Hydrogen atom
16. Indicate the reasons for the following: a) Most of the transition metals are paramagnetic b) Iron, Cobalt and Nickel are ferromagnetic.
17. Describe the different transition series in d block of periodic table.
18. Enumerate the salient features of hybridization. Do you expect all P-Cl bond length to be equal in Phosphorous pentachloride molecule? Explain.
19. Using free electron theory, explain the thermal conductivity and metallic lustre of metals.
20. Sketch the molecular orbital energy level diagram of nitrogen molecule.
21. Compare sigma bonds and pi bonds.

Part C

III. Answer any Two questions. Each question carries 10 marks **(2x10=20)**

22. Recall the classification of elements into s, p, d, f blocks. Describe the characteristics of each block briefly.
23. Describe the separation of Lanthanoid salts by ion-exchange chromatography.
24. Derive Born Lande equation for calculating the lattice energy of crystalline ionic compounds.
25. Describe Born Haber cycle and with the aid of suitable examples explain its applications.