

B Sc DEGREE END SEMESTER EXAMINATION - JULY 2021**SEMESTER 2 : CHEMISTRY (CORE COURSE)****COURSE : 19U2CRCHE02 : THEORETICAL AND INORGANIC CHEMISTRY II***(For Regular - 2020 Admission and Improvement / Supplementary - 2019 Admission)*

Time : Three Hours

Max. Marks: 60

PART A**Answer All (1 mark each)**

1. In which hybridisation, atomic radii of carbon is high, sp^3 , sp^2 or sp ?
2. Give the relationship between percentage ionic character and dipole moment of molecules
3. Does water have a zero or non zero dipole moment? Why?
4. Water has high surface tension and capillarity due to ----
5. Sketch the MO diagram of hydrogen molecule.
6. What is Lewis theory of acids and bases?
7. Give an example each for substances which acts as acid and base in liq. SO_2 as solvent.
8. What is mobile phase in chromatography?

(1 x 8 = 8)**PART B****Answer any 6 (2 marks each)**

9. Explain why chlorine is having higher electron affinity than fluorine.
10. Among the molecules $NaCl$, $MgCl_2$ and $AlCl_3$ which has more covalent character and why?
11. What is the significance and limitation of octet rule ?
12. Differentiate the concept of Atomic Orbital and Molecular Orbital
13. Explain the non-existence of helium diatomic molecule
14. What are levelling and differentiating solvents with examples?
15. Explain with an example, acid-base reaction in liq. NH_3 as solvent.
16. What is the principle behind fractional distillation?

(2 x 6 = 12)**PART C****Answer any 4 (5 marks each)**

17. Describe Slater rules for determining the effective nuclear charge. Calculate the effective nuclear charge experience by a 2p electron in oxygen atom.
18. Explain why PCl_5 is trigonal bipyramidal whereas IF_5 is square pyramidal.
19. Give reasons for the following : (i) Covalent bonds are directional bonds while ionic bonds are nondirectional. (ii) Water molecule has bent structure whereas carbon dioxide molecule is linear.
20. Compare and Contrast VBT and MOT
21. Give the postulates of MO theory and explain
22. Discuss any three type of reactions in liq. NH_3 as a solvent.

(5 x 4 = 20)**PART D****Answer any 2 (10 marks each)**

23. Discuss the structure of NH_3 , SF_4 and XeF_6 according to VSEPR theory, clearly indicating the state of hybridization of the central atom and lone pair of electrons (if any) on the central atom.

24. Sketch the electronic configuration of B_2 , C_2 , F_2 , NO and CO molecules with the help of MO diagrams. Calculate the bond order in each case.
25. Explain in detail the concept of Hard and soft acids and bases with examples
26. Discuss in detail the principle and procedure of the gravimetric estimation of Barium as Barium Sulphate

(10 x 2 = 20)