

B.Sc. DEGREE END SEMESTER EXAMINATION MARCH 2017**SEMESTER – 2: CHEMISTRY****COURSE: 15U2CRCHE2 –: THEORETICAL AND INORGANIC CHEMISTRY II***(Common for Regular 2016 admission and Supplementary 2015 admission)*

Time: Three Hours

Max. Marks: 60

SECTION AAnswer **all** questions, each question carries 1 mark

1. Among nitrogen, oxygen and fluorine the element having lowest ionization enthalpy is
2. A molecule which posses pentagonal bipyramidal shape is.....
3. The dipole moment of CH₄ molecule is.....
4. In a metallic crystal, the highest energy band containing electrons is called.....
5. If $^{238}_{92}\text{U}$ emits 8 alpha particles and 6 beta particles the product formed will be.....
6. Water has highest density at.....°C
7. If 2g of radioisotope decays to 1g in 7 days, 1g of the sample will become 0.25g in.....days.
8. In inorganic qualitative analysis, the cations of groupare precipitated as their carbonates.

(1 x 8 = 8)

SECTION BAnswer **any six** questions, each question carries 2 marks

9. Explain the variation of polarizing power of cations down a group?
10. What is the state of hybridization of N in NH₄⁺ molecule and what is the H–N–H bond angle in the ion?
11. Give the Born-Lande equation and explain the terms involved.
12. What are Vanderwaal's forces? Name 3 types of Vanderwaal's forces?
13. Which has higher boiling point, o-nitro phenol or p-nitrophenol? Explain the reason.
14. Give an example for induced radioactivity in which positron decay occurs.
15. State and explain Gieger - Nuttal Rule
16. What are the basic principles of chromatographic techniques?

(2 x 6 = 12)

SECTION CAnswer **any four** questions, each question carries 5 marks

17. Distinguish between the terms 'electro negativity' and 'electron affinity'
18. Based on MO theory predict which of the following are paramagnetic
a) He₂⁺ b) NO c) NO⁺ d) N₂⁺ e) B₂⁺ f) B₂⁻

19. Give the shape of IF_5 molecule. Explain its geometry on the basis of VSEPR theory.
20. Explain briefly the construction of MO's by LCAO treatment of the H_2^+ ion.
21. Differentiate between nuclear fission and nuclear fusion.
22. Explain how solubility product principle and common ion effect are applied in Inorganic qualitative analysis of analytical groups II and III (5 x 4 = 20)

SECTION D

Answer **any two** questions, each question carries 10 marks

23. Explain how electronegativities of elements are calculated using Pauling scale and Mullikan scales.
24. a) Construct the MO energy level diagram of dioxygen molecule and explain its properties.
b) Compare the bond length, magnetic behaviour and bond energy of O_2^+ , O_2^{2+} , O_2^- and O_2^{2-} on the basis of MO theory
25. a) Explain Fajans Rule and give its applications
b) Explain valence bond theory and band theory of metallic bonding
26. a) Explain Born-Haber cycle taking NaCl as example.
b) The enthalpy of formation of NaCl, enthalpy of sublimation of Na, ionization of Na, first ionization energy of Cl_2 and electron affinity of chlorine are respectively – 410, 109, 495, 240 and -349 kJmol^{-1} . Calculate the lattice energy of sodium chloride using Born-Haber Cycle. (10 x 2 = 20)
