B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH / APRIL 2018
SEMESTER – **2: B. Sc. CHEMISTRY (CORE COURSE)**
COURSE: **15U2CRCHE2 – THEORETICAL AND INORGANIC CHEMISTRY - II**
(Common for Regular 2017 / Supplementary - Improvement 2016 / 2015 Admission)

Time: Three Hours   Max. Marks: 60

PART – A

(Answer **all** questions, each question carries 1 mark)

1. Among halogens, the element having highest election affinity is………….…
2. A molecule which possess triagonal planar shape is……….……
3. The most polar molecule among HI, HCl, HBr and HF is…………….
4. The molecule having lowest bond length among N_2, O_2 and F_2 is……………
5. In an insulator, the……………….. band is completely filled.
6. If $^{238}_{92}U$ emits 8 alpha particles and 6 beta particles the product formed will be……………
7. If 2g of a 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 analytical group III are precipitated as their…………

$(1 \times 8 = 8)$

PART – B

(Answer any **six** questions, each question carries 2 mark)

9. Distinguish between the terms 'atomic radius' and 'covalent radius'.
10. Give the major conditions that favour ionic bond formation.
11. Write down the Born-Lande equation for calculating the lattice energy per mole of an ionic crystal.
12. Explain 'metallic lusture' on the basis of free electron theory.
13. Differentiate between 'bonding' and antibonding' molecular orbitals.
14. Explain the term 'radioactive equilibrium'.
15. Explain packing fraction.
16. Define 'Rf value'. How is it useful in identification of a compound? $(2 \times 6 = 12)$

PART – C

(Answer **any four** questions, each question carries 5 mark)

17. Discuss the applications of solubility product in the separation of cations into analytical groups.
18. Based on MO theory predict which of the following are paramagnetic

   a) He_2^+ b) NO   c) NO^+ d) N_2^+ e) B_2^+ f) B_2-

19. Draw the resonance structures of borate, carbonate and nitrate ions. Compare their bond energy.

20. Differentiate 'intermolecular hydrogen bonding' and 'intermolecular hydrogen bonding' with illustrative examples. Explain the effect of hydrogen bonding on physical properties of compounds.

21. State the slater rules for calculating the shielding constant. How is the effective nuclear charge related to screening constant?

22. Explain the basic principle of TLC? What are the advantages and disadvantages of TLC?

(4 x 5 = 20)

PART – D

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

23. Predict the shape and bond angles of the following molecule based on VSEPR theory

    a) SF_4 b) ClF_3 c) XeF_2 d) IF_5 e) $Xe F_4$

24. Briefly explain the following intermolecular forces.

    a) Vanderwalls forces   b) Ion-dipole interactions   c) dipole-dipole interactions

    d) ion-induced dipole interactions   e) dipole induced dipole interactions.

25. a) State and explain Fajan's rules

    b) Explain the valance bond theory and Band theory of metallic bonding.

26. Give the various steps involved in the gravimetric estimation of barium as barium sulphate.

(10 x 2 = 20)

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