Q.P. Code : 11222

Second Semester B.Sc. Degree Examination, May/June 2019

(CBCS – 2018–19 onwards)

Chemistry

Paper II — CHEMISTRY

Time : 3 Hours]   [Max. Marks : 70

Instructions to Candidates :

1. The question paper has two Parts. Answer both Parts.

2. Write equations, draw diagrams wherever necessary.

PART – A

Answer any **EIGHT** of the following questions :   **(8 × 2 = 16)**

1. What are Eigen values and Eigen function?

2. State uncertainity principle. Give its mathematical expression.

3. Draw the shape of the orbitals when $l = 1$.

4. Arrange the following in the increasing order of covalency. Justify your answer based on Fajan's rules.

   O^{2-}, Cl^-, N^{3-}

5. Mention the type of hybridisation in the central atom of (a) PCl_5 (b) SF_6.

6. What is hydrogen bond? Mention the different types of hydrogen bond.

7. Give any two applications of Zeolite.

8. Write the structure of XeF_4 and mention the type of hybridisation.

9. Calculate the magnetic moment of Cu^{2+} ions. (Atomic number of Cu = 29)

10. Cyclopentaclienyl anion is aromatic. Explain.

11. Write the Diels Alder reaction of anthracene with 1,2-dichloro ethene.

12. What is Birch reduction of benzene?

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PART – B

Answer any **NINE** of the following questions :   (9 × 6 = 54)

13. (a) Derive an expression for the energy of the *n*th orbit of hydrogen like atoms.

    (b) Mention any two drawbacks of Bohr's model of an atom.   (4 + 2)

14. (a) Explain the significance of (i) principal quantum number (ii) spin quantum number.

    (b) Calculate the ionisation energy of Li^{3+} given the energy of the first Bohr's orbit is -2.17×10^{-18} J.   (4 + 2)

15. (a) Derive the Schrodinger wave equation in one dimensional Box.

    (b) What is meant by wave-particle duality?   (4 + 2)

16. (a) Explain the shape of ammonia molecule based on VSEPR theory.

    (b) What is the significance of van der Waal's forces with respect to dry ice?
                                                                                 (4 + 2)

17. (a) Write the molecular orbital diagram of oxygen molecule and calculate the bond order.

    (b) What are semi conductors?   (4 + 2)

18. (a) Give any two applications for each of the following noble gases (i) Helium (ii) Argon

    (b) What are orthosilicates? Give an example.   (4 + 2)

19. (a) Set up the Born-Haber cycle for NaCl molecule. Calculate the lattice energy.

    (b) Write the Born-Lande equation for the calculation of lattice energy and explain the terms involved.   (4 + 2)

20. (a) Give reasons for the following :

        (i) Transition metals form complexes

        (ii) Transition metals exhibit variable oxidation states.

    (b) What is lanthanide contraction?   (4 + 2)

21. (a) Explain the ion exchange method for the separation of lanthanides.

    (b) What are interstitial compounds?   (4 + 2)

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22. (a) Explain the orienting influence of hydroxyl group taking phenol as an example.

    (b) The elements belonging to f-block are placed at the bottom portion of periodic table. Give reason.   **(4 + 2)**

23. (a) Explain Saytzeff elimination with an example.

    (b) Discuss S_N2 mechanism taking Bromoethane as an example. What does S_N2 stand for?   **(2 + 4)**

24. (a) Explain the mechanism of nitration on benzene.

    (b) What is anti aromaticity?   **(4 + 2)**

25. (a) How are the following conversions carried out? Give chemical equations.

       (i) Naphthalene to phthalic anhydride

       (ii) Phenanthrene to phenanthraquinone

    (b) Draw the structures of trans and cis-stilbenes.   **(4 + 2)**