

**II Semester B.Sc. Examination, May/June 2018**  
**(CBCS) (2014-15 and Onwards) (F + R)**  
**CHEMISTRY – II**

Time : 3 Hours

Max. Marks : 70

- Instructions :**
- The question paper has **two Parts**. Answer **both Parts**.
  - Write equations, draw diagrams **wherever necessary**.

**PART – A**

I. Answer any eight of the following questions. (8×2=16)

- Write the values of quantum numbers for  $2s^1$  electron.
- Calculate the energy associated with Bohr's  $2^{nd}$  orbit, given the energy of Bohr's  $1^{st}$  orbit =  $-2.17 \times 10^{-18} \text{J}$ .
- What is the physical significance of  $\Psi$  and  $\Psi^2$ ?
- Define lattice energy.
- Write the electronic configuration of oxygen molecule using MOT.
- Give one example each of molecule having inter-molecular hydrogen bond and intramolecular hydrogen bonding.
- What are orthosilicates? Give an example.
- Mention any two applications of Neon.
- Calculate magnetic moment of  $\text{Fe}^{2+}$  ion (atomic number of iron = 26).
- Explain Ullmann reaction with an example.
- Write the cis and trans isomers of stilbene.
- Mention the ortho and one meta orienting group of benzene.

**PART – B**

II. Answer any nine of the following questions. (9×6=54)

- Explain the terms : (i) Hamiltonian operator (ii) Laplacean operator.
  - Write de Broglie's equation, explain the terms. (4+2)
- Derive an expression for the radius of  $n^{th}$  orbit of hydrogen atom.
  - Calculate the wavelength of a moving ball of mass 0.2 kg travelling with a velocity 150 m/s,  $h = 6.63 \times 10^{-34} \text{ Js}$ . (4+2)

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- 15) a) Derive Schrodinger's wave equation.  
b) Define the term orbital in an atom. (4+2)
- 16) a) Set up Born-Haber cycle for the formation of NaCl crystal, write the expression for lattice energy.  
b) How lattice energy affects the solubility of an ionic crystal ? (4+2)
- 17) a) Discuss the structure of  $\text{BrF}_3$  molecule based on VSEPR theory.  
b) Why is  $\text{H}_2\text{O}$  liquid and  $\text{H}_2\text{S}$  is a gas at room temperature ? (4+2)
- 18) a) Write the molecular orbital diagram of nitrogen molecule and calculate the bond order.  
b) What are polar molecules ? Give examples. (4+2)
- 19) a) What are transition elements ? Why they (i) Exhibit variable oxidation states (ii) Form complex salts.  
b) What are zeolites ? Mention one application. (4+2)
- 20) a) Describe the separation of lanthanides by ion exchange method.  
b) Why  $\text{Cu}^{2+}$  ion is coloured, while  $\text{Cu}^+$  ion is colourless. (4+2)
- 21) a) How is Helium isolated from natural gas ?  
b) Write the reaction of oxidation of toluene by chromyl chloride. (4+2)
- 22) a) Write the mechanism of nitration of benzene.  
b) State Huckel's rule of aromaticity. (4+2)
- 23) a) Explain mechanism of  $\text{S}_{\text{N}}1$  reaction with an example.  
b) Explain Birch reduction reaction. (4+2)
- 24) a) Elucidate the structure of benzene using molecular orbital theory.  
b) State Saytzeff rule, give an example. (4+2)
- 25) a) Explain mechanism of  $\text{E}_1$  (Elimination) reaction with a suitable example.  
b) Why vinyl chloride is less reactive than ethyl chloride ? (4+2)