CHE-203 - Physical Chemistry Paper-VII

P. Pages : 2   **GUG/S/18/5710**

Time : Three Hours

‖‖‖‖‖‖‖‖‖‖‖
* 1 7 3 0 *

Max. Marks : 80

_____

Notes : 1. All five questions are compulsory.
        2. Write equations & draw diagrams wherever necessary.

1. a) i) Discuss electronic configuration. Explain Russell Saunders terms & coupling schemes. **8**

     ii) Determine the term symbol for the ground state electronic configuration of Nitrogen $(z = 7)$.

   b) Apply & explain simple Huckel theory of conjugated system to cyclopropenyl system (Carbonium ion, Carbanion, radical) & Calculate it's charge density. **8**

<div align="center">**OR**</div>

   c) Explain the following terms. **4**
     i) Zeeman splitting.
     ii) Spin orbit coupling.

   d) Using LCAO for wave function for $H_2^{\oplus}$, obtain the normalised wave function for BMO & ABMO. **4**

   e) What are hybrid orbitals? Calculate coefficient of atomic orbitals used in SP^3 hybrid orbitals. **4**

   f) State & explain perturbation method with its application to helium atom. **4**

2. a) Explain the following methods to determine the value of activity & activity coefficient **8**
     i) Solubility Method.
     ii) E.M.F. method.

   b) Write the application of Bose-Einstein statistic to Helium. **8**

<div align="center">**OR**</div>

   c) State assumption of Debye-Huckel theory. **4**

   d) Define ionic strength. Calculate the ionic strength of the following **4**
     i) $BaCl_2$
     ii) Na_3PO_4

   e) What is entropy production? Obtain entropy production in coupled reaction. **4**

   f) Derive an expression for entropy of mixing and enthalpy change of mixing for non-ideal solution. **4**

3. a) Discuss briefly the types of defects found in crystals. **8**

b) Discuss thermodynamics of Frenkel and Schottky defects with suitable example. **8**

OR

c) What is the experimental procedure used to study the solid state reactions? **4**

d) Describe BCS theory. **4**

e) Write a note on non-stoichiometry defects. **4**

f) Write a note on high temperature superconductivity. **4**

4. a) Explain nuclear shell model. What are the evidences in favour of this model? Give the advantages of this model. **8**

b) What is neutron activation analysis? Explain in detail. **8**

OR

c) Discuss isotopic dilution analysis. **4**

d) Explain in short fermi gas model. **4**

e) Discuss ionisation chamber counter. **4**

f) Explain photonuclear reactions, with suitable examples. **4**

5. a) What are Slater-Condon parameters? **2**

b) Distinguish between bounding & antibonding molecular orbitals. **2**

c) Define exess Gibb's free energy. **2**

d) What is Lechatelier principle of chemical equilibrium. **2**

e) Write a note on Meissner effect. **2**

f) What are F-centres? **2**

g) What is radioactive equilibrium? **2**

h) What is the similarity between liquid drop & nucleus? **2**

****