

M.Sc.-I (Chemistry) (CBCS Pattern) Semester - II  
**PSCCHT07 - Physical Chemistry**

P. Pages : 2

Time : Three Hours



**GUG/S/23/11230**

Max. Marks : 80

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1. a) Solve the secular equation for ethylene molecule using Huckel molecular orbital theory. **8**  
b) Explain in details about MO theory applied to  $H^{2+}$  ion. **8**

**OR**

- c) Define hybridization and explain SP hybridization. **4**  
d) Explain spin orbit coupling. **4**  
e) Write a note on variation principle. **4**  
f) What is term separation energies for  $d^n$  configuration? **4**
2. a) Explain excess function for non-ideal solutions in details. **8**  
b) Explain Maxwell Boltzmann theory. **8**

**OR**

- c) Derive an expression for Stirling approximation. **4**  
d) Write a note on entropy production. **4**  
e) Discuss about enthalpy of mixing in details. **4**  
f) Explain Le Chatelier's principle in brief. **4**
3. a) i) Explain color centres in detail.  
ii) Distinguish between Schottky & Frenkel defects. **8**  
b) What are solid state reactions? Give their applications in details. **8**

**OR**

- c) Write short note on **4**  
i) Perfect crystal ii) Imperfect crystal.  
d) Explain why coprecipitation is a precursor to solid state reactions? **4**  
e) What is F-centre? Give its details. **4**  
f) What is doping of semiconductor? Explain N-type doping. **4**

4. a) Discuss about radiometric titration in details. 8  
b) Write a note on counters & explain the GM counter. 8

**OR**

- c) Write note on shell model. 4  
d) Give the application of NAA technique. 4  
e) Explain proportional counter. 4  
f) Explain terms 4  
i) Magic number  
ii) Radioactive decay
5. a) What is Zeeman splitting? 2  
b) Explain  $SP^2$  hybridization. 2  
c) Define ionic strength. 2  
d) Name the three statistics used in thermodynamics. 2  
e) What is line defect? 2  
f) Define p-n junction. 2  
g) What are thermonuclear reactions. 2  
h) Write down semiempirical mass equation. 2

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