



**National Officers Academy**  
**Mock Exams for CSS-2022**  
**January 2022 (Mock-7)**  
**CHEMISTRY, PAPER-I**

**TIME ALLOWED: THREE HOURS**  
**PART-I(MCQS): MAXIMUM 30 MINUTES**

**PART-I (MCQS)**  
**PART-II**

**MAXIMUM MARKS = 20**  
**MAXIMUM MARKS = 80**

**NOTE:**

- i. **Part-II** is to be attempted on the separate **Answer Book**.
- ii. Attempt **ONLY FOUR** questions from **PART-II**. **ALL** questions carry **EQUAL** marks.
- iii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
- iv. **Use of Calculator is allowed.**

**SUBJECTIVE PART — PART-II**

- Q. No. 2.** (a) Derive Schrodinger wave equation for a particle in 3-D. (10)  
(b) What are major drawbacks of Bohr model? (4)  
(c) Derive De Broglie equation. (6)
- Q. No. 3.** (a) Explain thermodynamic spontaneity and the parameters responsible for it. Prove it with relevant thermodynamic expressions. (12)  
(b) Give a brief account of transition state theory indicating its advantages over collision theory. (8)
- Q. No. 4.** (a) Apply valence bond theory to explain the formation of  $\text{CHCl}_2$ ,  $\text{CH}_4$  and hydrazine. (12)  
(b) Predict the shapes of following molecules by the aid of VSEPR theory. (8)  
 $\text{SF}_6$ ,  $\text{PCl}_5$ ,  $\text{PCl}_3$ ,  $\text{HCHO}$ ,  $\text{SbF}_3$ ,  $\text{HgCl}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{NH}_3$
- Q. No. 5.** (a) Discuss valence bond theory of coordination compounds in detail. (10)  
(b) Give a brief account of stereochemistry of coordination compounds. (6)  
(c) Discuss the effect of following parameters on chemical equilibrium. (4)  
(i) Temperature (ii) Concentration of reactants
- Q. No. 6.** (a) What is Lowry Bronsted concept? How it is different from Lewis's concept? (5)  
(b) How weak electrolytes deviate from Debye Huckel theory. (5)  
(c) Discuss Kirchhoff's rule and highlight its applicability. (10)

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*Best of Luck for CSS-2022*