FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2021
FOR RECRUITMENT TO POSTS IN BS-17
UNDER THE FEDERAL GOVERNMENT

Roll Number

CHEMISTRY, PAPER-I

TIME ALLOWED: THREE HOURS	**PART-I (MCQS) MAXIMUM MARKS = 20**
PART-I(MCQS): MAXIMUM 30 MINUTES	**PART-II 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) All the parts (if any) of each Question must be attempted at one place instead of at different places.
(iv) Write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.
(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
(vi) Extra attempt of any question or any part of the question will not be considered.
(vii) **Use of calculator is allowed.**

PART-II

Q. 2. **(a)** Explain applications of Schrodinger wave equation to hydrogen and hydrogen like Atom. (10)

(b) **(i)** Give Molecular interpretation of entropy. (05)
(ii) Explain factors affecting the rate of a chemical reactions. (05) (10) **(20)**

Q. 3. **(a)** What are the uses of chelates. (07)

(b) State and explain Nomenclature of coordination complexes. (07)

(c) Explain VBT (Valence Bond Theory) of coordination complexes in detail. (06) **(20)**

Q. 4. **(a)** Explain photoelectric effect and probability density. (10)

(b) **(i)** Explain Eigen function & Eigen value. (05)
(ii) Derive Schrödinger wave equation for a particle in one dimensional box. (05) (10) **(20)**

Q. 5. **(a)** Predict molecular shapes using Valence Shell Electron Pair Repulsion (VESPER) model. (10)

(b) **(i)** Explain the experimental techniques for determination of order of reaction. (05)
(ii) Write a note on thermochemistry and calorimetry. (05) (10) **(20)**

Q. 6. **(a)** Derive a relation for dependence of Gibbs free energy on temperature or Gibbs Helmholtz equation. (07)

(b) What is isothermal process? Explain work done in isothermal reversible expansion of an ideal gas. (07)

(c) Explain fugacity and activity. (06) **(20)**

Q. 7. **(a)** Discuss common ion effect and its industrial applications in detail. (08)

(b) Describe significance of pk_a, pk_b, pH. (06)

(c) Write a note on basic concepts of chemical equilibrium. (06) **(20)**

Q. 8. Write notes on the following:-

(i) Debye-Huckel theory. (07)

(ii) Nernst's equation. (07)

(iii) Electrochemical series. (06) **(20)**

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