FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2019
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)** Describe the assumption of Bohr's atomic model. Based on Bohr's calculation, establish the energy expression of the rotation of electrons in Hydrogen like atomic species. (8)
(b) Derive de-Broglie's equation for the dual nature of matter. Apply this equation for microscopic and macroscopic properties of substances. (6)
(c) What are the postulates of Quantum Mechanics? (6) **(20)**

Q. 3. **(a)** What is Third law of thermodynamics? How it is used to determine the entropies of substance. (7)
(b) Discuss the isothermal expansion of a gas and derive the equation for the work done due to expansion of a gas. (7)
(c) Explain the law of corresponding states. (6) **(20)**

Q. 4. **(a)** Deduce the rate expression for 2nd order reaction where both the concentration terms are same. What is the half-life period for the 2nd order reaction? (10)
(b) What is activation energy? How it can be determined? (5)
(c) Write a note on Transition state theory of reaction rates. (5) **(20)**

Q. 5. **(a)** Develop a relation among phase, component and degree of Freedom. Draw a complete diagram for water system. (10)
(b) What is catalysis? Differentiate between positive and negative catalysis. (6)
(c) What is stoichiometry? Explain it with help of examples. (4) **(20)**

Q. 6. **(a)** State and explain Lowry-Bronsted theory and Lewis theory of acids and bases. In what way Lewis theory differs from Bronsted theory. (8)
(b) Explain with the help of examples why pH of a buffer solution does not change significantly on small addition of acids and bases. (6)
(c) What are indicators? How a suitable indicator can be chosen? Discuss. (6) **(20)**

Q. 7. **(a)** Give an account of phenomena of isomerism in co-ordination compound with suitable example. (8)
(b) Describe the extraction of thorium from mozite sand. (6)
(c) Compare the properties of lanthanides and actinides? (6) **(20)**

Q. 8. **(a)** Explain Kohlrausch's Law? Give its applications. (7)
(b) What is meant by transport number of ions? Give different methods for determination of transport number. (7)
(c) What is specific conductance? How it can be determined by using Wheatstone bridge? (6) **(20)**

****