FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2017
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)   Candidate must 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 attempted question will not be considered.
  (vii)   **Use of Calculator is allowed.**

PART-II

Q. No. 2.   **(a)**   Derive Schrodinger wave equation for motion of a particle in one dimensional box.   **(10)**

       (b)   Solve Schrodinger wave equation to find the expression for wave function energy of a particle in one dimensional box.   **(6)**

       (c)   What is Eigen function and Eigen value? Give examples.   **(4)**

Q. No. 3.   **(a)**   Define heat capacities and molar heat capacities. Prove that $C_p - C_v = R$ for ideal gases.   **(10)**

       (b)   What is Gibbs energy? Derive a relation between standard Gibbs energy change and equilibrium constant.   **(6)**

       (c)   Differentiate spontaneous and non spontaneous process.   **(4)**

Q. No. 4.   **(a)**   State and explain Kohlrausch's law. Give its applications.   **(10)**

       (b)   What is meant by standard deviation? Give its significance in analytical chemistry.   **(6)**

       (c)   Briefly describe conductometric titrations.   **(4)**

Q. No. 5.   **(a)**   Discuss the effect of temperature on rate of chemical reaction on the basis of Arrhenius equation. How can you determine activation energy and pre-exponential factor for a chemical reaction using Arrhenius equation?   **(10)**

       (b)   Derive kinetic equation for 1st order reaction.   **(6)**

       (c)   Prove that half life period for 1st order reaction is independent of initial concentration of reactant.   **(4)**

Q. No. 6.   **(a)**   What is adsorption isotherm? Derive Langmuir adsorption isotherm for adsorption of a gas on solid surface.   **(10)**

       (b)   What is enzyme catalysis? Discuss its kinetics.   **(6)**

       (c)   What are surfactants? Give their properties.   **(4)**

Q. No. 7.   **(a)**   What is electrophoresis? Give its principle and discuss its applications in biochemistry.   **(10)**

       (b)   Give six chemical properties of nitrogen.   **(6)**

       (c)   What is Common ions effect? Give its applications.   **(4)**