



**FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2017
FOR RECRUITMENT TO POSTS IN BS-17
UNDER THE FEDERAL GOVERNMENT**

<u>Roll Number</u>

CHEMISTRY PAPER-I

TIME ALLOWED: THREE HOURS	PART-I (MCQS)	MAXIMUM MARKS = 20
PART-I(MCQS): MAXIMUM 30 MINUTES	PART-II	MAXIMUM MARKS = 80
<p>NOTE: (i) Part-II is to be attempted on the separate Answer Book.</p> <p>(ii) Attempt ONLY FOUR questions from PART-II. ALL questions carry EQUAL marks.</p> <p>(iii) All the parts (if any) of each Question must be attempted at one place instead of at different places.</p> <p>(iv) Candidate must write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.</p> <p>(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.</p> <p>(vi) Extra attempt of any question or any part of the attempted question will not be considered.</p> <p>(vii) Use of Calculator is allowed.</p>		

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)
- Q. No. 8.** (a) State John-Teller theorem. Explain it using suitable examples from coordination complexes. (10)
- (b) Give postulates of Werner's theory of coordination complexes. (6)
- (c) Briefly describe nuclear decay rate law for disintegration of radioactive elements. (4)
