

21(A)

**Khyber Pakhtunkhwa,  
Public Service Commission**

**Competitive Examination for the Posts of Provincial Management  
Services (BPS- 17) 2018**

**Chemistry Paper 1**

**Time Allowed: 3 Hours**

**Max Marks: 100**

**Note: Attempt any 5 questions. All questions carry equal marks.**

**Q1) a) Derive Schrodinger equation. What is wave function? What is its importance? [12]**

**b) What is photoelectric effect? How can you explain it with the help of quantum theory of light? [8]**

**Q2) a) What is meant by free energy of a system? How is it related with enthalpy and entropy of the system? [10]**

**b) State and explain the 1<sup>st</sup> law of thermodynamics? [10]**

**Q3) a) Write down the applications of soft and hard acid base concept. [10]**

**b) What are indicators? Discuss acid base and redox indicators. [10]**

**Q4) a) Explain why nitrogen cannot expand its octet but phosphorus can? [6]**

**b) Write a detailed note on oxyacids of phosphorous. [14]**

**Q5) a) What are transition metals? Discuss their characteristics features. [10]**

**b) What is crystal field splitting? What does it depend upon? How would you proceed to calculate crystal field stabilization energy of a complex? [10]**

**Q6) a) Explain the lead chamber process for the manufacture of sulfuric acid. Also draw the flow sheet diagram. [10]**

**b) Describe the composition of the Portland cement. Discuss the wet process for the manufacture of cement. [10]**

**Q7) a) What is water pollution? Discuss the primary sources of water pollution. [10]**

**b) How is copper extracted from its ores? Discuss the refining process of copper. [10]**

**Q8) Write notes on the following:**

**a) Photochemical smog [10]**

**b) Allotropes of carbon [10]**