



# UNIVERSITY OF THE PUNJAB

B.A. / B.Sc. Part - I  
Annual Examination - 2018

Roll No. ....

**TIME ALLOWED: 3 hrs.**  
**MAX. MARKS: 40**

**Subject: Chemistry-I**  
**PAPER: A (Physical Chemistry)**

**NOTE:** Attempt any two questions from each section including question No. 1 that is compulsory. All questions carry equal marks.

Q. 1 (a) Solve the following set of simultaneous equations 02

$$2x + 3y = 8$$

$$3x + 2y = 7$$

(b) Differentiate the following: 04

(i)  $\frac{3}{2}x^2$

(ii)  $\frac{2}{x}$

(c) Find the following indefinite integral 02

$$\frac{1}{(a-n)^3}$$

### Section-I

Q. 2. (a) What is meant by average, root mean square and most probable velocity of a gaseous molecule? What is ratio between different molecular velocities? 04

(b) Determine a relation between Vander Waals constant and critical constants. 02

(c) Oxygen at 1 atmosphere pressure and 0°C has a density of 1.4290 grams per litre. Find the RMS velocity of oxygen molecules. 02

Q. 3. (a) Derive a Kinetic expression for 1<sup>st</sup> order reaction. 03

(b) Give different methods for the measurement of order of reaction. 03

(c) Derive units for 2<sup>nd</sup> order reaction rate. 02

Q. 4. (a) Derive Clausius Clapeyron equation? Give its applications. 04

(b) Discuss entropy change due to mixing of ideal gases. 02

(c) Calculate the increase in entropy when one gram molecular weight of ice at 0°C melts to form water. Latent heat of fusion of ice = 80 calories. 02

Q. 5. (a) What is the co-efficient of viscosity of liquid? How is the viscosity of liquid is measured by Ostwald's viscosimeter? 04

(b) Discuss the heat capacities of solids. 02

(c) What is effect of temperature on surface tension of liquid? 02

### Section-II

Q. 6. (a) Derive the Schrodinger wave equation. 04

(b) Discuss dual nature of matter. 02

(c) Discuss Bohr's model and its defects. 02

Q. 7. (a) Explain Nerst's Distribution law. Give its application in chemistry. 04

(b) Discuss depression in freezing point graphically. 02

(c) Calculate the osmotic pressure of 5% solution of glucose (mol. wt. = 180). 02

Q. 8. (a) Discuss the applications of conductance measurement. 04

(b) What is molar conductance? Derive its units. 02

(c) What is cell constant? How it can be determined experimentally? 02

Q. 9. (a) Describe theories of catalysis. 04

(b) What is catalyst? Explain positive and negative catalyst. 02

(c) What is an isotherm? Give applications of Langmuir adsorption isotherm. 02



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PAPER: B (Inorganic Chemistry)

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MAX. MARKS: 40

**Note: Q. No. 1 is compulsory. Attempt four more questions by selecting at least two questions from each section I and II.**

**Q.1:** Answer the following:

- (i) Why  $O_2$  molecule is paramagnetic? (2 x 4 = 8)  
(ii) Calculate CFSE for  $d^6$  high spin as well as low spin system for octahedral geometry.  
(iii) Differentiate between inner and outer transition elements.  
(iv) Define the term co precipitation.

### Section I

- Q.2:** a). What is electronegativity? How does it change within the group? Also discuss Pauling's scale for estimation of relative electronegativity. (2 + 2 + 4 = 8)  
**Q.3:** a) Discuss some important applications of SHAB concept. (6)  
b) The cations of basic radical group II are precipitated as sulphides by passing  $H_2S$  gas in acidic medium. Comment the statement. (2)  
**Q.4:** What is Law of Mass action? Describe its application towards the solubility of a sparingly soluble salt with examples. (2, 6)  
**Q.5:** What is metallic bond? Describe different theories to explain the nature of metallic bond. (2 + 6 = 8)

### Section II

- Q.6:** What is basic principle of chromatography? Discuss application of thin layer chromatography in detail. (2 + 6 = 8)  
**Q.7:** What is Crystal field splitting phenomenon? Discuss it with reference to octahedral geometry. (2 + 6 = 8)  
**Q.8:** Discuss and compare the structures of following coordination compounds on the basis of MOT. (8)  
i.  $[Co(H_2O)_6]^{3+}$  ii.  $[Co(NH_3)_6]^{3+}$   
**Q.9:** What is radioactivity? Differentiate between natural and artificial radioactivity. (2 + 6 = 8)