

Reg. No. :

Name :

First Semester M.Sc. Degree Examination, December 2019

Chemistry/Polymer Chemistry

CH/CL/CM/CA/PC 213-PHYSICAL CHEMISTRY I

**(Common for Chemistry (2016 Admission Onwards)) and
Polymer Chemistry (2018 Admission Onwards)**

Time : 3 Hours

Max. Marks: 75

SECTION – A

Answer any **two** from a,b,c, of each question. Each question carries **2** marks.

1. (a) Calculate de Broglie wave length of mass 0.1gm moving with a velocity of 10 ms^{-1} .
(b) Explain uncertainty principle and its consequences.
(c) Define Hermitian operator.
2. (a) Discuss any one application of third law of thermodynamics.
(b) Explain the term fugacity.
(c) What are state functions? Explain with example.
3. (a) Explain the cleansing action of soap.
(b) Write any two examples for homogeneous catalysis.
(c) Give a brief account on enzyme catalysis.

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4. (a) Calculate the temperature at which the RMS velocity of nitrogen equals that of CO₂.
- (b) Discuss briefly the effect of temperature and pressure on transport properties of gases.
- (c) Give Radhich-Kwong equation. What are the limitations of this equation?
5. (a) Explain Taft's equation.
- (b) What are the factors that affect rate of a chemical reaction?
- (c) Define quantum yield.

(10 × 2 = 20 Marks)

SECTION – B

Answer **either (a) or (b)** of each question. Each question carries **5** marks.

6. (a) Distinguish between parallel and opposing reactions explain with suitable example.
- (b) Write the decomposition kinetics of acetaldehyde.
7. (a) Explain two methods for the determination of surface tension of liquids.
- (b) Explain the Virial equation of state and explain the terms.
8. (a) What is standard free energy of formation (ΔG) of Give its derivation.
- (b) Explain Clausius equation with derivation.
9. (a) Write any two methods for the determination of surface area.
- (b) Write the principle of photoelectron spectroscopy.
10. (a) Prove that eigen values of Hermitian operator are real.
- (b) Derive time dependent schrodinger equation.

(5 × 5 = 25 Marks)



SECTION – C

Answer any **three** questions. Each question carries **10** marks

11. Explain fast reaction and describe any two methods to study fast reaction kinetics.
 12. Discuss quantum mechanical aspect for a free particle in one dimensional box, What are application of Hermite polynomials. **(7+3)**
 13. Derive Gibb's Helmholtz equation and its applications.
 14. (a) Illustrate collision theory of reaction rates. What are the limitations of this theory?

(b) Discuss RRKM theory. **(5+5)**
 15. Discuss Maxwell's distribution of molecular velocities. Explain the various Maxwell's types of velocities. **(3 × 10 = 30 Marks)**
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