Reg. No. : ....

Name : ....

First Semester M.Sc. Degree Examination, August 2021

Chemistry / Polymer Chemistry

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

(Common for Chemistry (2016-2019 Admission) and Polymer Chemistry (2018-2019 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

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

1. (a) Give any four consequences of classical mechanics.

   (b) What is Laplacian operator?

   (c) Prove that position and momentum will not commute each other.

2. (a) Explain different types of surfaces.

   (b) Give the use of Langmuir adsorption isotherm.

   (c) What is physisorption?

3. (a) Explain Euler's relation.

   (b) What is fugacity? Give an expression for fugacity.

   (c) Discuss activity and activity coefficient.

4.   (a) Explain parallel reactions with example.

    (b) Discuss relaxation spectroscopy.

    (c) What is quantum yield?

5.   (a) Derive an expression for mean free path.

    (b) Explain dipole-dipole interaction.

    (c) Give the principle of drop weight method.

(10 × 2 = 20 Marks)

SECTION – B

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

6.   (a) Explain Hermitian operator and their properties.

    (b) Derive an expression for partition function in 1D box.

7.   (a) Discuss the principle and application of ESCA.

    (b) Explain the significance of BET and Harkins - Jura isotherms.

8.   (a) Derive Maxwell relations. Explain it.

    (b) Discuss the dependence of activity on temperature and pressure.

9.   (a) Explain the kinetics of $H_2–Cl_2$ reaction.

    (b) Write a note on Flash photolysis.

10. (a) Derive equation of state of a real gas.

    (b) Differentiate barometric method and dynamic method of measurement of vapour pressure of a liquid.

(5 × 5 = 25 Marks)

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SECTION – C

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

11. Give any five postulates of quantum mechanics and explain.

12. Explain the mechanism and theory of heterogeneous catalysis.

13. Discuss Gibb's Helmholtz equation and its application.

14. Explain theories of unimolecular reactions.

15. Write a note on quenching of fluorescence. Derive Stern-Volmer equation.

(3 × 10 = 30 Marks)

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