

Reg. No. :

Name :

Second Semester M.Sc. Degree Examination, May 2020

Branch : Chemistry/Polymer Chemistry

CH/CL/CM/CA/PC 223 : PHYSICAL CHEMISTRY — II

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

Time : 3 Hours

Max. Marks : 75

SECTION A

Answer any **two** sub-questions among (a), (b) or (c) from each question.

Each sub-question carries **2** marks.

1. (a) What are Cartesian coordinates?
(b) What are associated Legendre polynomials?
(c) Discuss the radial distribution functions of orbitals.
2. (a) What is meant by 'finger print region'? What is its significance?
(b) 'Raman spectroscopy is complimentary to IR spectroscopy'. Discuss.
(c) Discuss the Frank-Condon principle.
3. (a) What is the theory of non-equilibrium process?
(b) What is thermal diffusion?
(c) What is triple point? What is its importance?

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4. (a) Distinguish between canonical and grand canonical ensembles.
(b) What are super cooled liquids? What are their uses?
(c) What is thermionic emission?
5. (a) What are the limitations of Onsager equation?
(b) What is liquid - junction potential? How is it eliminated?
(c) What is the theory of over-voltage?

(10 × 2 = 20 Marks)

SECTION B

Answer either (a) or (b) of each question.

Each question carries **5** marks.

6. (a) Discuss the solution of phi equation of particle on a ring.
(b) Discuss the potential energy of Hydrogen like atom.
7. (a) Distinguish between rotational and vibrational Raman Spectroscopy.
(b) Briefly explain the instrumentation of FT-IR spectrometer.
8. (a) Describe the Glansdorf-Pregogine equation.
(b) Briefly describe the Onsager reciprocal relation.
9. (a) Explain Maxwell-Boltzmann distribution.
(b) Briefly explain Fermi-Dirac statistics.
10. (a) Distinguish between Lippmann and membrane potentials.
(b) Explain the Butler -Volmer equation.

(5 × 5 = 25 Marks)



SECTION C

Answer any **three** questions.

Each question carries **10** marks.

11. (a) Explain Laplace's spherical harmonics.
(b) Explain the Hartree-Fock equation. **5 + 5**
12. (a) Explain the classification of vibrational modes.
(b) Explain the applications of electronic spectra. **5 + 5**
13. (a) Explain the applications of irreversible thermodynamics.
(b) Construct the phase diagram of a three liquid component system. **5 + 5**
14. Explain the difference between Maxwell-Boltzmann and Bose-Einstein statistics.
15. (a) Explain the Debye-Huckel theory of strong electrolytes. **10**
(b) Give an account of various types of electrodes. **5 + 5**

(3 × 10 = 30 Marks)

