

Reg. No. :

Name :

Second Semester M.Sc. Degree Examination, September 2024
Chemistry/Analytical Chemistry/Polymer Chemistry/Chemistry With
Specialisation in Drug Design and Development
CH 223/CL 223/PC 223/CHDD 523 : PHYSICAL CHEMISTRY – II
(2020 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) Why is wave function important?
(b) What is spherical harmonics used for?
(c) What are anti-symmetric wave functions?
2. (a) What is Morse curve?
(b) What is the importance of mutual exclusion principle?
(c) What is the classical theory of Raman Effect?
3. (a) What is the basic principle of permutation in statistical thermodynamics?
(b) What is the importance of Maxwell Boltzmann distribution?
(c) Describe the Sackur-Tetrode equation.

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4. (a) Discuss the applications of thermionic emission.
(b) What is Kopp's law of heat capacity?
(c) Discuss the quantum theory of heat capacity.
5. (a) What are the properties of activity coefficients?
(b) What is qualitative verification of Debye Huckel limiting law?
(c) What are the advantages and disadvantages of solid oxide fuel cells?

(10 × 2 = 20 Marks)

SECTION – B

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

6. (a) Discuss the polar diagrams of spherical harmonics.
(b) What is the difference between angular wave function and radial wave function?
7. (a) What is Fortrat diagram? Discuss its use in electronic spectroscopy.
(b) What is a vibrational Raman spectrum? How is it differing from rotational Raman spectrum?
8. (a) What is meant by grand canonical ensemble? How is it differing from canonical ensemble?
(b) Explain the principle of equipartition of energy.
9. (a) What is the basic difference between Einstein and Debye theory?
(b) What is a distribution function in statistics?
10. (a) What is Debye Huckel-Onsager equation? How is it verified?
(b) What is Butler-Volmer equation? How is it differing from Tafel Equation.

(5 × 5 = 25 Marks)

SECTION – C

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

11. (a) Discuss the energies of hydrogen-like systems.
(b) Explain the spectral lines of hydrogen atom.
12. (a) Discuss the general vibration of polyatomic molecules.
(b) Explain the classification of vibrational modes of polyatomic molecules.
13. What are molecular partition functions? Explain rotational and vibrational partition functions.
14. (a) Explain Fermi-Dirac statistics.
(b) Differentiate between Maxwell-Boltzmann and Bose - Einstein statistics.
15. (a) Explain the instrumentation and applications of stripping voltammetry.
(b) What is the Principle behind Conductometric Titrations? What are its uses?

(3 × 10 = 30 Marks)
