10. (a) (i) Discuss the principle of Harmonic oscillator of vibrational spectra. (7)

(ii) Write a brief account on fermi resonance. (3)

Or

(b) Write a notes on the following

(i) Hot bands. (2)

(ii) Over tones and combination frequencies. (4)

(iii) Electronic spectra of diatomic molecule. (4)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

First Semester

Chemistry

PHYSICAL CHEMISTRY – I

(Common for M.Sc. Analytical Chemistry)

Time : Three hours   Maximum : 75 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

1. (a) Derive the relation between cp-cv.

Or

(b) Define the term chemical potential.

2. (a) State and explain arrhenius theory. Discuss its significances.

Or

(b) Give the comparison between collision theory and Activated complex theory.

3. (a) Write a notes on photo electric effect.

Or

(b) Discuss the postulates of quantum mechanics.

4. (a) Explain with suitable example of proper rotation.

Or

(b) Define and explain direct product representation.

5. (a) State and explain Einstein's theory of transistion probability.

Or

(b) State and explain Frank-Condon principle.

PART B — (5 × 10 = 50 marks)

Answer ALL questions.

6. (a) (i) Give the Maxwell's relations and thermodynamic equations of state. (6)

(ii) Discuss the applications of in the evaluation of cp-cv for solids. (4)

Or

(b) (i) How will you determine the chemical potential by direct method. (5)

(ii) How the chemical potential varies with pressure. Explain. (5)

7. (a) Explain with suitable mechanism of Hard-sphere collision theory of reaction rate.

Or

(b) Give the method of determination of the following:

(i) Free energy (4)

(ii) Enthalpy (3)

(iii) Entropy of Activation. (3)

8. (a) Write a brief account on

(i) Heisenberg's uncertainty principle. (4)

(ii) Hamiltonion operator. (6)

Or

(b) Derive schrodinger equation and its solution to the problem of a particle in Hormonic oscillator.

9. (a) (i) Explain with suitable examples of symmetry elements and symmetry operation. (7)

(ii) What is point group? Explain with suitable examples. (3)

Or

(b) (i) State and explain the great orthogonality theorem. and its consequences. (7)

(ii) Define the term reducible and irreducible representation. (3)