Unit IV

7. (a) What do you mean by the following terms ? Give brief idea of any *two*) :

(i) natural line width

(ii) intensity of spectral lines

(iii) resolving power.

(b) What kind of spectrum will you get for an anharmonic oscillator and how ? Also define zero point energy. **10,10**

8. (a) What are symmetric top molecules ? Considering one example, explore the rotational spectrum of such molecules under non-rigidity.

(b) Explore the vibrational spectra of a vibrating-rotator. What kind of information do we get from it ? **10,10**

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BB-293

M. Sc. EXAMINATION, Dec. 2017

(Second Semester)

(Re-appear Only)

CHEMISTRY

CH-506-B

Physical Chemistry-II (Kinetics, Quantum Mechanics and Spectroscopy)

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Log tables and single memory calculator may be used.

Unit I

1. (a) Give short note with examples on :

(i) Hermitian operator with example

(ii) Commutation relation of quantum mechanism operators.

(b) Define Heisenberg's uncertainty principle and give its proof. **10,10**

2. (a) Solve Schrodinger wave equation for a particle in three-dimensional box and give brief discussion of results obtained.

(b) Evaluate the expectation values of x, x^2 for a particle in one-dimensional box of length and show that the product of root mean square uncertainties in p and x is greater than $h/2\pi$. **10,10**

Unit II

3. (a) What are opposing reactions ? Discuss the kinetics of first order reactions when opposed by first order reactions. **10**

(b) Discuss activated complex theory and compare it with collision theory. **10**

4. (a) What are ionic reaction ? Give double-sphere model and also discuss its results. **10**

(b) How are second order rates affected by ionic strength ? **10**

Unit III

5. (a) What are chain reactions ? Explain the kinetics of reactions between H_2 and Br_2. **12**

(b) Explain kinetics of pyrolysis of acetaldehyde and hence give chain length. **8**

6. (a) Explain kinetics of fully competitive enzyme inhibition reactions. **10**

(b) What do you mean by branching chain reactions and upper and lower limits of explosion for H_2-O_2 reaction. **10**