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B.Sc. (Hons.) Chemistry (Semester – 6th)

PHYSICAL CHEMISTRY – V

Subject Code: BCHMS1-601

Paper ID: 19131636

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. State Heisenberg uncertainty principle and de Broglie equation.
- b. Give reasons for low quantum yield.
- c. What do you understand by zero-point energy?
- d. What are hot bands?
- e. Discuss commutation rules.
- f. What is Morse potential?
- g. How will you determine bond length of diatomic and linear triatomic molecules?
- h. Discuss chemiluminescence with example.
- i. What is Born Oppenheimer approximation?
- j. Describe Franck-Condon principle.

Section – B

(5 marks each)

- Q2. Derive Beer's Lambert law.
- Q3. State and explain laws of photochemistry.
- Q4. Separate Schrodinger wave equation for hydrogen like particles into the radial equation and angular equation.
- Q5. A ball of mass 1 g which is confined to a one-dimensional box of length 0.1m moves with a velocity of 0.01m/s. Calculate the quantum number n . Justify with proper reason whether it possible or not to observe the quantization of energy levels of the ball?
- Q6. Describe the phenomenon of photosensitization and quenching in detail.

Section – C

(10 marks each)

- Q7. Develop molecular orbital wave function for H_2^+ on the basis of LCAO approximation.
- Q8. Explain the ESR spectra of methyl radical and hydrogen atom.
- Q9. Discuss role of photochemical reactions in biochemical process.