Exam. Code : 210402
Subject Code : 4248

M.Sc. Chemistry 2nd Semester

COURSE–X PHYSICAL CHEMISTRY–QUANTUM CHEMISTRY

Time Allowed—3 Hours] [Maximum Marks—50

Note :— Attempt total **five** questions selecting at least one from each section.

SECTION—A

1. (a) Explain photoelectric effect. How it supported plank's concept ?

   (b) A line in the lyman series of hydrogen has a wavelength of 1.03×10^{-7} m. Find the original energy level of the electron. 6,4

2. Solve classical wave equation and discuss its relevance to quantum mechanics. 10

SECTION—B

3. (a) What are hermitian operators ? Why quantum mechanical operators are hermitian in nature ? Prove that two different Eigen functions of hermitian operators with different Eigen values are orthogonal in nature.

(b) Prove that Hamiltonian operator is hermitian in nature. 3,4

4. Write postulates of quantum mechanics. 10

SECTION—C

5. Write Schrodinger equation for rigid rotator and solve it for the energy and wave function. Describe the conclusions. 10

6. (a) What are ladder operators ? What is their importance?

(b) Prove that Eigen values of L^2 operator are 21+1 times degenerate. 2,8

SECTION—D

7. Explain perturbation approximation method including perturbation of second order. 10

8. Explain Huckel molecular orbital theory for conjugated molecules. How it is applied and what information can be extracted from the results. 10