

Exam. Code : 103206

Subject Code : 7023

B.A./B.Sc. 6th Semester (Old Syllabus 2018)

CHEMISTRY

(Physical Chemistry—IV)

Time Allowed—Three Hours] [Maximum Marks—35

Note :— (1) Part—A is compulsory. Each question carries 1 mark.

(2) Attempt **TWO** questions each from the Sections, I, II and III in Part—B. Each question carries 4.5 marks.

PART—A

1. Define Compton Effect.
2. Write Planck's radiation law.
3. Write quantum mechanical operator for z component of linear momentum.
4. Compare quantum mechanical solutions for simple harmonic oscillator and particle in one dimensional box.
5. To a good approximation, microwave spectrum of HCl consists of series of equally spaced lines separated by 6.26×10^{11} Hz. Calculate bond length of HCl.
6. Describe symmetry element glide plane.
7. Define Stark Einstein law.
8. What is difference between internal conversion and intersystem crossing ?

PART—B
SECTION—I

9. (a) Explain Bohr's model of hydrogen atom along with the defects.
(b) Explain photoelectric effect and its explanation.
10. (a) What is Hamiltonian operator ? Explain with at least two examples.
(b) What is expectation value ?
(c) Define wave function and give its significance.
11. (a) Write Schrödinger equation, wave function and energy of particle in three dimensional box.
(b) Explain degeneracy.

SECTION—II

12. What is zero point vibrational energy ? Explain with suitable derivation.
13. (a) What are spherical harmonics ?
(b) Solve Schrödinger equation for rigid rotator.
14. (a) Why s orbital is spherical in shape ?
(b) Draw radial and angular probability functions for 3s, 3p and 3d.

SECTION—III

15. (a) Define the two laws related to crystallography.
(b) Derive Bragg's law.
16. Describe determination of structure of KCl by powder method.
17. (a) Differentiate fluorescence and phosphorescence.
(b) What are photosensitized reactions ? Explain with appropriate example.