Exam. Code : 103206
Subject Code : 1394

B.A./B.Sc. Semester—VI

CHEMISTRY

(Physical Chemistry–IV)

Time Allowed—3 Hours] [Maximum Marks—35

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

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

PART—A

1. What is Hamiltonian Operator ? Give one example.
2. What are limitations of Bohr Theory ?
3. State and explain Heisenberg's uncertainty principle.
4. What are zero point energies of rigid rotator and harmonic oscillator ?
5. Draw radial and angular distribution functions for 2p.
6. Define unit cell.

7. Define quantum yield.

8. Draw crystal structure of NaCl.

PART—B

SECTION—I

9. (a) Give brief account of Compton Effect.

   (b) The threshold wavelength for potassium metal is 564 nm. What is the kinetic energy of electrons ejected if incident radiation of wavelength 410 nm is used ?

10. State and explain postulates of quantum mechanics.

11. What is separation of variables method ? Apply this to solve Schrodinger equation for particle in two dimensional box.

SECTION—II

12. Solve Schrodinger equation for simple harmonic oscillator and show that energy is quantized.

13. Write Schrodinger equation for rigid rotator and transform into spherical polar coordinates.

14. (a) Separate the Schrodinger equation for hydrogen atom into radial and angular parts.

   (b) The general solution of Φ part of Schrodinger equation of hydrogen atom is $\Phi(\varphi) = A \exp(im\varphi)$. Find the value of A.

SECTION—III

15. (a) Define the laws related to crystallography.

    (b) Derive Bragg's equation.

16. Draw Jablonski diagram depicting various processes occurring in excited state. Define all the processes.

17. (a) Compare thermal and photochemical processes.

    (b) What are photosensitized reactions ? Explain with minimum one example.