

# SYLLABUS

## Paper-XIX: PHYSICAL CHEMISTRY-A

Time: 3 Hrs.

Max. Marks: 22+3

30 Hrs. (2 Hrs/week)

3 Periods/week

### OBJECTIVE OF THE COURSE

To teach the fundamental concepts of Chemistry and their applications. The syllabus pertaining to B.Sc. (GENERAL) (Semester system) in the subject of Chemistry has been upgraded as per provision of the UGC module and demand of the academic environment. The course contents have been revised from time to time as per suggestions of the teachers of the Chemistry working in the Panjab University, Chandigarh and affiliated colleges. The syllabus contents are duly arranged unit wise and contents are included in such a manner so that due importance is given to requisite intellectual and laboratory skills.

#### UNIT - I

(8 Hrs.)

##### Elementary Quantum Mechanics-I:

Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect.

De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.

Schrodinger wave equation for H-atom, separation in to three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

#### UNIT - II

(7 Hrs.)

##### Elementary Quantum Mechanics-II:

Molecular orbital theory, basic ideas - criteria for forming M.O. from A.O., construction of M.O.'s by LCAO -  $H_2^+$  ion. Calculation of energy levels from wave functions, physical picture of bonding and antibonding, wave functions, concept of s, s\*, p, p\* orbitals and their characteristics. Hybrid orbitals - sp, sp<sup>2</sup>, sp<sup>3</sup>; calculation of coefficients of A.O.'s used in these hybrid orbitals.

Introduction to valence bond model of  $H_2$ , comparison of M.O. and V.B. models.

### UNIT - III

(8 Hrs.)

#### Photochemistry-I

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of Photochemistry: Grothus - Drapper law, Stark - Einstein law, Jablonski diagram depicting various processes occurring in the excited state.

### UNIT - IV

(7 Hrs.)

#### Photochemistry-II

Qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reaction - energy transfer process (simple examples). Photochemistry of carbonyl compounds and alkenes.

#### Instructions for paper setters and candidates:

- (i) Examiner will set total of NINE questions comprising TWO questions from each unit and ONE compulsory question of short answer type covering whole syllabi.
- (ii) The students are required to attempt FIVE questions in all, ONE question from each unit and the Compulsory question.
- (iii) Compulsory question carries six marks and remaining all questions carry four marks each.