

# **Syllabus for TO-B (3)**

## **Programming Languages**

- Programming in C
- Programming in C++
- Programming in Java
- Object Oriented Programming

## **Web Technologies**

- HTML Common tags
- Client-side Scripting
- World Wide Web (WWW)
- Cloud Computing and IoT

## **Database Management Systems:**

- Database System Concepts and Architecture
- Data Modeling
- SQL
- Normalization for Relational Databases
- Enhanced Data Models

## **Server Administration**

## **Software Engineering**

- Software Process Models
- Software Requirements
- Software Design
- Software Quality
- Software Testing
- Software Configuration Management

## **Data Communication and Computer Networks**

- Data Communication
- Computer Networks
- Network Models

## **System Software and Operating System**

- Basics of Operating Systems
- CPU Scheduling
- Deadlocks
- Storage Management
- File and Input/output Systems
- Security
- Virtual Machines

## **Data Structures and Algorithms**

- Data Structures
- Design Technique
- Graph Algorithms
- Advanced Algorithms

## Syllabus for TO-B(2)

### Fundamentals of Physical Chemistry:

- Thermodynamics: Chemical Thermodynamics, Molecular Thermodynamics.
- Quantum Chemistry
- Chemical Kinetics : Recapitulation, Theories of Reaction Rates

### Molecular Symmetry and Chemistry of Main Group Elements:

- Definitions and Theorems of Group Theory
- Molecular Symmetry and Symmetry Groups
- Representations of Groups
- Group Theory and Quantum Mechanics
- Symmetry Adapted Linear Combinations
- Molecular Orbital Theory
- Periodicity in Properties
- S Block Elements
- P Block Elements
- Organometallic Compounds

### Fundamentals of Organic Chemistry

- Structure and Reactivity
- Stereochemistry
- Substitution Reaction
- Aromatic Electrophilic Substitution
- Aromatic Nucleophilic Substitution
- Addition Reactions: Addition to C-C multiple bonds
- Elimination Reactions

### Good Laboratory Practices and Biomolecules:

- Good Laboratory Practices
- Biomolecules

### Advanced Physical Chemistry:

- Molecular spectroscopy
- Chemical bonding
- Nuclear and radiation Chemistry

### Coordination and Bioinorganic Chemistry:

- Ligand Field Theory of Coordination Complexes
- Electronic spectra of Transition Metal Complexes

- Magnetic Properties of Coordination Complexes
- Biochemistry of Porphyrins, Iron, Manganese & other metals in medicine

### **Synthetic Organic Chemistry and Spectroscopy:**

- Oxidation reactions
- Reduction reactions
- Rearrangements
- Photochemistry
- IR
- PMR
- Introduction to CMR and mass spectrometry
- Problems based on UV, IR and PMR

### **Modern Separation Methods and Chemometrics:**

- Modern Separation Methods and Hyphenated Techniques:
  - Mass Spectrometry Principle
  - Gas Chromatography
  - High Performance Liquid Chromatography (HPLC)
- Chemometrics
- Data Handling and Spreadsheets in Analytical Chemistry
- Quality in Analytical Chemistry

### **Advance Analytical Techniques**

- Electro-analytical technique
  - Coulometry
  - Polarography
  - Hydrodynamic voltametry
  - Pulse Polarography
  - Cyclic Voltammetry and Amperometry
- **Thermal Methods of Analysis**
  - Thermo gravimetric methods of analysis
  - Differential Thermal Analysis (DTA)
  - Differential Scanning Calorimetry (DSC)
  - Thermometric titrations and evolved gas analysis(EGA)
- **Atomic Spectroscopic Techniques**
  - Introduction to Optical Atomic Spectroscopic Analysis
  - Atomic Absorption Spectroscopy
  - Atomic Emission Spectrometry (AES)
  - Atomic Fluorescence Spectroscopy (AFS)
  - Atomic Mass Spectroscopy.

- Laser Based Techniques

## **Extraction Techniques and Metallurgy**

- Liquid-Liquid extraction (LLE)
- Solid Phase Extraction (SPE)
- Microwave Assisted and Supercritical Fluid Extraction
- Analysis of Ores and Alloys
- Metallurgy
- Analysis of Soil

## **Structure Determination by Analytical Methods**

- <sup>1</sup>H-NMR Spectroscopy
- <sup>13</sup>C NMR spectroscopy
- 2D NMR Techniques
- Mass Spectrometry

## **Chemistry of Natural Products and Chiron Approach**

- Total Synthesis of some important Natural products
- Biogenesis: The building blocks and construction mechanism of
- Chiron Approach
- Chiral Drugs

## **Analytical Spectroscopy**

- Electron Microscopy
  - Electron spectroscopy
  - Surface Characterization by spectroscopy and microscopy
  - X-ray Methods of Analysis
  - Chemiluminescence, Fluorescence and phosphorescence
  - Nuclear magnetic resonance spectroscopy:
    - <sup>1</sup>H- NMR
    - <sup>13</sup>C NMR
    - 2-D NMR
- Electron Paramagnetic Resonance Spectroscopy (EPR)

## **Advanced Synthetic Organic Chemistry:**

- Transition metal complexes in organic synthesis

## **Syllabus for TO-B (1)**

### **Fundamentals of Food & Nutrition**

- Classification of nutrients based on the chemical composition

### **Introduction to foods**

- Composition, Nutritive Value, Nutrient losses during Processing of commonly consumed Cereals, Millets, Pulses, and Legumes
- Toxic Constituents – Trypsin Inhibitors, Lathrogens, Favism, Haemagglutinins, Cyanogenic Glycoside, Saponins and Goitrogens
- Vegetables - Classification, Composition, and Nutritive Value, Changes during cooking, Loss of nutrients during cooking, Storage, and Factors affecting storage.

### **Nutrition through Lifecycle**

- Pre-Schoolers – Nutritional Requirement, Factors Affecting Nutritional Status
- School Going Child – Nutritional Requirement and School Lunch Programs
- Adolescence – Nutritional Requirement, Eating Disorders
- Adulthood – Nutritional Requirements for an Adult Man and Adult Woman
- Pregnancy – Physiological Changes, Increase in Nutritional Requirement, Complications of Pregnancy
- Lactation – Role of hormones in milk production, Increase in Nutritional Requirement and Lactogogues
- Infancy – Nutritional Requirement, Importance of Breastfeeding, Artificial Feeding (Comparison of various kinds of milk Vs Human Milk), Weaning and Supplementary Food
- Geriatrics – Nutritional Requirement, Physiological Changes, and Dietary Modification

### **Community Nutrition & Public Health Education**

- Principles of Community Nutrition
- Methods of Nutritional Assessment
- Epidemiology of Communicable Diseases
- Measures to Combat Malnutrition & Vital Statistics
- Nutrition Intervention Programs

## **Nutritional Biochemistry**

- Carbohydrates – Classification, Functions, Dietary sources, requirement, Digestion, and Absorption, Dietary fiber, glycemic load & index.
- Steps in Glycolysis, Tri Carboxylic acid Cycle.
- Basics of energy metabolism, nutrition & dietetics - Unit of measuring energy, the calorific value of food, BMR & factors affecting it
- Lipids - Classification, Functions, Dietary Sources, requirements, Digestion, and Absorption
- $\beta$ - Oxidation of Fatty Acids and biosynthesis
- Essential fatty acids
- Amino acids - Nutritional Significance, Classification – based on the nutritional requirement (essential, semi and non-essential amino acid) and Dietary Sources.
- Proteins - Classification – based on function, Functions, Dietary sources, Recommended Dietary Allowance, Deficiency, Digestion, and Absorption.
- Evaluation of Protein Quality-Protein Efficiency Ratio, Digestibility Coefficient, Biological Value, Net Protein Utilization, and Net Protein Ratio.
- Vitamins & Minerals - Classification, Functions, Dietary sources, requirements, Deficiency & Toxicity
- Water and Electrolyte Balance in the Body
- Acid-Base balance in the body

## **Human Physiology**

- Cell - Structure and function