Saurashtra University
Semester 1st Syllabus of Biochemistry(CBCS)
New Proposed Syllabus- June 2019
Biochemistry – 101
Physical and Chemical Aspects of Biochemistry

UNIT.I: Chemical Bond and Water [12 hours]

1. Concepts of Atoms and Molecules,

2. Chemical Bonds and their importance in structure of biomolecules: Ionic Bonds ,Covalent bond. Dipole moment and molecular structure. Weak chemical forces-hydrogen bond, inter and intramolecular hydrogen bonds, effects of hydrogen bonding, Van der Waals forces.

3. Electrophiles and Nucleophiles.

4. Water as a biological solvent, physical and chemical properties of water, importance of water for living organisms.

UNIT. II Introduction to Thermodynamics and Electrochemistry [12 hours]

1. Introduction to thermodynamic system

2. First and second law of thermodynamics, concept of free energy, standard free energy

3. High-energy compounds and their applications in biochemistry.

4. Introduction to Electrochemistry- Electrochemical Cells and Galvanic Cells

5. Nernst Equation: Derivation of Nernst equation , Application of Nernst equation

6. Oxidation and reduction, Redox potential and its role in biological reaction

UNIT. III: pH, Buffer and Physiological Buffers. [12 hours]

1. Properties of Acid and Base. Shapes of titration curves of strong and weak acids and bases. Meaning of k_a and pk_a values.

2. Concept of pH and pOH, numerical problems of pH

3. Methods to determine pH, pH meters- types of electrodes , principle and working of pH meter.

4. Buffers, buffer capacity and factors affecting buffering capacity,

5. Henderson– Hesselbalch equation, simple numerical problems involving application of this equation.

6. Physiological Buffers: Types and importance.

UNIT 4. Osmosis, Viscosity, Diffusion and Adsorption: [12 hours]

Basic principles, factors affecting, biological importance and applications of Osmosis, Viscosity , Diffusion and Adsorption in life sciences.

UNIT V: Solutions: [12 hours]

1. Mole concept , Normal , Molar , Molal and Percent Solutions.

2. Numerical problems. Stock, Working solutions .

3. Preparation of w/v, v/v and dilute solutions.

4. Concepts of Density and specific gravity

Biochemistry Practicals:101

Credit: 3 6 Hours / Week

1. Introduction to Basic Instruments used in Biochemistry laboratory- Microscope, Balance, Vortex mixer, Magnetic stirrer, Refrigerator, Water Distillation system, Water bath , Incubator , Hot air Oven.

2. Use, importance and cleaning of different types of glassware and auto pipettes and their calibration.

3. Principle and Use of pH meter.

4. Measuring and adjusting pH of given sample.

5. Preparation of different types of buffer solutions.

6. Preparation and Numerical problems on Normal Solutions.

7. Preparation and Numerical problems on Molar Solutions.

8. Preparation and Numerical problems on percent solutions and dilutions.

Reference Books:

1) Biochemistry by U. Satyanarayan

2) Physical biochemistry by Vanholde K.E., Practice Hall Inc. New Jersey.

3) Principles and techniques of practical biochemistry by K.Wilson and Walker, Cambridge University press.

4) Biophysical biochemistry by Upadhyay and Nath.

5) Tools of biochemistry by Cooper.

6) Outlines of biochemistry by Eric Conn., P.K.Stumpf. John Wiley and Sons.

7) Lehninger's Principles of Biochemistry by Nelson, David & Cox., Macmillan NY.

8) Fundamentals of Biochemistry by Donald Voet, Judith Voet and Charlotte Pratt. John Willey and Sons.

9) Biochemistry by LubertStryer, W.H.Freeman and Co.

10) Standard methods of biochemical analysis by S.R.Thimmaiah, Kalyani Publishers Delhi, India.

11) Instant Notes in Chemistry for Biologists by J.Fisher and J.R.P. Arnold.

12) Chemical Principles, the quest for insight by Atkins Jones

13) Biochemical Calculations by Irwin H. Segel.

14) Physical biochemistry by D.Frifelder, W.H.Freeman and Co.