

SARDAR PATEL UNIVERSITY
Programme: MSC (Integrated Biotechnology)
Semester: II
Syllabus with effect from: December 2010

Paper Code: PS02CIGB02	Total Credits: 3
Title Of Paper: Biophysical Chemistry	

Unit	Description in detail	Weightage (%)
1	<p>Ionic equilibria Structure and physical properties of water, distribution of body water, measurements of body water, hydrogen bonding, ionization of water, pH scale, acid-base concepts, Henderderson-Hasselbalch equation and its signification, Buffer solution, acid-base indicators, theory of indicator, acid-base titration and use of indicators, mathematical treatment of acid-base titrations.</p>	
2	<p>Thermodynamics Terminology of thermodynamics, First law of thermodynamics, internal energy, enthalpy of a system, heat capacity, spontaneous process, Second law of thermodynamics, concept of entropy, entropy of mixing, standard entropies, criteria for reversible and irreversible process, Gibbs-Helmholtz equation, Third law of thermodynamics, determination of absolute entropies of elements and compounds. Applications of first and second law of thermodynamics in living cells, chemical potential and equilibrium constant.</p>	
3	<p>Physical properties of liquids Surface tension : surface energy, factors affecting surface tension, interfacial tension, surface active agents, measurements of surface tensions. Viscosity: units of viscosity, factors affecting viscosity, measurement of viscosity, application of viscometer, significance of viscosity in biological system. Osmosis and osmotic pressure:Definitions of osmosis and osmotic pressure, semi permeable membrane, osmotic pressure and its measurement, molecular-kinetic approach to diffusion, methods of determination and significance of diffusion co-efficient, Van't-Hoff equation. Mechanism of the semipermeable membrane and of osmotic pressure, mechanism of respiratory exchange, osmotic behavior of cells, significance of osmosis in biology.</p>	
4	<p>Radioactivity and Isotopes Introduction to radioactivity, detection and measurements of radioactivity, radioactivity decay, important applications of radioactivity. Introduction of Isotopes, separation of isotopes, applications of radioisotopes in biology. Measurements of radioactivity by Geiger-Muller counter, photographic methods, liquid scintillation counting.</p>	
	Practical:	
	<ul style="list-style-type: none"> • Preparation of normal/molar solutions of acids and bases. • Estimation of Hardness of water by EDTA. • Determination of strong acid by titrating it against NaOH using phenolphthalein indicator • Determination of weak acid by titrating it against NaOH using phenolphthalein indicator. 	



	<ul style="list-style-type: none"> • To determine the amount of carbonate and bicarbonate in a given mixture by titrating it against sulphuric acid using phenolphthalein and methyl orange indicator. • To determine the concentration of a solution for the given liquid by determination of surface-tension of a liquid by drop-volume method at various concentration. • To determine the viscosity of the given liquid with the help of Ostwald's viscometer. • To determine the percentage composition of the given solution solution by Ostwald's viscometer. • To determine the molecular weight of given polymer using Ostwald's viscometer. • Determination of Pka value of amino acid (glycine). • Estimation of Ascorbic acid. • To determine effect of organic solvents on plant and animal cell permeability. 	
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Basic Text & Reference Books:

- Principles of Physical chemistry by B. R. Puri, L. R. Sharma and M. S. Pathania, 41th Ed.
- Biophysical chemistry, Principles and Techniques by Upadhyay, Upadhyay and Nath.
- Fundamentals of radiochemistry by D. D. Sood, A.V.R. Reddy, N. Ramamoorthy.
- Text Books of Biochemistry by Rana, Shinde and Chattergy.
- Elements of Physical Chemistry by S. Glasstone and D. Lewis.
- Analytical Chemistry by Subhash, satish and keemtilal, Vol III
- Lehninger's principles of biochemistry by David Nelson and Michel Cox.
- An advance course in practical Chemistry by Ghoshal , Mahapatra, Nad.

