Semester	**VI**
Course	**Minor 2**
Paper Title	**BIOPHYSICAL CHEMISTRY**
Paper Code	
No of Credits	4 (3+1)
Theory /Practical /Composite	Composite
Minimum No. of preparatory hours per week a student has to devote	3
Number of Modules	1
Syllabus	**THEORY:** **Unit-I: Buffer solution and its application:** Ionization of water, pH scale, Calculation of pH, Hydrolysis of salts, Buffer solutions, pH of buffer solutions, Buffer capacity, Buffer solution in biological systems, Acid-base titration. **Unit-II: Thermodynamics and its application in Biology:** First and second law of thermodynamics, Concept of entropy, enthalpy and free energy, Criteria for reversible and irreversible processes, Gibbs-Helmholtz equation, Applications of first and second law of thermodynamics in living cells, Chemical potential and equilibrium constant, Thermodynamics of protein folding/stability. **Unit-III: Spectroscopic Techniques:** Absorption and emission spectroscopy, Lambert-Beer Law. UV-Vis spectroscopy, Fluorescence spectroscopy, Circular dichroism (CD), Infrared (IR) spectroscopy and their applications in studying biological molecules. **Unit-IV: Chromatographic Techniques:** Principle of chromatography. Paper chromatography, Thin layer chromatography, Size exclusion, Ion exchange and Affinity chromatography, HPLC and FPLC, Gel Electrophoresis. **PRACTICAL:** 1. Preparation of normal/molar solutions 2. Titration of strong acid against NaOH using phenolphthalein indicator 3. Titration of weak acid against NaOH using phenolphthalein indicator 4. Estimation of total quantity of amino nitrogen 5. Preparation of phosphate buffer 6. Paper chromatography 7. Thin layer chromatography 8. Estimation of protein by Biuret method

Learning Outcomes	1. To introduce students to the application of buffer solution and its importance in biological system. 2. To enable students to understand basic thermodynamic principles and application to biological systems 3. To enable students to understand the principles of chromatography and its application. 4. To introduce students to the principles of spectroscopy including absorption, linear and circular dichroism and its application. 5. To provide an overview of various technical methods which have useful applications in Biotechnology	
Reading / Reference List	1. Biophysical Chemistry, Principles and Techniques by Upadhyay, Upadhyay and Nath. 2. P. C. Rakshit, Physical Chemistry, Sarat Book House, Revised & enlarged 7th edition, 2014. 3. Banwell, C N. and McCash, E. M. (1994) Fundamentals of Molecular Spectroscopy. 4th Edition, McGrawHill. 4. David T Plummer – An Introduction to Practical Biochemistry	
Evaluation	**Theory** CIA- 10 Assignment – 02 Attendance - 03 Semester Exam- 45	**Practical** CA- 30 Attendance - 02 Semester Exam- 08
Paper Structure for Theory Semester Exam	1. Compulsory question of 5 marks 2. Questions of 10 marks each (Any 4 out of 6 questions) [No subpart will be less than 1 mark, not more than 5 marks]	