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| Semester | III |
| Course ^{*1} | SEC-1 |
| Paper Code | S2BT230311T |
| Paper Title | Biophysical Methods and Bioinorganic Chemistry |
| No. of Credits ^{*2} | 3 |
| Theory / Practical / Composite | Theory |
| Minimum No. of preparatory hours per week a student has to devote | 3 |
| Number of Modules | 1 |
| Syllabus | <p>UNIT I: Buffer solution and its application: Ionic product of water, pH scale, Calculation of pH for strong acid, strong base, weak acid and weak base. Hydrolysis of salt - calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions, pH of buffer solutions, Henderson Hasselbalch equation, Buffer capacity, Buffer solution in biological systems, Regulations of Bicarbonate buffer, pH meter.</p> <p>UNIT II: Chromatography: Introduction to the principle of chromatography. Paper chromatography, Thin layer chromatography, Column chromatography: silica and gel filtration, affinity and ion exchange chromatography, HPLC. Principles of Gel Electrophoresis. Overview of sedimentation and density gradient techniques.</p> <p>UNIT III: Spectroscopy: Absorption and emission spectroscopy, Lambert-Beer Law, Spectrophotometry (UV, visible, infrared), colorimetry, fluorimetry.</p> <p>Unit IV: Bioinorganic Chemistry: A brief introduction to Bioinorganic Chemistry, Elements of life, Classification of elements according to their action in biological system, Role of metal ions present in biological systems (Na⁺, K⁺, Ca²⁺, Mg²⁺, Fe³⁺/Fe²⁺, Cu²⁺/Cu⁺, Zn²⁺). Oxygen carrying proteins - structure and physiological role of haemoglobin and myoglobin. Electron transport proteins- iron-sulfur proteins and cytochromes. Redox enzymes- Fe, Cu, Zn-containing redox enzymes. Hydrolytic enzymes- carboxypeptidase A, carbonic anhydrase. Phosphate transfer and metabolic energy.</p> |
| Learning Outcomes ^{*3} | <ol style="list-style-type: none"> 1. introduce students to the application of buffer solution and its importance in biological system. 2. enable students to understand the principles of chromatography and its application. |

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| | <p>3. provide an overview of various technical methods which have useful applications in Biotechnology.</p> <p>4. introduce students to the principles of spectroscopy and its application.</p> <p>5. provide a knowledge of Bioinorganic Chemistry and its application.</p> |
| Reading/Reference Lists *4 | <p>1. P. S. Kalsi, Spectroscopy of Organic Compounds.</p> <p>2. C. N. Banwell & E. M. McCash, Fundamentals of Molecular Spectroscopy.</p> <p>3. Lehninger, Principles of Biochemistry.</p> <p>4. R. P. Sarkar, General and Inorganic Chemistry.</p> <p>5. Asim K. Das, Bioinorganic Chemistry.</p> |
| Evaluation | <p>Theory (50)</p> <p>CIA- 10 Seminar/Assignment/Any other form – 03 Attendance - 02 Semester Exam- 35</p> |
| Paper Structure for Theory Semester Exam | <p>Compulsory objective questions: $1 \times 5 = 5$ marks Any three out of four questions: Each of 10 marks with subparts [No sub-part will be more than 5 marks]</p> |