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| G:\PRGC Logo Latest.png | **Pithapur Rajah’s Government College (Autonomous)Kakinada** | **Program &Semester**  **I B.Sc**  **Semester -I** | | | |
| Course Code | **Bio-molecules &Analytical Techniques** |
| Teaching | **Hours Allocated: 60**  **(Theory)** | **L** | **T** | **P** | **C** |
| Pre-requisites: |  | 3 | 1 | - | 4 |

**Course Objectives:**

To ensure students gain knowledge about the structure, properties and functions of bio molecules and characterization of bimolecular using analytical techniques

**Course Outcomes:**

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| --- | --- |
| On Completion of the course, the students will be able to- | |
| CO1 | Impart complete knowledge about structure and function of different biomolecules  (Proteins, lipids, nucleic acids, and carbohydrates) found in living cells. |
| CO2 | Impart knowledge on enzyme activity. |
| CO3 | Course will impart knowledge on the principle, working, maintain and calibrations of  Bio analytical tools and techniques for industrial and research purpose. |
| CO4 | Imparts knowledge on radio isotopes and their role in biology |

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| Skill Development |  |  | Employability |  |  | Entrepreneurship |  |

**Syllabus:**

**UNIT-I:**

**Scope of Biotechnology and Biomolecules**

1.1 Scope of Biotechnology, Biotechnology as a branch of Science and Opportunities.

1.2 Classification, structure, properties of Carbohydrates.

1.3 Classification, structure and properties of amino acids. Peptide bond. Structure (primary, secondary, tertiary, quaternary) of Proteins.

1.4 Denaturation and Renaturation of Proteins.

1.5 Classification structure and properties of saturated and unsaturated fatty acids.

Structure and functions of glycolipids, phospholipids, and cholesterol.

**UNIT-II:**

**Nucleic acid & Bioenergetics:**

2.1 Structure and functions of DNA and RNA

2.2 Watson Crick model of DNA.

2.3 Types of DNA

2.4 Free energy, entropy, enthalpy and redox potential

2.5 High energy compounds.

**UNIT-III:**

**Centrifugation and Chromatography:**

**3.1** Basic principles of sedimentation – RCF, Types of rotors.

**3.2** Types of centrifugations **-** differential and Density gradient Centrifugation.

**3.3** Principle, instrumentation and application of partition, absorption chromatography

**3.4** Paper chromatography, thin layer chromatography.

**3.5** Ion exchange, gel permeation and affinity chromatography.

**UNIT-IV:**

**Spectroscopy and Electrophoresis**

**4.1** Beer-Lambert law, light absorption and transmission. Extinction coefficient, Design and application of photoelectric colorimeter. UV-visible spectrophotometer.

**4.2** Basic principles and types of electrophoresis. Factors affecting electrophoretic migration.

**4.3** PAGE (Native, SDS-PAGE)

**4.4** Principles of microscopy, Electron microscopy - TEM, SEM

**4.5** Introduction to radioisotopes, measurement of radioactivity - GM Counter

**UNIT – V**

**Biostatistics:**

**5.1** Mean, median, mode.

**5.2** Standard deviation.

**5.3** ANOVA - One-way A.

**5.4** F-test**.**

**5.5** chi-square test.

**:**

**Textbooks**

1. Enzymes: Biochemistry, Biotechnology & Clinical chemistry, (2001), Palmer Trevor, Publisher: Horwood Pub. Co., England.
2. Biophysical Chemistry Principles & Techniques Handbook, (2003), A. Upadhyay, K. Upadhyay, and N. Nath.

**:**

**Referencebooks**

1. Principles of Biochemistry, 5th Edition (2008), Lehninger, David Nelson & MichaelCox; W.H. Freeman and Company, NYPrinciples of Biochemistry, 4th edition, (1997), Jeffory Zubey; McGraw-Hill College, USA
2. Fundamentals of Biochemistry, 3rd Edition (2008), Donald Voet & Judith Voet; John Wiley and Sons, Inc. USA
3. Biochemistry, 7th Edition, (2012), Jeremy Berg & Lubert Stryer; W.H.Freeman and Company, NY

**WebLinks:**

**CO-PO Mapping:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | **3** | **2** | **3** | **3** | **1** | **2** | **3** | **2** | **1** | **3** | **1** | **2** |
| CO2 | **3** | **2** | **3** | **3** | **2** | **3** | **3** | **2** | **2** | **3** | **2** | **2** |
| CO3 | **2** | **3** | **2** | **2** | **3** | **3** | **2** | **3** | **2** | **2** | **3** | **2** |
| CO4 | **3** | **2** | **3** | **3** | **2** | **2** | **3** | **2** | **2** | **1** | **2** | **3** |

**(1:Slight[Low] 2: Moderate[Medium]; 3: Substantial[High]:No Correlation)**

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| Course Code | **Bio-molecules &Analytical Techniques** |
| Teaching | **Hours Allocated: 60**  **(Lab)** | **L** | **T** | **P** | **C** |
| Pre-requisites: |  | - | - | 2 | 1 |

**Course 1: Bio-molecules & Analytical Techniques Lab**

**Total Hours: 30 Credits: 1**

**Details of Lab/Practical/Experiments/Tutorials syllabus**:

1. Introduction to basic instruments (Principle standard operation procedure) demonstration and record.

2. Calculation of molarity, normality and molecular weight of compounds.

3. Qualitative analysis of carbohydrates (sugars)

4. Quantitative analysis of carbohydrates.

5. Quantitative estimation of protein - Lowery method.

6. Estimation of DNA by diphenylamine reagent.

7. Estimation of RNA by orcinol reagent.

8. Assay of protease activity.

9. Preparation of starch from potato and its hydrolyze by salivary amylase

10. Preparation of standard buffer and pH determination.

11. Separation of amino acids by paper chromatography

12. Separation of lipids of TLC

13. Agarose gel electrophoresis

14. Calculation of mean, median and mode.