

LS401- Biochemistry-I

2-credits

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| Sl. No. | Topic | Faculty | No. of Lectures |
|---------|--|---------|-----------------|
| 1. | History of Biochemistry. Evolution of the concept of the applicability of basic laws of chemistry and thermodynamics in cell function. Concept of molecular interactions and its importance in understanding cellular processes. | VY | 2 |
| 2. | Structure of amino acids, peptide bonds, Ramachandran Plot, alpha helical and beta pleated structures-I | VY | 1 |
| 3. | Structure of amino acids, peptide bonds, Ramachandran Plot, alpha helical and beta pleated structures-II | VY | 1 |
| 4. | Motifs, domains, super secondary structures of proteins. Classification of proteins based on the structures like Zn finger, lucine zipper proteins. Functional relationship between domains and function of proteins. | VY | 2 |
| 5. | Structures of fibrous proteins like collagen, keratin, and elastin. | VY | 1 |
| 6. | Structure of hemoglobin, oxygen binding properties and its relation to its structure mechanisms of cooperability in oxygen binding. | VY | 2 |
| 7. | Evolution of haemoglobin and myoglobin and their differences. Hemoglobin structure and its physiological functions as an oxygen transporter. | VY | 2 |
| 8. | Isolation and purification of proteins by various conventional and advance methods. | VY | 1 |
| 9. | Basic concepts of protein folding and stability, folding pathways, role of accessory proteins in protein folding. | VY | 2 |

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| 10. | Monosaccharides and derivatives of sugars, polysaccharides, glycosaminoglycans, proteoglycans, protein glycosylation and its significance | SLP | 2 |
| 11. | Fatty acids, triacylglycerols, glycerophospholipids, sphingolipids, cholesterol lipid bilayers | SLP | 1 |
| 12. | Biological membranes, integral membrane proteins, lipoproteins and trafficking through membrane | SLP | 1 |
| 13. | Protein structure and function: enzyme functions, specificity of Enzymes, Induced fit model of enzyme function, Electronic and geometrical compatibility. | SLP | 1 |
| 14. | Enzyme catalysis, specificity of enzyme action, coenzymes and Vitamins, Factors affecting enzymes activities, feedback and allosteric inhibition | SLP | 2 |
| 15. | Chemical kinetics and order of reactions, Michaelis and Menten equation, V_{max} and Michaelis constant | SLP | 2 |
| 16. | Competitive and uncompetitive inhibition, bisubstrate reaction | SLP | 1 |
| 17. | Mechanisms of acid base, covalent, metal ion catalysis, Mechanisms of actions of seine proteases, glutathione reductases | SLP | 1 |
| 18. | Biochemical problems | SLP | 1 |

Suggested reading:

1. Biochemistry by Jeremy Berg, John Tymoczko and Lubert Stryer
2. Biochemistry by Donald J. Voet and Judith G. Voet
3. Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox