

SEMESTER-II
CORE COURSE DCS -2
THEORY-II
BIOLOGICAL CHEMISTRY AND MICROBIOLOGY

Unit 1: Biomolecules

- 1.1. Carbohydrates- importance, classification; structure and functions of monosaccharides (glucose & fructose), disaccharides (sucrose, lactose & maltose) and polysaccharides (starch, glycogen & insulin)
- 1.2. Amino acids- importance, classification, structure, physical and chemical properties of amino acids; peptide bond formation
- 1.3. Proteins- importance, structure of proteins- primary, secondary, tertiary and quaternary
- 1.4. Lipids- importance, classification- simple lipids (triacylglycerides & waxes), complex lipids (phospholipids & glycolipids), derived lipids (steroids, terpenes & carotenoids)
- 1.5. Nucleic acids :structure and chemistry of DNA (Watson and crick) and RNA(TMV)
Structure and forms of DNA (A, B and Z)
- 1.6. Enzymes- importance, classification and nomenclature; Michaelis-Menton Equation, factors influencing the enzyme reactions; enzyme inhibition (competitive, uncompetitive & mixed), co-enzymes

Unit 2: Bioenergetics

- 2.1 Glycolysis, Tricarboxylic Acid (TCA) Cycle,
- 2.2 Electron Transport, Oxidative Phosphorylation
- 2.3 Gluconeogenesis and its significance
- 2.4 Transamination and Oxidative deamination reactions of amino acids
- 2.5 B-Oxidation of Fatty acids
- 2.6 Glyoxalate cycle.

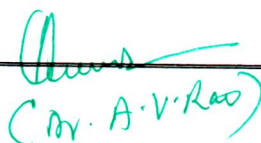
Unit 3 : Fundamentals of Microbiology

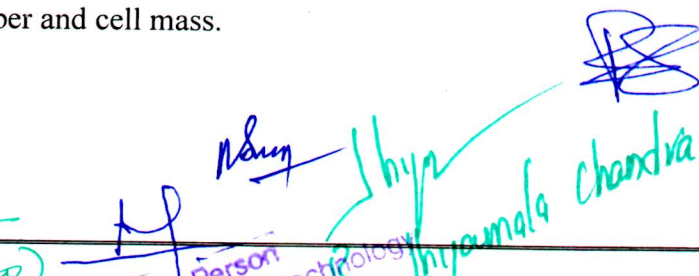
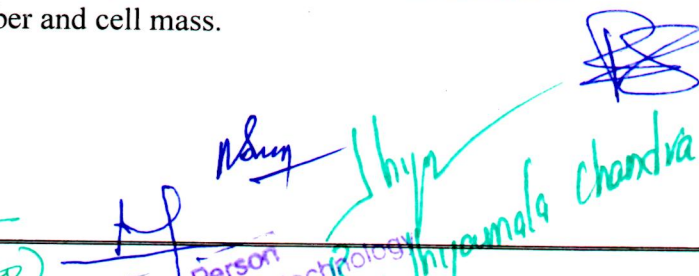
- 3.1 Historical development of microbiology and contributors of microbiology
- 3.2 Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, Flourescent microscopy, Scanning and Transmission electron microscopy
- 3.3 Outlines of classification of microorganisms
- 3.4 Structure and general characteristics of bacteria and virus
- 3.5 Disease causing pathogens and symptoms (Eg: *Mycobacterium*, *Hepatitis*)
- 3.6 Structure and general characteristics of micro-algae and fungi

Unit 4: Culture and identification of microorganisms

- 4.1 Methods of sterilization- physical and chemical methods
- 4.2 Bacterial nutrition nutritional types of bacteria, essential macro micro nutrients and growth factors.
- 4.3 Bacterial growth curve-batch and continuous cultures, synchronous cultures measurement of bacterial growth-measurement of cell number and cell mass.
- 4.4 Factors affecting bacterial growth
- 4.5 Culturing of anaerobic bacteria and viruses
- 4.6 Pure cultures and its characteristics


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PRACTICALS

BS306: BIOCHEMISTRY AND MICROBIOLOGY

1. Preparation of normal molar, molal solutions.
2. Preparation of buffers (acidic, basic ,neutral)
3. Qualitative tests of sugars, amino acids and lipids
4. Estimation of total sugars by anthrone method
5. Separation of amino acids by paper chromatography
6. Estimation of proteins by biuret method
7. Sterilization methods
8. Preparation of microbiological media (bacterial, algal & fungal)
9. Isolation of bacteria by streak, spread and pour plate methods
10. Isolation of bacteria from soil
11. Simple staining and differential staining (gram's staining)
12. Bacterial growth curve
13. Technique of micrometry(ocular and stage)

Spotters:

1. Osazone
2. Globular protein
3. Lock and key model
4. Compleitive inhibition
5. RUBISCO
6. ATP synthase
7. Autoclave
8. Laminar air flow
9. Tyndalization
10. Bacterial growth curve
11. Hot air oven
12. Serial dilution technique

REFERENCE BOOKS

1. Lehninger Principles of Biochemistry By: David L. Nelson and Cox
2. Biochemistry By: Rex Montgomery
3. Harper's Biochemistry By: Robert K. Murray
4. Enzymes By: Trevor Palmer
5. Enzyme structure and mechanism By: AlanFersht
6. Principles of Biochemistry By: Donald J. Voet, Judith G.Voet, Charlotte W.Pratt
7. Analytical Biochemistry By: Cooper
8. Principles and techniques of Biochemistry and Molecular Biology Edited By: Keith Wilson and John Walker
9. Experimental Biochemistry: A Student Companion by: Sashidhar Beedu et al.
10. Practical Biochemistry By: Plummer
11. Biology of Microorganisms by: Brock, T.D. and Madigan, M.T.
12. Microbiology by: Prescott, L.M., Harley, J.P. Klein, D.A.
13. Microbiology by: Pelczar, M.J, Chan, E.C.S., Ereig, N.R.
14. Microbiological applications by: Benson