

Sri Satya Sai University of Technology & Medical Sciences,
Sehore (M.P.)

Faculty of Science
Sixth Semester - Bachelor of Science (MICROBIOLOGY)

SUBJECT: CHEMISTRY

CODE: BSCMB-601A

UNIT-I

A. Amino acids: Classification, structure, stereochemistry of amino acids, acid base behaviour, isoelectric point, general methods of preparation and properties of α -amino acids. Proteins and peptides. Introduction to peptide linkage, end group analysis, classification, properties and structure of proteins (primary, secondary and tertiary).

B. Elementary idea of Fats, Oils & Detergents: Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils, Saponification value, iodine value, acid value.

UNIT –II

A. Organometallic Chemistry: Synthesis; structure and bonding in metal carbonyl complexes, metal olefin complexes and metal alkyne complexes. Oxidative addition reactions.

B. Organometallic Compounds: Organ magnesium Compound - Grignard Reagent and Organ lithium Compounds, methods of preparation, structure and synthetic applications.

UNIT –III

A. Magnetic properties of transition metal complexes: magnetic moment (spin only and with L-S coupling), orbital contribution magnetic moment.

B. Electronic spectra of transition metal complexes: Spectroscopic ground and excited states, types of electronic transitions, selection rules for transitions, Orgel-energy level diagram for $d1$ to $d9$ states.

C. Water Analysis: Hardness, types of hardness, acidity and alkalinity, BOD, COD and DO.

UNIT-IV

A. Infrared spectroscopy: Statement of the Born-Oppenheimer approximation, rotational spectrum of diatomic molecules. Energy levels of a rigid rotator, selection rule, intensity of absorption bands, Maxwell- Boltzmann distribution and population of energy levels.

B. Raman Spectroscopy: concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules. Selection rules, application of Raman spectrum.

UNIT-V

A. NMR Spectroscopy Principle and Instrumentation, NMR active nucleus, chemical shift, spin-spin coupling, spectrum of ethanol and ethanal.

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B. Surface Phenomena and Catalysis: adsorption of gases and liquids on solid adsorbent, Freundlich and Langmuir adsorption isotherms, determination of surface area, characteristics and mechanism of heterogeneous catalysis.

Recommended Books

1. Physical Chemistry-Puri, Sharma and Pathania, Vikas Publications, New Delhi
2. Physical Chemistry -G.M. Barrow, International Student Edition, McGraw Hill.
3. The Elements of Physical Chemistry, P.W. Atkins, Oxford University Press
4. Organic Chemistry, Morrison and Boyd, Prentice Hall.
5. Organic Chemistry, L.G. Wade Jr. Prentice Hall
6. Fundamentals of Organic Chemistry Solomons, John Wiley.
7. Inorganic Chemistry – J.D. Lee, John Wiley
8. Inorganic Chemistry – Cotton and Wilkinson, John Wiley

B.Sc. Semester VI CHEMISTRY Paper: Practical

Organic Chemistry Binary mixture analysis containing two solids: Separation, identification and Preparation of derivatives.

A. Physical Instrumentation

- (i) Job's Method
- (ii) Mole-ratio method

B. Inorganic Chemistry

- (i). Effluent Analysis Identification of cations and anions in different water samples.
- (ii). Water analysis to determine the amount of dissolved oxygen in water samples in ppm units.
- (iii) Determination of Hardness of Water

Faculty of Science Sixth Semester - Bachelor of Science (MICRO Biology) SUBJECT: BOTANY

Sri Satya Sai University of Technology & Medical Sciences,
Sehore (M.P.)

CODE: BSCMB-602A

UNIT I

Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and dominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropic, Recessive and Dominant traits, Penetrance and Expressivity, Numerical; Polygenic inheritance

UNIT II

Extrachromosomal Inheritance: Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast; Maternal effects-shell coiling in snail; Infective heredity-Kappa particles in Paramecium

UNIT III

Linkage, crossing over and chromosome mapping, Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.

UNIT IV

Variation in chromosome number and structure, Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy

UNIT V

Gene mutations, Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: ClB method. Role of Transposons in mutation. DNA repair mechanisms

Suggested readings:

- 1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons, India. 8th edition**
- 2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition**
- 3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. Benjamin Cummings, U.S.A. 10th edition**
- 4. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th e**

**SUBJECT: BOTANY
PRACTICAL**

1: Meiosis through temporary squash preparation

2. Mendel's laws through seed ratios.

Laboratory exercises in probability and chi-square analysis

3. Chromosome mapping using test cross data.

4. Pedigree analysis for dominant and recessive autosomal and sex linked traits

5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)

6. Blood Typing: ABO groups & Rh factor

7. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes

8. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.

9. Study of human genetic traits: Sickle cell anemia, XerodermaPigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe.

Faculty of Science
Sixth Semester - Bachelor of Science (MICRO Biology)
SUBJECT: MICROBIOLOGY
Paper: Industrial Microbiology

CODE: BSCMB-603C

UNIT-I

Production of alcohol, wine, beer, organic acid (acetic acid, citric acid).

UNIT-II

Production of antibiotic, Penicillin and Streptomycin

UNIT-III

Industrial production of Vitamin (Vitamin B₁₂ and Riboflavin), enzyme (amylase) and amino acids (L-lysine)

UNIT-IV

Importance of microorganism in bakery and dairy industries

UNIT-V

Microbial cells as fermentation products (Baker's yeast, legume inoculants, mushrooms and algae) and its applications.

Books:

Industrial Microbiology	–	Waites, Morgan, Rockey, Higton
Industrial Microbiology	–	L. E. Casida
Industrial Biotechnology	–	A. Cruger
Fermentation Technology	–	Ashok Pandey

Practical Books

1. Practical Microbiology:	RS Gaud and GD Gupta
3. Practical Microbiology:	RC Dubey and DK Maheshwari
2. Experimental in Microbiology, Plant Pathology and Biotechnology:	KR Aneja

**SUBJECT: MICROBIOLOGY
PRACTICAL**

To determine the pH of different fruits juices

1. Detection of number of bacteria in milk
2. Determination of quality of a milk sample
3. Microbial examination of foods
4. Immobilization of enzymes
5. Isolation of antibiotic producing microbes

Faculty of Science
Sixth Semester - Bachelor of Science (Micro Biology)

SUBJECT: BIOINFORMATICS

CODE: BSCMB-605A

UNIT I

Introduction to Computer Fundamentals & RDBMS - Definition of relational database Mode of data transfer (FTP, SFTP, SCP), advantage of encrypted data transfer

UNIT II

Introduction to Bioinformatics and Biological Databases ,Biological databases - nucleic acid, genome, protein sequence and structure, gene expression databases, Database of metabolic pathways, Mode of data storage - File formats - FASTA, Genbank and Uniprot, Data submission & retrieval from NCBI, EMBL, DDBJ, Uniprot, PDB

UNIT III

Sequence Alignments, Phylogeny and Phylogenetic trees Local and Global Sequence alignment, pairwise and multiple sequence alignment. Scoring an alignment, scoring matrices, PAM & BLOSUM series of matrices Types of phylogenetic trees, Different approaches of phylogenetic tree construction - UPGMA, Neighbour joining, Maximum Parsimony, Maximum likelihood

UNIT IV

Genome organization and analysis , Diversity of Genomes: Viral, prokaryotic & eukaryotic genomes Genome, transcriptome, proteome, 2-D gel electrophoresis, Maldi Toff spectroscopy Major features of completed genomes: E.coli, S.cerevisiae, Arabidopsis, Human

UNIT V

Protein Structure Predictions Hierarchy of protein structure - primary, secondary and tertiary structures, modeling Structural Classes, Motifs, Folds and Domains Protein structure prediction in presence and absence of structure template Energy minimizations and evaluation by Ramachandran plot Protein structure and rational drug design

SUGGESTED READING :

- 1. Saxena Sanjay (2003) A First Course in Computers, Vikas Publishing House**
- 2. Pradeep and Sinha Preeti (2007) Foundations of Computing, 4th ed., BPB Publications**
- 3. Lesk M.A.(2008) Introduction to Bioinformatics . Oxford Publication, 3rd International Student Edition**
- 4. Rastogi S.C., Mendiratta N. and Rastogi P. (2007) Bioinformatics: methods and applications, genomics, proteomics and drug discovery, 2nd ed. Prentice Hall India Publication.**

Faculty of Science
Sixth Semester - Bachelor of Science (Micro Biology)
SUBJECT: INSTRUMENTATION AND BIOTECHNIQUES
CODE: BSCMB-605B

UNIT I

Microscopy No.: 10 of Highrightfield and dark field microscopy, Fluorescence Microscopy, Phase contrast Microscopy, Confocal Microscopy, Electron Microscopy (Scanning and Transmission Electron Microscopy) and Micrometry

UNIT II

Chromatography Principles and applications of paper chromatography (including Descending and 2-D), Thin layer chromatography. Column packing and fraction collection. Gel filtration chromatography, ion exchange chromatography and affinity chromatography, GLC, HPLC.

UNIT III

Electrophoresis -Principle and applications of native polyacrylamide gel electrophoresis, SDS-polyacrylamide gel electrophoresis, 2D gel electrophoresis, Isoelectric focusing, Zymogram preparation and Agarose gel electrophoresis

UNIT IV

Spectrophotometry No. of Hours: 10 Principle and use of study of absorption spectra of biomolecules. Analysis of biomolecules using UV and visible range. Colorimetry and turbidometry

UNIT V

Centrifugation No. of Hours: 12 Preparative and analytical centrifugation, fixed angle and swinging bucket rotors. RCF and sedimentation coefficient, differential centrifugation, density gradient centrifugation and ultracentrifugation.