

DEPARTMENT OF BIOCHEMISTRY

BRIEF HISTORY

- ▶ As there is great demand for the *Biochemists*, the Government of Andhra Pradesh has come forward to introduce the subject of *Biochemistry* at the Degree level in the year 1999.
- ▶ The Department of Biochemistry was established in June'1999. Dr. Mushtaq Ahmed, Reader in Zoology was the first in charge of the Department. Later Sri. K. Satyanarayana Chary, Lecturer in Chemistry has taken the charge of the Department till 2013. Then R. Shyamala Chandra was the in charge of the Department till 2018. Currently A. Chandra Shekhar is the in charge of department.
- ▶ We have faculty, who work with devotion, commitment and discipline for the orderly growth and development of the institution and this has resulted in excellent standards making it a prestigious institution in the town among university constituent and affiliated colleges under the jurisdiction of Satavahana University by getting distinctions every year.

MISSION:

“We the department of **Biochemistry** will create and facilitate an environment for the students to probe, search, learn and evolve into an effective social being.”

VISION:

“Search for **Biochemistry** within and beyond by observation and analysis to produce a better human being.”

SCOPE AND CAREER IN BIOCHEMISTRY

- ▶ BIOCHEMISTRY is a branch of science which deals with chemistry of living organisms and that of their biological processes.
- ▶ A career in BIOCHEMISTRY will involve the person's ability to comprehend chemical combinations and reactions that will take place because of the biological processes such as growth, reproduction, metabolism, heredity etc.

Job Prospects: A graduate in biochemistry can work with fields in medical, agriculture, Public health care, forensic etc., there is a tremendous scope of research.

Public and Private Companies offer job opportunities in Drug Manufacturing Companies, Environment Pollution Control, Agriculture and Fisheries, Forensic Science, Regulation and Quality control in almost all fields of food industry etc.

FACULTY PROFILE:

Sl. No	Name	Designation	Qualifications	Experience
1	A.CHANDRA SHEKHAR	Asst. Professor & In charge of the Dept.	M.Sc., NET, (Ph.D.)	10 Years

Course outcomes (COs)-B.Sc. (Biochemistry)

At the successful completion of the course, the students are expected

- Become familiar with the fundamentals of Biochemistry at undergraduate level.
- Exhibit certain levels of learning outcomes such as, Understanding of discipline, critical thinking, problem solving, analytical and scientific reasoning, research/industry related skills, etc.
- Get exposed to a wide range of careers that combine biology, and medicine.

CO1. Chemistry of Biomolecules: The students will get basics of the biomolecules & will understand the structure, functions and biochemical reactions of the biomolecules.

CO2. Chemistry of Nucleic Acids & Biochemical Techniques: To understand the chemistry & functions of nucleic acids and to gain an insight into the principle of working of various techniques used for the biochemical analysis of biomolecules.

CO3. Bioenergetics, biological oxidation & Enzymology: The student will also have an understanding about the fundamental energetics of biochemical processes. The student will be able to describe structure, functions, mechanisms of action of enzymes, kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process.

CO4. Intermediary Metabolism: To have a indepth view on metabolism and to describe how biomolecules (carbohydrates, lipids, amino acids and nucleic acids) are synthesized and degraded in the body.

CO5. Physiology & Clinical Biochemistry: The students will gain knowledge regarding the digestion of biomolecules and physiology of various organs such as heart, muscle and nervous system. The student will also gain knowledge regarding the chemistry, physiological role and

disorders of various hormones of human body. To gain knowledge regarding the clinical tests to identify various diseases pertaining to liver, kidney, heart.

CO6. Molecular Biology: To understand the basics of replication, transcription and translation processes and their regulation.

CO7. Nutrition & Immunology: The student will be able to comprehend the structure, role of nutrients & their deficiency disorders .To be able to understand about the organs and cells involved in the immunological response, immunoglobulin's, antigen-antibody interactions and vaccines. To get overall knowledge on human body defense mechanism.

CO8. Microbiology & r-DNA Technology: The student will be able to understand basic knowledge on bacteria and viruses and the basics of genetic engineering, tools of r-DNA technology, principle and applications of blotting and gene cloning.

CO9. Cell biology & genetics: To have in depth understanding of cell structure and its functions and to be able to describe the gene interactions, mutations, linkage analysis and bacterial genetics.

CO10. Biotechnology: To have basic knowledge regarding the plant tissue culture, animal tissue culture techniques and to get knowledge on microbial and environmental biotechnology.

DEPARTMENT LIBRARY:

- ❖ Though the central library (UG, PG) has a total number of books related to Biochemistry, the Department also maintains its own stock of books for the benefit of staff and students. At present it has 20 Books.

Modern Teaching methods in practice:

- In addition to the traditional lecture method, the following modern methods are practiced by our faculty
- Continuous comprehensive evaluation
- Emphasis on understanding the concepts
- Emphasis on skill building, life skills and values
- Collaborative learning
- Activity-based learning and learning labs
- Interdisciplinary learning

Highlights:

1. Advanced learners Projects
2. Slow learners Assignments and Remedial classes
3. PPT slides
4. Seminars by students
5. Question Bank and Previous papers
6. Extension lectures by Eminent personalities

Lab Facilities Available:

- Autoclave
- Colorimeter
- Water bath
- Thin Layer Chromatography
- Spectrophotometer
- Electrophoresis
- Hot Plates
- Centrifuges
- Microscopes
- Incubator
- Hot air oven
- pH meter
- Hemometers
- Neubaur counting chamber

B.Sc. Biochemistry Syllabus

Semester - I DSC -1A

Semester – I: Paper-BS104 (Theory): Chemistry of Biomolecules (4 Credits; 4 Hr/week)

Credit- I: Introduction

1. Scope of Biochemistry
2. Water as biological solvent
3. Weak acids and bases
4. pH and concept of Buffers
5. Biological buffers and their physiological importance
6. Henderson- Hasselbalch equation (Simple numerical problems)
7. Concept of Stereo chemistry with reference to Carbohydrates and Amino acids.

Credit – II: Amino acids & proteins

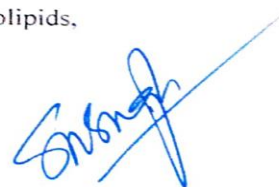
1. Classification, structure, stereochemistry and chemical reactions of amino acids.
2. Titration curve of glycine & pK values.
3. Essential, nonessential amino acids and non-protein amino acids.
4. Peptide bond- Nature and conformation, Naturally occurring peptides –Glutathione and Brain peptides (Enkephalin)
5. Outlines of protein classification, structural organization of proteins: primary, secondary, tertiary and quaternary structures (ex. hemoglobin & myoglobin)
6. General properties of proteins, denaturation and renaturation of proteins.
7. Determination of amino acid composition of proteins.

Credit - III: Carbohydrates

1. Classification of carbohydrates
2. Monosaccharides : Structures, Fisher and Haworth projections
3. Reactions of monosaccharides, Mutarotation
4. Amino sugars and Glycosides
5. Disaccharides, Oligosaccharides and Polysaccharides
6. Storage and Structural Polysaccharides
7. Glycosaminoglycans and Bacterial cell wall polysaccharides.

Credit – IV: Lipids

1. Classification of lipids, Reactions & properties of lipids
2. Saturated, Unsaturated and Essential fatty acids
3. Structure and functions of Neutral fats, waxes, phospholipids, sphingolipids,
4. Structure and functions of cholesterol and glycolipids.
5. Prostaglandins and lipoproteins.



6. Bio membranes, behavior of amphipathic lipids in water, formation of micelles, bilayers, vesicles, Liposomes

7. Membrane composition and fluid mosaic model.

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons
4. Textbook of Biochemistry – West.E.S., Todd.W.R, Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell.V.W., McGraw-Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.




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DSC – 1A
Semester – I: BS 104; Practicals: Qualitative Analysis of Biomolecules
(1 Credits; 2 Hr/week)

1. Laboratory general safety procedures
2. Preparation of standard solutions (Molar, Normal and percent solutions)
3. Determination of pKa values of amino acids by titration (Glycine)
4. Preparation of buffers (Acetate and Phosphate buffers)
5. Qualitative identification of Carbohydrates
6. Qualitative identification of Amino acids
7. Qualitative identification of Lipids

References

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern



Semester - II
DSC – 1B
Semester – II: Paper-BS204 (Theory) Chemistry of Nucleic Acids
and Biochemical Techniques
(4 Credits; 4 Hr/week)

Credit - I: Composition of Nucleic acids

1. Nature (functions) of nucleic acids.
2. Structure of purines and pyrimidines.
3. Nucleosides and Nucleotides
4. DNA & RNA.
5. Stability and formation of phosphodiester linkages
6. Effect of acids, alkali and nucleases and phosphodiester linkages
7. Photochemical and Spectral characteristics of Nucleic acid.

Credit - II: Structure of nucleic acids

1. Watson& Crick DNA double helix structure.
2. Introduction to circular DNA, supercoiling, helix to random coil transition,
3. denaturation of nucleic acids.
4. Hyperchromic effect
5. T_m values and their significance.
6. Reassociation kinetics, cot curves and their significance.
7. Different types of RNA and their biological functions.

Credit - III: Spectrophotometric and Centrifugation Techniques

1. Colorimetry and spectrophotometry.
2. Beer-Lamberts law and its limitations.
3. UV and Visible spectra
4. Molar extinction coefficient.
5. Principle of fluorimetry
6. Principle of Centrifugation techniques
7. Types of centrifugation and their applications

Credit – IV: Chromatography and Electrophoresis techniques

1. Introduction and principles of chromatographic techniques
2. Paper chromatography and applications
3. Thin layer chromatography and applications
4. Gel filtration (molecular sieve) chromatography
5. Ion exchange Chromatography
6. Affinity chromatography
7. Principle of electrophoresis and applications: Native, SDS-PAGE and Agarose gel electrophoresis



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References

1. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons
2. Textbook of Biochemistry – West.E.S., Todd.W.R, Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
3. Outlines of Biochemistry – Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
4. Principles and Techniques of Practical Biochemistry- Wilson, K. and Walker, J. Cambridge Press.
5. The Tools of Biochemistry- Cooper, T. G. John Wiley & Sons Press.
6. Physical Biochemistry- Friefelder, D. W.H. Freeman Press.
7. Analytical Biochemistry – Holme.D.J. and Peck.H., Longman.
8. Biophysical Chemistry: Principle and techniques- Upadhyay A, Upadhyay K and Nath. N. Himalaya Publishing House.
9. Experimental Biochemistry- Clark Jr. J.M and Switzer, R. L. Freeman & Co..



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DSC – 1B
Semester – II: Paper-BS204; Practicals: Quantitative Analysis of Biomolecules
(1 Credits; 2 Hr/week)

1. Amino acid Estimation by Ninhydrin method
2. Protein Estimation by Biuret
3. Protein estimation by Folin's Method
4. Estimation of Total Sugars by Anthrone Method
5. Estimation of Total Reducing Sugars by Dinitrosalicylate method
6. Estimation of Keto sugar by Roe's resorcinol Method
7. Estimation of total sugars by Phenol-sulphuric acid method

References

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern



SEMESTER-III

SEC - 1

Semester III- Paper BS 301: BASICS IN BIOCHEMICAL CALCULATIONS AND BIostatISTICS (2 Credits; 2 Hr/week)

Credit-I: Basic Biochemical Calculations

1. Units and measurements
2. Concentration of analyte: Mole, Molarity, Normality and percent solutions
3. Concept of density and specific gravity
4. Enzyme activity, Specific activity and Purity index
5. pH scale and measurement of redox potential
6. Concept of buffers and Buffer preparations
7. Construction of calibration curve and absorption curve (λ_{max})

Credit-II: Biostatistics

1. Basic statistical concepts: Population, sampling and variables
2. Biostatistics: Measures of central tendency (Mean, Median Mode) :
3. Measurement of dispersion: Standard deviation, standard error, Spread sheets
4. Depiction of data by graphical methods
5. t-Test
6. Regression and Correlation, precision and accuracy
7. ANOVA

References

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern
3. Enzyme Assays- A practical Approach: Eienthal, R and Dawson,M.I., IRL Press.
4. Biostatistics – Arora & Malhan, Himalaya Publishing House.



DSC – 1C
Semester – III: Paper-BS305 (Theory): BIOENERGETICS, BIOLOGICAL OXIDATIONS
AND ENZYMOLOGY
(4 Credits; 4Hr/week)

Credit- I : Bioenergetics

1. Laws of thermodynamics
2. Energy transformations in the living system
3. Free energy, Enthalpy and Entropy concepts.
4. Exergonic and endergonic reactions.
5. High energy compounds, Substrate level phosphorylation
6. Phosphate group transfer potential.
7. Cytochromes-structure, types and their functions

Credit – II: Biological Oxidations

1. Biological oxidations: Definition, enzymes involved- oxidases, dehydrogenases and oxygenases.
2. Redox reactions. Redox couplers. Reduction potential (ϵ , ϵ_0 , ϵ'_0). Standard reduction potential (ϵ'_0) of some biochemically important half reactions.
3. Ultrastructure of mitochondria, Electron transport chain (ETC) and carriers involved.
4. Oxidative phosphorylation, theories of oxidative phosphorylation- Mitchell's chemiosmotic theory. F_0F_1 - ATPase, Inhibitors of ETC and oxidative phosphorylation, uncouplers.
5. Formation of reactive oxygen species and their disposal through enzymatic reactions.
6. Ultrastructure and functions of chloroplast
7. Cyclic and non-cyclic photophosphorylation.

Credit- III : Introduction to Enzymology

1. Introduction to biocatalysis, differences between chemical and biological catalysis.
2. Principles of energy of activation, transition state
3. Nomenclature and classification of enzymes.
4. Definition of holo-enzyme, apo-enzyme, coenzyme, cofactor, Fundamentals of enzyme assay, enzyme units.
5. Enzyme specificity. Active site.
6. Interaction between enzyme and substrate- lock and key, induced fit models.
7. Methods of Enzyme purification

Credit – IV: Enzyme Kinetics and Enzyme action

1. Rate of a Reaction – Law of Mass action, Factors affecting the catalysis- substrate concentration, pH, temperature, Time, Enzyme concentration and Product concentration
2. Michaelis - Menten equation for single substrate reaction, significance of K_M and V_{max} .
3. Enzyme inhibition- irreversible and reversible, types of reversible inhibitions- competitive and non-competitive.
4. Outline of mechanism of enzyme action- acid-base catalysis, covalent catalysis, electrostatic catalysis, and metal ion catalysis.
5. Regulation of enzyme activity- allosterism and co-operativity. ATCase as an allosteric enzyme
6. Zymogen activation- activation of trypsinogen and chymotrypsinogen.
7. Isoenzymes (LDH) and Multienzyme complexes (PDH). Ribozyme.



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References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons
4. Textbook of Biochemistry – West.E.S., Todd.W.R, Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw-Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry – Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.
10. Fundamentals of Enzymology – Price.N.C.and Stevens.L., Oxford University Press.
11. Understanding Enzymes – Palmer.T., Ellis Harwood.
12. Enzymes – Biochemistry, Biotechnology, Clinical Chemistry – Palmer.T., Affiliated East-West Press



DSC – 1C
Semester – III: Paper-BS305 (Practicals): ENZYMOLOGY
(1 Credits; 2Hr/week)

1. Assay of salivary α -amylase
2. Assay of β -amylase from sweet potatoes
3. Assay of urease
4. Assay of phosphatase
5. Determination of optimum temperature for amylase
6. Determination of optimum pH for amylase
7. Effect of Substrate concentration of amylase activity

References

1. Experimental Biochemistry-A student companion-BeeduSashidharRao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern
3. Enzyme Assays- A practical Approach: Eisenthal, R and Dawson,M.I., IRL Press.
4. Biochemical Methods- Sadasivam,S and Manickyam,A. New Age International Publishers.



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SEMESTER-IV

SEC - 3

Semester – III: Paper BS 401: APPLIED AND COMPUTATIONAL BIOCHEMISTRY (2 Credits; 2 Hr/week)

Credit – I: Enzyme and Protein purification methods

1. Homogenization techniques
2. Centrifugation methods
3. Ammonium sulfate precipitation and Dialysis
4. Column chromatography and determination of molecular weight
5. UV-Vis spectrophotometry
6. Native PAGE
7. SDS-PAGE

Credit-II: Computational Biochemistry

1. Introduction to Computational Science and applications
2. Software packages used in Docking studies
3. Principles of molecular modeling-Drug designing
4. Drug-Biomolecule, Receptor-Biomolecule interactions
5. Applications in Enzyme Kinetics (Km & Vmax)
6. Metabolic databases (KEGG)
7. Gene identification, Protein Data Bank

References:

1. An Introduction to Computational Biochemistry by C. Stan Tsai, A JOHN WILEY & SONS, INC., PUBLICATION
2. Computational Biochemistry and Biophysics by Oren M. Becker, Alexander D. MacKerell Jr., Benoit Roux, Masakatsu Watanabe. CRC Press, Taylor & Francis Group.
3. Applied Biochemistry and Bioengineering by Lemuel Wingard, JR., Ephraim Katchalski-Katzir and Leon Goldstein, Academic Press Inc.
4. Protein purification – Principles and practice by Robert K. Scopes, Springer-verlag
5. Protein purification – Principles, High resolution methods and applications by Jan-Christer Janson, Wiley
6. Enzyme purification and related techniques, Vol 22, Nathan KaplanNathan Colowick, Elsevier



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DSC – 1 D
Semester – IV: Paper-BS405 (Theory): INTERMEDIARY METABOLISM
(4 Credits; 4Hr/week)

Credit-I : Amino acid Metabolism

1. General reactions of amino acid metabolism- transamination, decarboxylation and deamination
2. Urea cycle and regulation
3. Catabolism of carbon skeleton of amino acids- glycolytic and ketogenic amino acids.
4. Metabolism of glycine, serine, aspartic acid, methionine, phenylalanine and leucine.
5. Biosynthesis of creatine.
6. Inborn errors of aromatic amino acids
7. Inborn errors of branched chain amino acid metabolism.

Credit- II : Carbohydrate Metabolism

1. Glycolysis, energy yield. Fate of pyruvate - formation of lactate and ethanol
2. Citric acid cycle, regulation, energy yield, amphipathic role. Anaplerotic reactions.
3. Glycogenolysis and glycogenesis.
4. Pentose phosphate pathway.
5. Gluconeogenesis.
6. Photosynthesis- Light and Dark reactions, Calvin cycle and C₄ Pathway. CAM Pathway
7. Metabolic disorders of carbohydrates – Galactosemia and Pentosuria

Credit – III: Lipid Metabolism

1. Catabolism of fatty acids (β - oxidation) with even and odd number of carbon atoms, Ketogenesis
2. *de novo* synthesis of fatty acids
3. Elongation of fatty acids in mitochondria and microsomes
4. Biosynthesis and degradation of triacylglycerol
5. Biosynthesis of lecithin.
6. Biosynthesis of cholesterol
7. Metabolic disorders of lipid metabolism – Nieman-pick disease and Fabry's disease

Credit – IV : Nucleic acid Metabolism

1. Biosynthesis of purine and pyrimidine nucleotides, *de novo* and salvage pathways.
2. Regulation of purine and pyrimidine nucleotides
3. Catabolism of purines and pyrimidines.
4. Biosynthesis of deoxyribonucleotides- ribonucleotide reductase and thymidylate synthase and their significance.
5. Disorders of nucleotide metabolism- Gout, Lesch- Nyhan syndrome.
6. Biosynthesis of heme
7. Degradation of heme



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References

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
4. Textbook of Biochemistry – West.E.S.,Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Principles of Biochemistry: General Aspects-Smith, E. L., Hill, R.L. Lehman, I. R. Lefkowitz, R.J. Handler, P., and White, A. McGraw-Hill
6. Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H.. John Wiley & Sons .
7. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. &Rodwell,V.W., McGraw-Hill
8. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N, S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.
10. Biochemistry – Rama Rao. A and RatnaKumari. D, Kalyani Publishers.
11. Biochemistry- The Molecular Basis of Life – McKee. T and McKee, J. R. McGraw-Hill.



DSC – 1 D
Semester – IV: Paper-BS405 (Practicals): BIOCHEMICAL PREPARATIONS AND SEPARATIONS
(1 Credits; 2Hr/week)

1. Isolation of egg albumin from egg white.
2. Isolation of cholesterol from egg yolk.
3. Isolation of starch from potatoes.
4. Isolation of casein from milk.
5. Separation of amino acids by Paper chromatography
6. Separation of Plant pigments by TLC
7. Absorption maxima of colored substances- *p*-Nitrophenol, Methyl orange, BSA and DNA

References

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern



Semester - V

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Semester – V: Paper – BS 501: Biochemistry and Physiology (4 Credits; 4 Hr/week)

Credit – I: Biomolecules

1. Water properties, pH and Buffers
2. Carbohydrates – Classification (mono, di, oligo and poly), properties and importance
3. Amino acids – Classification, properties and importance. Structure of proteins.
4. Lipids – Classification, properties and importance
5. Nucleic acids – Purines, Pyrimidines, Nucleosides, Nucleotides. Structure and types of DNA and RNA and denaturation
6. Enzymes – Classification, Factors affecting enzyme activity, Clinically important enzymes (SGOT, SGPT, LDH and CPK)
7. Vitamins (Fat soluble and water soluble) and Trace elements

Credit – II: Metabolism

1. Amino acid metabolism – General reactions, metabolism of aromatic amino acids
2. Carbohydrate metabolism – Glycolysis and TCA cycle
3. Gluconeogenesis and Glycogen metabolism
4. Lipid metabolism - β -oxidation of fatty acids
5. De novo synthesis of fatty acids
6. Nucleic acid metabolism – Synthesis and degradation of purines and pyrimidines
7. Metabolic disorders

Credit – III: Physiology

1. Physiology of digestion
2. Physiology of vision
3. Physiology of muscle
4. Physiology of nerve and mechanism of nerve impulse transmission
5. Composition of blood and blood coagulation
6. Structure of heart and cardiac cycle
7. Factors controlling blood pressure

Credit – IV: Endocrinology

1. Introduction to Endocrinology and Organization of endocrine system
2. Hormones of Hypothalamus
3. Hormones of Pituitary
4. Hormones of Thyroid and Clinical Relevance
5. Hormones of Pancreas and Clinical Relevance
6. Hormones of Adrenal gland
7. Hormones of Gonads

References

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons
4. Textbook of Biochemistry – West.E.S., Todd.W.R, Mason.H.S. and Bruggen, J.T.V., Oxford & IBH Publishers.
5. Principles of Biochemistry: General Aspects-Smith, E. L., Hill, R.L. Lehman, I. R. Lefkowitz. R.J. Handler, P., and White, A. McGraw-Hill
6. Outlines of Biochemistry – Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
7. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw-Hill
8. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Textbook of Biochemistry and Human Biology – Talwar, G.P. and Srivastava. L.M., Printice Hall of India
9. Human Physiology – Chatterjee.C.C, Medical Allied Agency
10. William's Textbook of Endocrinology – Larsen, R. P. Korenberg, H. N. Melmed, S. and Polensky, K. S. Saunders
11. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
12. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co
13. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.

DSC – I E
Semester – V: Paper-BS 504 A (Theory) : Physiology, Nutrition and Clinical Biochemistry
(4 Credits; 4Hr/week)

Credit-I: Physiology

1. Digestion and absorption of carbohydrates, lipids and proteins
2. Composition of blood and coagulation of blood
3. Hemoglobin and transport of gases in blood (oxygen and CO₂)
4. Heart- structure of the heart, Cardiac cycle, cardiac factors controlling blood pressure
5. Physiology of Vision
6. Muscle- kinds of muscles, structure of myofibril, organization of contractile proteins and mechanism of muscle contraction.
7. Structure of Neuron and propagation of nerve impulse

Credit-II: Endocrinology

1. Endocrinology- organization of endocrine system. Classification of hormones.
2. Mechanism of hormonal action- Steroid and peptide hormones such as adrenaline, glucocorticoids and insulin.
3. Chemistry, physiological role and disorders of hormones of Pituitary, Hypothalamus and Thyroid
4. Chemistry, physiological role and disorders of hormones of Pancreas
5. Chemistry, physiological role and disorders of hormones of Parathyroid
6. Chemistry, physiological role and disorders of hormones of Gonads, Placenta and Adrenals
7. Gastrointestinal hormones and their physiological role

Credit – III: Nutrition

1. Balanced diet. Calorific values of foods and their determination by bomb calorimeter.
2. BMR and factors affecting BMR. Specific dynamic action of foods.
3. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women.
4. Sources of complete and incomplete proteins. Biological value of proteins. Role of essential fatty acids in human nutrition.
5. Malnutrition- Kwashiorkar, Marasmus and PEM.
6. Vitamins- sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins; Bulk and trace elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F.
7. Nutraceuticals; Obesity and starvation.

Credit-IV: Clinical Biochemistry and Organ Function tests

1. Structure and functions of the liver, Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio, hippuric acid and bromsulphthalein tests. Serum enzymes in liver diseases- SGPT, GGT and alkaline phosphatase.
2. Kidneys-structure of nephron and Mechanism of urine formation, Normal and abnormal constituents of urine
3. Biological buffers. Role of kidneys in maintaining acid-base and electrolyte balance in the body.
4. Renal function tests- creatinine and urea clearance tests, phenol red test.
5. Biochemical tests for the diagnosis of heart diseases- HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.
6. Brain function tests - EEG
7. GI tract test - Endoscopy

References

1. Textbook of Biochemistry and Human Biology – Talwar, G.P. and Srivastava. L.M., Printice Hall of India
2. Review of Medical Physiology-Ganong, McGraw-Hill.
3. Human Physiology – Chatterjee.C.C, Medical Allied Agency
4. Textbook of Medical Physiology – Guyton.A.G and Hall.J.E., Saunders
5. William’s Textbook of Endocrinology – Larsen, R. P. Korenberg, H. N. Melmed. S. and Polensky, K. S. Saunders
6. Mammalian Biochemistry- White, A. Handler, P. and Smith, E. L. McGraw-Hill.
7. Textbook of Human Nutrition- Bamji, PralhadRaoand Reddy V. Oxford & IBH Publishers.
8. Foods: Facts & Principle- Shakuntala andShadaksharaswamy. Wiley Ester Press.
9. Essentials of Food and Nutrition – Swaminathan.M. Bangalore Press.
10. Human Nutrition and Dietetics. Davidson, S. and Passmore, J. R. ELBS.
11. A Textbook of Biochemistry: Molecular and Clinical Aspects. Nagini, S. Scitech Publishers.
12. *Tietz* Fundamentals of Clinical Chemistry- Burtis, A. A. and Ashwood, E. R. Saunders-imprint Elsevier Pub.
13. Textbook of Biochemistry with Clinical Correlations – Devlin.T.M., Wiley – Liss
14. Textbook of Medical Biochemistry – Chatterjea.M.N. and Shinde.R, Jaypee Brothers Medical Publishers.
15. Textbook of Medical Biochemistry- Ramakrishnan, S., Prasannan, K. G. and Rajan, R. Orient Longman
16. Essentials of Food and Nutrition –Swaminathan M. Bangalore Press

DSC – 1E
Semester – V: Paper - BS 504 A (Practicals): Physiology, Nutrition and Clinical
Biochemistry
(1 Credits; 2Hr/week)

1. Estimation of hemoglobin in blood, Total count and Differential count – RBC and WBC
2. Urine analysis for albumin, sugars and ketone bodies.
3. Estimation of urinary creatinine.
4. Estimation of total serum cholesterol.
5. Estimation of vitamin C by 2, 6 - DCPIP method.
6. Determination of iodine value of oil.
7. Determination of peroxide value of oil.

References

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern
3. Biochemical Methods- Sadasivam,S and Manickyam,A. New Age International Publishers

DSC – 1 E

Semester – V: Paper-BS 504 B (Theory): Cell Biology, Genetics and Microbiology (4 Credits; 4Hr/week)

Credit – I: Cell Biology

1. Cell as basic unit of living organisms; Ultra-structure of prokaryotic cell and eukaryotic cell
2. Composition & functions of cell organelles
3. Cytoskeleton- Microfilaments, Microtubules & Intermediate filaments
4. Chromosome organization in Prokaryotes and Eukaryotes and structure of chromosomes (Polytene and Lamp Brush)
5. Cell cycle
6. Mitosis and Meiosis
7. Cell death – Apoptosis and Necrosis

Credit – II: Genetics

1. Basic concepts of Genetics - Mendel's laws
2. Non-Mendelian inheritance: Extra chromosomal inheritance (*Paramoecium* & *Drosophila*).
3. Partial or incomplete dominance and Co-dominance
4. Maternal inheritance (Coiling in snails, Leber's hereditary optic neuropathy (LHON)).
5. Polygenic inheritance (Introduction to quantitative traits).
6. Sex linked inheritance. X-linked recessive inheritance (colour blindness & Hemophilia). Concept of Autosomal recessive and dominant inheritance
7. Linkage and recombination

Credit – III: Mutations and Mutagens

1. Mutations (spontaneous / induced, somatic / germinal, forward / reverse, transition / transversions)
2. Mutations (Silent, missense, nonsense, and frame shift mutations, conditional, leaky)
3. Detection, selection & isolation of microbial mutants
4. Estimation of mutation rates
5. Reversion and suppression of mutations
6. Mutagens – physical, chemical
7. Transposon mutagenesis, site-directed mutagenesis

Credit – IV : Microbiology

1. Introduction to brief history of microbiology. Classification of microorganisms, Mycoplasma.
2. Motility and sporulation
3. Isolation and cultivation of bacteria. Selective media and enriched media. Gram's staining
4. Bacterial growth curve and kinetics of growth. Batch, continuous and synchronous cultures.
5. Industrial uses of *Aspergillus niger*, yeast and Spirulina.
6. Structure and composition of viruses. One-step growth and determination of plaque forming units (PFU).
7. Viral life cycles – T4 (Lytic), λ phage (lytic and lysogenic), TMV, Retro viruses- HIV.

References

1. Principles of Genetics by Eldon John Gardner, Michael J. Simmons, D. Peter Snustad; John Wiley
2. Modern Genetic Analysis Anthony JF Griffiths, William M Gilbert, Jeffrey H Miller, and Richard C Lewontin. Pub. W. H. Freeman
3. Lewin B. (Ed) (1996) Genes, VII edition, John Wiley and Sons, New York.
4. Cell and Molecular Biology, De Robertis and De Robertis, Lippincott & Wilkins
5. Cell Biology by C. B. Pawar
6. Principles of Genetics by R.H. Tamarin McGrawhill
7. Theory & problems in Genetics by Stansfield, Schaum out line series McGrawhill
8. Textbook of Microbiology – Ananthanarayan, R and JayaramPaniker, C.K., Orient Longman.
9. Microbiology – Prescott.L.M.,Harley.J.P. & Klein.D.A, McGraw-Hill.
10. Microbiology – Pelczar Jr.,M.J., Chan.E.C.S. and Krieg.N.R., Tata McGraw-Hill.
11. Textbook of Microbiology- Dubey, R. C. and Maheshwari, D. K. S. Chand & Co.

DSE – 1 E
Semester – V: Paper-BS 504 B (Practicals): Cell Biology, Genetics and Microbiology
(1 Credits; 2Hr/week)

1. Preparation of different stages of Mitosis and Meiosis
2. Problems on Monohybrid cross, Problems on dihybrid ratio in *Drosophila*/maize, Linkage and Recombination, Sex linked inheritance and X-linked recessive inheritance
3. Sterilization methods and preparation of culture media, Isolation of pure cultures: (i) Streak plate method (ii) Serial dilution method.
4. Gram staining.
5. Motility of bacteria by hanging drop method.
6. Bacterial growth curve.
7. Antibiotic sensitivity by paper disc method.

References

1. Essential practical handbook of Cell Biology & Genetics, Biometry and Microbiology: A Laboratory Manual by Debarati Das, Academic Publishers
2. Microbiology – A Laboratory manual by Cappuccino and Sherman, Pearson Publications LPE.
3. Experiments in Microbiology, Plant Pathology and Biotechnology by Aneja A. R., New Age Publications

Semester – VI

DSE – 1 F

Semester – VI: Paper-BS 603 A (Theory): Molecular Biology and Immunology (4 Credits; 4Hr/week)

Credit- I : DNA Replication

1. Experimental evidences to prove DNA as genetic material.
2. Nature and structure of the gene.
3. DNA replication- models of replication, Meselson-Stahl's experimental proof for semi-conservative model.
4. Replication in prokaryotes - DNA polymerases I, II and III of *E.coli*, helicase, topoisomerases, primase, ligase.
5. Bidirectional replication model. Okazaki fragments, leading and lagging strands of DNA synthesis.
6. Replication in Eukaryotes
7. Inhibitors of DNA replication.

Credit- II : Transcription and Translation

1. Transcription - RNA synthesis, RNA polymerases of prokaryotes and eukaryotes
2. Initiation, Elongation and Termination- rho dependent and rho independent.
3. Post-transcriptional modifications and Inhibitors of RNA synthesis.
4. Genetic code, Deciphering of genetic code, Nirenberg's and Khorana's experiments, wobble hypothesis, degeneracy of genetic code.
5. Protein synthesis- structure of t-RNA activation of amino acids (aminoacyl t-RNA synthetases). Ribosome structure
6. Initiation, elongation and termination of protein synthesis. Post- translational modifications and Inhibitors of protein synthesis.
7. Regulation of prokaryotic gene expression- induction and repression. Lac operon

Credit – III: Immunology

1. Organization of immune system.
2. Organs and cells of immune system.
3. Innate and acquired immunity.
4. Cell mediated and humoral immunity (T- and B- cells).
5. Classification of immunoglobulins, structure of IgG. Theories of antibody formation- clonal selection theory.
6. Epitopes / antigenic determinants. Concept of haptens. Adjuvants.
7. Monoclonal antibodies and their applications

Credit – IV: Immunotechnology

1. Antigen-antibody reactions- agglutination, immunoprecipitation, immunodiffusion.
2. Blood group antigens.
3. Immunodiagnosics-RIA, ELISA.
4. Vaccines and their classification, Traditional vaccines
5. Modern vaccines- recombinant and peptide vaccines.
6. Outlines of hypersensitivity reactions.
7. Fundamentals of graft rejection and MHC proteins.

References

1. Molecular Biology of Cell- Alberts, B. Bray, D. Lewis, J. Raff, M. Roberts, K. and Watson, J. D. Garland Publishing.
2. Recombinant DNA and Biotechnology: A Guide for teachers- Helen and Massey. ASM Press.
3. Genes VIII – Lewin. B, Oxford University Press .
4. Molecular Biology- Freifelder. D. Naroasa Pub. House
5. Molecular Biology of the Gene- Watson. J.D., Baker, T.A, Bell, S.P., Gann.A, Levine, M and Losick.R, Pearson Education.
6. Molecular Biotechnology- Glick, B. R. and Pasternak, J. J. ASM Press
7. Principles of Gene Manipulation: An Introduction to GE- Old, R. V. and Primrose, S. B. Blackwell Sci. Pub.
8. Molecular Cell Biology- Lodish, H., Berk, A., Matsudaira, P., Kaiser, C. A., Krieger, M. Scott M P., Zipursky, S. L. and Darnell, J. Freeman & Co.
9. Immunology. Tizard, I. R. Thomson Press.
10. Kuby Immunology – Kindt.T.J., Goldsby.R.A. and Osborne.B.A., Freeman & Co.
11. Roitt's Essential Immunology – Roitt.I.M. and Delves.P.J., Blackwell Science.

DSE – 1 F
Semester – VI: Paper - BS 603 A (Practicals) : Molecular Biology and Immunology
(1 Credits; 2Hr/week)

1. Isolation of DNA from onion/Plasmids
2. Determination of purity of nucleic acids by UV-spectrophotometric method.
3. Estimation of DNA by diphenylamine method.
4. Estimation of RNA by orcinol method.
5. Electrophoresis of nucleic acids and visualization by ethidium bromide staining.
6. Agglutination: A, B, AB and O blood groups and Rh
7. ODD and Sandwich ELISA

References

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern
3. Biochemical Methods- Sadasivam,S and Manickyam,A. New Age International Publishers

DSE – I F
Semester – VI: Paper-BS 603 B (Theory): r-DNA technology and Biotechnology
(4 Credits; 4Hr/week)

Credit – I: r-DNA technology I

1. Cloning strategies.
2. Tools of r-DNA technology: Enzymes- Restriction endonucleases and ligases
3. Restriction mapping.
4. Polymerase chain reaction- principle and applications
5. Outlines of blotting techniques-Southern, Northern and Western
6. Molecular markers–RFLP,AFLP and RAPD
7. DNA sequencing- Maxam Gilbert and Sanger's methods

Credit – II: r-DNA technology II

1. Construction of c-DNA libraries.
2. Cloning vectors- Plasmids, Cosmids, and λ phages
3. Hosts- *E.coli*
4. Applications of gene cloning- production of insulin
5. Production of human growth hormone
6. Production of *Bt* cotton
7. Edible vaccines.

Credit – III: Plant and Animal Biotechnology

1. Plant tissue culture and its applications
2. Plants as bioreactors and valuable chemical factories (production of bioactive compounds)
3. Transgenic plants, Crop improvement, Production of herbicide and insect resistant plants
4. Genetically modified crops – Arabidopsis, Golden rice, soybeans, Bt cotton, tobacco, potato, papaya, jatropha,
5. Animal cell cultures and its applications.
6. Animal cells as bioreactors. Molecular pharming; Production of vaccines, pharmaceutical proteins, recombinant hemoglobin and blood substitutes
7. Transgenic animals

Credit – IV: Microbial and Environmental Biotechnology

1. Microbes as biocontrol agents, Microbial insecticides (Baculoviruses, *Bacillus thuringiensis* and *Bacillus sphaericus*)
2. Bioremediation, Biodegradation of cellulose and lignocellulose, bio-surfactants and bio-emulsifiers
3. Microbial ore leaching and production of microbial fuels (hydrogen, methane)
4. Renewable and Non-renewable energy sources
5. Strategies involved in Municipal solid waste treatment, Treatment of industrial and domestic effluent (aerobic and anaerobic)
6. Biomaterials as an alternative to non-degradable materials. Heavy Metal Accumulation. Biosorption.
7. Heavy metal tolerance (including mechanism) and its impact on environment

References

1. Principles of Gene Manipulation: An introduction to GE – Old, R. and Primrose, S.B. Blackwell Sci. Pub
2. Molecular Biotechnology Glick, BR and Paternak, JJ. Publish ASM Press
3. Introduction to Biotechnology, William J. Thieman, Michael A. Palladino, Benjamin Cummings Publ
4. Biotechnology- Arora, Himalaya pub. House
5. Introduction to Environmental Biotechnology by A. K. Chatterji, PHI Learning Pvt. Ltd.
6. Animal Cells as Bioreactors - By Terence Gatoright, Cambridge Univ Press
7. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
8. Introduction to Plant Tissue Culture - By M.K. Razdan (Oxford and IBH Publishing Company, New Delhi)
9. Industrial Microbiology by L.E. Casida

DSE – 1 F

Semester – VI: Paper-BS 603 B (Practicals): r-DNA technology and Biotechnology (1 Credits; 2Hr/week)

1. Restriction mapping: λ -DNA with any two restriction enzymes; strategies of Gene cloning
2. Preparation and transformation of competent cells
3. Preparation of MS medium and initiation of callus, Micropropagation of plants
4. Isolation of microbes from environment (Any source : soil, water, skin, bread, milk)
5. Efficacy testing for bio-fertilizers (nodulation test for rhizobia) and Efficacy testing for bio-pesticides
6. Microbial degradation of organic matter, Municipal solid waste treatment and Waste water treatment
7. Production of hydrogen and methane

References

1. Molecular Cloning (Lab manual) by Maniatis T, Fritsch EF, Sambrook J, Volume -I, CSH
2. Microbial Biotechnology – A Laboratory Manual for bacterial systems by Das, Surajit, Dash, HirakRanjan, Springer-Verlag
3. Plant Tissue Culture by Kalyan Kumar De
4. Biogas Technology by b.T. Nijaguna
5. Biotechnology procedures and experiments handbook by S. Harisha, Infinity Science Press LLC.

Semester IV: Optional Paper in place of Project (Theory)
Biochemistry in health and disease
(4 Credits: 4 hrs/week)

Credit I. Metabolic disorders

1. Amino acid metabolism
2. Phenylketonuria, Alkaptonuria
3. Carbohydrate Metabolism
4. Galactosemia, Pentosuria
5. Nucleic acid metabolism
6. Gout, Lesch-Nyhan syndrome
7. Lipid Metabolism
8. Gaucher's disease, Tay-sachs disease

Credit II. Genetic disorders

1. Introduction to genetic diseases
2. Chromosomal disorders- Down syndrome, Turner syndrome
3. Hemoglobinopathies- Sickle cell anaemia
4. Thalassemia
5. Genetic counselling
6. Pre-natal diagnosis
7. Gene therapy

Credit III. Endocrine disorders

1. Introduction to endocrine disorders
2. Endocrine organs-
 - a) Pituitary glands
 - b) Thyroid gland
 - c) Parathyroid gland
 - d) Pancreas
 - e) Ovaries, Testis
 - f) Adrenal glands
3. Diabetes – Type I & II
4. Thyroidism
5. Polycystic Ovaries
6. Endometriosis
7. Contraceptives
8. Addison's and Cushing syndrome

Credit IV. Molecular Basis of Cancer

1. Chemical Carcinogens
2. Fundamental features of carcinogenesis
3. Oncogenes, Tumor suppressor genes causing cancer
4. Tumor biomarkers in bodily fluids.
5. Mechanism of carcinogenesis
6. New therapies in cancer
7. Epigenetic mechanism in cancer.

References:

1. Voets Principles of Biochemistry V Edition-2016 for Unit I & II.
2. Tietz Fundamentals of Clinical Chemistry-2010 for Unit III.
3. Harpers illustrated Biochemistry for Unit IV.

B.Sc., CBCS for all Universities in Telangana (wef 2019-2020)
B.Sc., BIOCHEMISTRY

MODEL PAPER: THEORY

For I & II Semesters

Duration 3 hours

Max. Marks 80

Section - A (Short Answer Type)
Answer any eight of the following questions

8 x 4 = 32 Marks

1. Credit-I
2. ..
3. ..
4. Credit-II
5. ..
6. ..
7. Credit-III
8. ..
9. ..
10. Credit-IV
11. ..
12. ..

Section - B (Essay Answer Type)
Answer all Questions 4 x 12 = 48 Marks

9. (a) Credit-I
(OR)
(b) Credit-I

10. (a) Credit-II
(OR)
(b) Credit-II

11. (a) Credit-III
(OR)
(b) Credit-III

12. (a) Credit-IV
(OR)
(b) Credit-IV

MODEL PAPER PRACTICALS

For V&VI Semesters

Duration: 3 hours

Max. Marks 50

- | | |
|---|------------|
| 1. Write the Principles for the following experiments | (10 Marks) |
| 2. Major Experiment | (20 Marks) |
| 3. Minor Experiment | (10 Marks) |
| 4. Viva-Voce and Record | (10 Marks) |

Participation of teachers in academic and personal counseling of students:

- ▶ The institution appoints one faculty member as class mentor for students entering newly into the college who helps the students to feel like a friendly environment and discusses their problems to adjust in the new environment and orients them to college practices, guides them throughout 3 years.
- ❖ Detail of faculty development programmes and teacher who have been benefited during the past five years

Name of the Lecturer	Title of the Course Attended	Organized by	Date
A CHANDRA SHEKHAR	RC in Life sciences	MAANUU Hyderabad	17-09-2020 to 30-09-2020
	ICT tools in Higher Education	Osmania University UGC HRDC & RUSA	20-08-2020 to 26-08-2020
	"Research process and Design"	Osmania University UGC HRDC & RUSA	07-09-2020 to 12-09-2020
	FDP on Soft Skills	Ramanujan College University of Delhi	25-10-2021 to 31-10-2021

Co curricular & extracurricular activities.

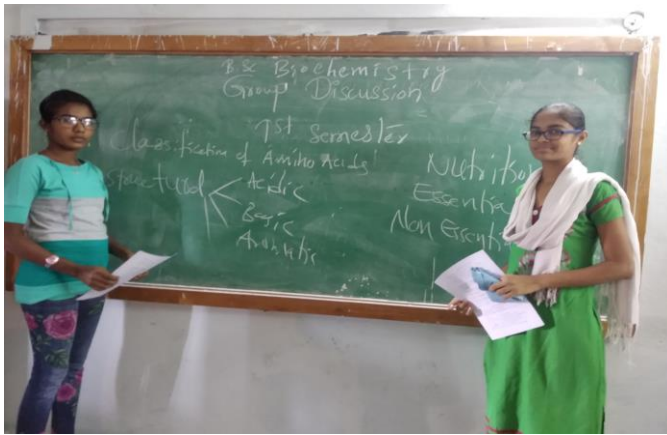
Co curricular activities:

- ❖ Mentor: Our staff, each individual take one particular group, and act as mentor , by counseling them in academic and personal matters to mould them in suitable to grab the opportunities in the form of jobs by imparting them guidance and training them in communication skills, analytical skills etc.
- ❖ Field trips: We arrange field trips to students to inculcate interest in the students to know the mechanism behind the power production, transmission etc.
- ❖ Study Projects: We give study projects to the students which make them to do authentic research, analyze data and draw conclusions
- ❖ We are conducting different tests like slip test exams to evaluate the students.
- ❖ We are encouraging the students to attend the seminars, workshops conducted by other departments to expose them to different disciplines.

Extracurricular activities:

Encourage and involve students to participate in NSS, NCC, Cultural activities, Quiz, Elocution, Readers forum membership, film club membership, clean and green programme, students participation in seminars, group discussions for personality development.





STUDENT STUDY PROJECTS:

We have given study projects to the students.

List of students STUDY PROJECT 2018-19.	
Sl.No	Name
1	Athika Ummul Khair
2	Gatla Madhuri
3	K Madhumitha

List of students STUDY PROJECT 2019-20.	
Sl.No	Name
1	Mora Shivani
2	Hajra Asma

List of students STUDY PROJECT 2020-21.	
Sl.No	Name
1	Afsha Fathima
2	Pravallika Priya Kumari
3	Pandrala Sripriya

Student achievements:

Name of the student enrolling into higher education	Programme graduated from	Name of the institution joined	Name of programme admitted to
Gatla Madhuri(2019)	B.Sc(Biochemistry)	Mahatma Gandhi university campus	M.Sc. Biochemistry
K Madhumitha(2019)	B.Sc(Biochemistry)	Mahatma Gandhi university campus	M.Sc. Biochemistry
Mora shivani (2020)	B.Sc(Biochemistry)	Hyderabad central university	M.Sc. Biochemistry
Janapathi pravallika priya kumara(2021)	B.Sc(Biochemistry)	Mahatma Gandhi university campus	M.Sc. Biochemistry
Pandrala sripriya(2021)	B.Sc(Biochemistry)	Osmania university campus	M.Sc. Environmental science

Future plans of the department

- ▶ Faculty members are planning to apply for minor research projects.
- ▶ Planning to encourage students to participate in Diabetes, Nutritional awareness campaign in nearby villages.
- ▶ To arrange more extension lectures by eminent subject experts
- ▶ Encourage advanced learners for research and project works so they can improve knowledge and get motivated for higher studies

BIO-DATA OF FACULTY

- | | | |
|-------------------------------------|---|--|
| 1. Name with surname | : | ANUGULA CHANDRA SHEKHAR |
| 2. Date of Birth & Age | : | 18-01-1984 |
| 3. Gender | : | M |
| 4. Permanent Address | : | |
| | | H.No.- 2-41/4
Seetharampur
Karimnagar. |
| 5. Marital Status | : | Married |
| 6. No. of Children | : | 2 |
| 7. Educational Qualification | : | M.Sc Biochemistry

CSIR-UGC NET (PhD) |
| 8. Mode of Appointment | : | Direct |
| 9. Designation | : | Assistant Professor |
| 10. Scale of Pay (State/UGC) | : | UGC |
| 11. Date of Appointment | : | 26-12-2011 |
| 13. Date of joining in this college | : | 30-06-2018 |
| 14. Do you hold additional charge? | : | MOOCS Coordinator. |