Telangana State Council of Higher Education, Govt. of Telangana
B.Sc., CBCS Common Core Syllabi for all Universities in Telangana (wef 2019-2020)

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B.Sc., BIOCHEMISTRY

SEMESTER-I				
Code	**Course Type**	**Course Title**	**HPW**	**Credits**
BS 101	AECC 1	Environmental Science	2	2
BS 102	L-1A	English	4	4
BS 103	L-2A	Second Language	4	4
BS 104	**DSC - 1A**	**Chemistry of Biomolecules**	**4T+2P=6**	**4+1=5**
BS 105	DSC - 2A	Optional II	4T+2P=6	4+1=5
BS 106	DSC - 3A	Optional III	4T+2P=6	4+1=5
		TOTAL		**25**
SEMESTER-II				
BS 201	AECC 2	Basic Computer Skills	2	2
BS 202	L-1B	English	4	4
BS 203	L -2B	Second Language	4	4
BS 204	**DSC -1B**	**Chemistry of Nucleic acids and Biochemical Techniques**	**4T+2P=6**	**4+1=5**
BS 205	DSC -2B	Optional II	4T+2P=6	4+1=5
BS 206	DSC -3B	Optional III	4T+2P=6	4+1=5
		TOTAL		**25**
SEMESTER-III				
BS 301	**SEC -1**	**Computational Biochemistry**	2	2
BS 302	**SEC - 2**	**Medical Lab Technology**	2	2
BS 303	L -1C	English	3	3
BS 304	L -2C	Second Language	3	3
BS 305	**DSC- 1C**	**Bioenergetics, Biological oxidation and Enzymology**	**4T+2P=6**	**4+1=5**
BS 306	DSC- 2C	Optional II	4T+2P=6	4+1=5
BS 307	DSC- 3C	Optional III	4T+2P=6	4+1=5
		TOTAL		**25**
SEMESTER-IV				
BS 401	**SEC – 3**	**Basics in Biochemical calculations and Biostatistics**	2	2

BS 402	**SEC – 4**	**Applied Biochemistry**	2	2
BS 403	L-1D	English	3	3
BS 404	L-2D	Second Language	3	3
BS 405	**DSC- 1D**	**Intermediary Metabolism**	**4T+2P=6**	**4+1=5**
BS 406	DSC- 2D	Optional II	4T+2P=6	4+1=5
BS 407	DSC- 3D	Optional III	4T+2P=6	4+1=5
		TOTAL		**25**
SEMESTER-V				
BS 501	**GE**	**Physiology and Biochemistry**	4T	4
BS 502	L-1E	English	3	3
BS 503	L-2E	Second Language	3	3
BS 504	**DSE-1E**	**A - Physiology and Clinical Biochemistry**	4T+2P=6	4+1=5
		B - Cell Biology and Genetics		
BS 505	DSE-2E	Optional II A/B	4T+2P=6	4+1=5
BS 506	DSE-3E	Optional III A/B	4T+2P=6	4+1=5
		TOTAL		**25**
	SEMESTER-VI			
BS 601	L-1F	English	3	3
BS 602	L-2F	Second Language	3	3
BS 603	DSE-1F	**A - Molecular Biology and Immunology**	4T+2P=6	4+1=5
		B – r-DNA technology and Biotechnology		
BS 604	DSE-2F	Optional II A/B	4T+2P=6	4+1=5
BS 605	DSE-3F	Optional III A/B	4T+2P=6	4+1=5
BS 606		Project work/Optionals	4	4
		TOTAL		**25**
		TOTAL CREDITS		**150**

AECC- Ability Enhancement Compulsory Course
DSC- Discipline Specific Core
SEC- Skill Enhancement Course
DSE- Discipline Specific Elective
GE- Generic Elective
HPW – Hours per week

Note: Credits under Non-CGPA : i. NSS/NCC/Sports/Extra-curricular – 2 in each year (up to 6)
ii. Summer internship – 2 in each after I & II years (up to 4)

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. Bichemistry-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.

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 VijayDeshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

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. Tm 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

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..

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

References

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