

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part - I BIOCHEMISTRY

SEMESTER I AND II

(Syllabus to be implemented from June, 2018 onwards.)

B. Sc. – I C B C S P A T T E R N (With effect from 2017-18)

SEMESTER – I														
Sr. No.	Course (Subject) Title	TEACHING SCHEME						EXAMINATION SCHEME						
		THEORY			PRACTICAL			THEORY				PRACTICAL		
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Hours	Max	Total Marks	Min	Hours	Max	Min
1	DSC-A	2	5	4	2	4	3.2	2	50	100	35	PRACTICAL EXAMINATION IS ANNUAL		
2	DSC-A	2						2	50					
3	DSC-A	2	5	4	2	4	3.2	2	50	100	35			
4	DSC-A	2						2	50					
5	DSC-A	2	5	4	2	4	3.2	2	50	100	35			
6	DSC-A	2						2	50					
7	DSC-A	2	5	4	2	4	3.2	2	50	100	35			
8	DSC-A	2						2	50					
9	AECC-1A	2	4	3.2	-----	-----	-----	2	50	50	18			
	TOTAL	18	24		8	16	12.8			450				
SEMESTER – II														
1	DSC-B	2	5	4	2	4	3.2	2	50	100	35	As per BOS Guide-lines	50	18
2	DSC-B	2						2	50					
3	DSC-B	2	5	4	2	4	3.2	2	50	100	35		50	18
4	DSC-B	2						2	50					
5	DSC-B	2	5	4	2	4	3.2	2	50	100	35		50	18
6	DSC-B	2						2	50					
7	DSC-B	2	5	4	2	4	3.2	2	50	100	35	50	18	
8	DSC-B	2						2	50					
9	AECC-B	2	4	3.2	-----	-----	-----	2	50	50	18			
		18	24	19.2	8	16	12.8			450			200	
	TOTAL	36	48	38.4	16	32	25.6			900				
• Student contact hours per week : 32 Hours (Min.)						• Total Marks for B.Sc.-I (Including English) : 1100								
• Theory and Practical Lectures : 48 Minutes Each						• Total Credits for B.Sc.-I (Semester I & II) : 52								
<p>• DSC- Discipline Specific Core Course. Any four subjects (Courses) from B.Sc.-I CBCS curriculum Physics, Chemistry, Mathematics, Statistics, Electronics, Computer Science, Botany, Zoology, Biotechnology (opt.), Geography, Geology, Seed Technology, Microbiology, Industrial Microbiology, Biochemistry (opt.), Psychology, Food Science and Quality Control, Astrophysics, Nanotechnology (Opt), and other subjects approved by Competent Authorities.</p>														
• AECC- Ability Enhancement Compulsory Course (1A & 1B)- English														
• Practical Examination will be conducted annually for 50 Marks per course (subject).														
• <i>Except English, combined passing for two theory papers of 50 marks each. i.e. Min. 35 marks required for passing out of 100.</i>														
• <i>There shall be separate passing for theory and practical courses.</i>														

OVERVIEW OF CURRICULUM B. Sc. I BIOCHEMISTRY (OPTIONAL)

Course Code	Title of the Course	Theory/ Practical
Semester I		
BHC - 29A	Basics of Cell Biology	Theory
BHC - 30A	Introduction to Amino acids and Carbohydrates	Theory
BHC - 101	Biochemistry Practical Course I	Practical
Semester II		
BHC - 29B	Introduction to Lipids and Nucleic acids	Theory
BHC - 30B	Introduction to Proteins and Enzymes	Theory
BHC - 102	Biochemistry Practical Course II	Practical

Syllabus for B,Sc. I - BIOCHEMISTRY (CBCS STRUCTURE)

BASICS OF CELL BIOLOGY (THEORY)

SEMESTER – I Paper I (29 A)

TOTAL HOURS : 30 CREDITS: 2

Unit I

Introduction to Cell Biology

No. of Hours: 15

Prokaryotic (archaea and eubacteria) and eukaryotic cell (animal and plant cells)

Structure of nucleus, ER structure, organization of golgi, Lysosome, structure and function of mitochondria, Chloroplast and peroxisomes

Unit II

Cell and Cell Division

No. of Hours: 15

Prokaryotic and eukaryotic cell wall, cell matrix proteins. Cell-matrix interactions and cell-cell interactions. Adherence junctions, tight junctions, gap junctions

Cell Division- Basics of Cell cycle; Mitosis, Meiosis

INTRODUCTION TO AMINO ACIDS AND CARBOHYDRATES (THEORY)

SEMESTER – I Paper II (30 A)

TOTAL HOURS : 30 CREDITS: 2

Unit I

The Foundations of Biochemistry

No. of Hours: 02

Cellular and chemical foundations of life

Water

No. of Hours: 03

Unique properties, weak interactions in aqueous systems, ionization of water, buffers,

Amino acids

No. of Hours : 10

Structure and classification, physical, chemical and optical properties of amino acids, Ninhydrin reaction

Unit II

Carbohydrates

No. of Hours : 10

Definition, classifications, monosaccharide, disaccharide and polysaccharide (Sugar: glucose, fructose, lactose, sucrose, maltose, starch and glycogen)

Aldoses and ketoses, mutarotation, pyranose and puranose structure, glycosidic bond, formation (disaccharide), biological importance of carbohydrates

Homo and hetero polysaccharide (starch and pectin)

Structural and storage polysaccharide (cellulose and glycogen)

INTRODUCTION TO LIPIDS AND NUCLEIC ACIDS (THEORY)

SEMESTER – II Paper III (29 B)

TOTAL HOURS : 30 CREDITS: 2

Unit I

Lipids

No. of Hours: 15

Building blocks of lipids - fatty acids, glycerol, ceramide. Storage lipids - triacyl glycerol and waxes. Structural lipids in membranes – glycerophospholipids, sphingolipids and sterols (Cholesterol)

Biological functions of lipids

Unit II

Nucleic acids

No. of Hours: 15

Nitrogen bases, purines, pyrimidines, sugars (ribose and deoxyribos) phosphate

Structure of nucleosides, nucleotides and polynucleotide formation

. Nucleic acid structure – Watson-Crick model of

DNA. Structure of major species of RNA - mRNA, tRNA and rRNA.

Effect of acid and alkali on DNA. Other functions of nucleotides - source of energy, component of coenzymes, second messengers.

INTRODUCTION TO LIPIDS AND NUCLEIC ACIDS (THEORY)

SEMESTER – II Paper III (30 B)

TOTAL HOURS : 30 CREDITS: 2

Unit I

Proteins

No. of Hours: 15

Formation of peptide bond, structural level of proteins, primary structure (oxytocin), secondary structure (alpha helix and beta plates e.g. keratin) tertiary structure (myoglobin), quaternary structure (hemoglobin) forces involved in stabilization of protein structure (covalent – disulphide, non-covalent- hydrogen bonds, Vander wall, ionic, hydrophobic)

Unit II

Vitamins

No. of Hours: 06

Sources, daily requirements and deficiency disorder of water and fat soluble vitamins

Enzymes

No. of Hours: 09

Define terms: Cofactor Coenzyme, Apoenzyme, Holoenzyme, Prosthetic group, endoenzyme, exoenzyme, intracellular and extracellular enzymes, constitutive and inducible enzymes

Classification of enzymes

Concept of catalysis: ES complex, reaction coordinate and activation of energy

Concept of active site

Lock and key model and induced fit model

B.Sc. I BIOCHEMISTRY (CBCS STRUCTURE)

Practical Course I (BHC 101)

Sr. No.	Name of the Practical	Practicals 20 L
1.	Fundamentals of Biochemical analysis. Control and Accuracy.	1
2.	Calibration of glassware's (pipette, burette, volumetric flasks etc.) and its importance.	1
3.	Preparation of standard solutions (% , Molar, Molal and Normal) of acids and alkali, stock and working solutions.	1
4	Preparations of buffer solutions of known pH and molarity using pH meter (Bicarbonate/phosphate/acetate).	1 (Minor expt)
VOLUMETRIC EXPERIMENTS		
5	Estimation of glycine by formal titration	1
6	Estimation of Vitamin C from lemon juice/tablet by 2,6, Dichlorophenol indophenols method	1
7	Estimation of lactose in milk by Benedict's method.	1
ISOLATIONS OF BIOLOGICAL SAMPLES		
8	Isolation and characterization of starch from potatoes.	1
9	Isolation and characterization of albumin from egg.	1
10	Isolation and characterization of casein from milk	1

B.Sc. I BIOCHEMISTRY (CBCS STRUCTURE)**Practical Course II (BCH 102)**

Sr. No.	Name of the Practical	Practicals 20 L
	SEPARATION METHODS	
1	Paper chromatographic separation & identification of amino acids from binary mixture.	1
2	Paper chromatographic separation & identification of carbohydrates from binary mixture.	1
3	Uptake of Na ions by cation exchange resin	1
	COLOURIMETRIC ESTIMATIONS	
4	Verification of Beer Lambert's law and estimation of copper sulphate.	1
5	Estimation of protein by biuret method	1
6	Estimation of creatinine in urine	1
7	Estimation of DNA by diphenylamine method	1
	QUALITATIVE TESTS AND DETECTIONS(Minor expts)	
8	Detection of Carbohydrates – Xylose, Glucose, Fructose, Sucrose, Maltose, Starch.	3
9	Detection of amino acids – Ninhydrin, xanthoproteic, sodium nitro preside , Pauly's diazo test.	1
10	Qualitative test of enzyme (amylase/invertase/urease)	1

Suggested readings:-

- 1) A text book of biological chemistry- M. S.Yadav, Dominant publishers.
- 2) Biophysics- Patabhi & Gautam Narosa publishing house
- 3) Outline of biochemistry- Conn & Stumph
- 4) Principles of Biochemistry- Jeffory, Zubey
- 5) Biochemistry- Lubert Stryer
- 6) Biochemistry (Concepts and Applications)-BurtonE.tropp Brooks/ Cle publishing company
- 7) Principles of Biochemistry-White, Handler and Smith.
- 8) Biochemistry-O.P.Agrawal.
- 9) Text book of Biochemistry-West, Todd and Manson.
- 10) Text book of Biochemistry and Human Physiology-G.P.Talwar.
- 11) Review of physiological chemistry-H.A.Harper.
- 12) Hawk's physiological chemistry- Oser.
- 13) Introduction to Chromatography theory and practice - Shrivastava.
- 14) Chromatography- B.K.Sharma.
- 15) Biochemistry- S.C. Rastogi.
- 16) Text book of Biochemistry-R.C. Dubey.
- 17) Text book Biochemistry- A.V.S.S.Ramarao.
- 18) Biochemistry-J.H. Weil.
- 19) Fundamentals of Biochemistry-Voet,Voet & Pratt.
- 20) Fundamentals of Biochemistry-J.L.Jain.
- 21) Biochemistry-U.Satyanarayan.
- 22) Theory and Problems in Biochemistry-P.W.Kuchel and Ralston.
- 23) Nutritional Biochemistry-Dr.S.Ramkrishna & dr.S.Vyankatrao.
- 24) Cell and molecular biology-P.K.Gupta.
- 25) Biotechnology-B.D.Singh.
- 26) Biotechnology-M.P.Arora.