

**PROGRAMME: B.Sc. BIOCHEMISTRY
CURRICULUM**

SEMESTER I									
Sl. No	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	STA1101 SFR1101 SHN1101	Tamil - I French - I Hindi – I	3	0	0	3	50	50	1 3 5
2.	SHS1109	General English – I	3	0	0	3	50	50	5
3.	SBC1001	Biomolecules	4	0	0	4	50	50	7
4.	SBB1102	Fundamentals of Microbiology	4	0	0	4	50	50	8
5.	SBT1001	Environmental Science	3	0	0	3	50	50	9
6.	SBC4101	Fundaments of Biochemistry Lab	0	0	2	2	50	50	11
7.	SBB4102	Fundaments of Microbiology Lab	0	0	2	2	50	50	11
Total Credits for Semester 1 – 21									
Total Marks for Semester 1 – 700									

SEMESTER II									
Sl. No	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	STA 1102 SFR 1102 SHN1102	Tamil – II French – II Hindi – II	3	0	0	3	50	50	12 14 15
2	SHS 110	General English – II	3	0	0	3	50	50	16
3.	SBB1101	Cell Biology	4	0	0	4	50	50	18
4.	SBB1201	Zoology	4	0	0	4	50	50	19
5.	SBC1202	Basics of Computers	3	0	0	3	50	50	20
6.	SBB4202	Cell Biology Lab	0	0	4	2	50	50	21
7.	SBC4201	Zoology Lab	0	0	4	2	50	50	21
Total Credits for Semester 2 – 21									
Total Marks for Semester 2 – 700									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS
CAE – CONTINUOUS ASSESSMENT EXAMINATION,
ESE – END SEMESTER EXAMINATION

SEMESTER III									
S. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBC2101	Molecular Biology I	4	0	0	4	50	50	22
2.	SCY1213	Chemistry I	3	0	0	3	50	50	23
3.	SBC2102	Enzymes	4	0	0	4	50	50	24
4.	SBC2103	Biophysical chemistry	3	0	0	3	50	50	25
5.		Elective I	3	0	0	3	50	50	
6.	SBB4301	Molecular Biology Lab	0	0	3	2	50	50	26
7.		Chemistry Lab	0	0	3	2	50	50	26
Total Credits for Semester 3 – 21									
Total Marks for Semester 3 – 700									

SEMESTER IV									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBC2201	Intermediary Metabolism I	4	0	0	4	50	50	27
2.	SCY1214	Chemistry II	3	0	0	3	50	50	28
3.	SBC2202	Molecular Biology II	3	0	0	3	50	50	29
4.	SBB1201	Immunology	4	0	0	4	50	50	30
5.		Elective II	3	0	0	3	50	50	
6.	SBB4201	Immunology Lab	0	0	3	2	50	50	31
7.	SBC4401	Enzymology Lab	0	0	3	2	50	50	31
Total Credits for Semester 4 – 21									
Total Marks for Semester 4 – 700									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS
 CAE – CONTINUOUS ASSESSMENT EXAMINATION,
 ESE – END SEMESTER EXAMINATION

SEMESTER V									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBC3101	Intermediary Metabolism II	4	0	0	4	50	50	32
2.	SBC3102	Genetics	3	0	0	3	50	50	33
3.	SBC3103	Endocrinology	3	0	0	3	50	50	34
4.	SBC3104	Clinical Biochemistry	4	0	0	4	50	50	35
5.		Elective III	3	0	0	3	50	50	
6.	SBC4501	Clinical Biochemistry Lab	0	0	3	2	50	50	36
7.	SBC4502	Genetics Lab	0	0	3	2	50	50	36
Total Credits for Semester 5 – 21									
Total Marks for Semester 5 – 700									

SEMESTER VI									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBT1002	Research Methodology	3	0	0	3	50	50	37
2.	SBC3201	Plant Biochemistry	3	0	0	3	50	50	38
3.	S30PROJ	Project	0	0	30	15	50	50	
Total Credits for Semester 6 – 21									
Total Marks for Semester 6 – 300									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS
 CAE – CONTINUOUS ASSESSMENT EXAMINATION,
 ESE – END SEMESTER EXAMINATION,

Semester	Theory courses (including elective courses)			Practical Courses (including Project)		
	Total No.	Total Credits	Total Marks	Total No.	Total Credits	Total Marks
1	5	17	500	2	4	200
2	5	17	500	2	4	200
3	5	17	500	2	4	200
4	5	17	500	2	4	200
5	5	17	500	2	4	200
6	2	6	500	1	15	100
Overall Total	27	91	3000	11	35	1100

Overall total credits for B.Sc.(Biochemistry) Programme	126
Overall total marks for B.Sc.(Biochemistry) Programme	4100

LIST OF ELECTIVES

ELECTIVE COURSES									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1	SBB2103	Concepts in Biotechnology	3	0	0	3	50	50	39
2	SMB1602	Biofertilizers and Biopesticides	3	0	0	3	50	50	40
3	SMB1603	Food Fermentation Techniques	3	0	0	3	50	50	41
4	SBB1601	Nutritional Biochemistry	3	0	0	3	50	50	42
5	SMB1605	Advanced instrumentation Techniques	3	0	0	3	50	50	43
6	SBB1609	Introduction to Bioinformatics	3	0	0	3	50	50	44
7	SMB1607	Medical Laboratory techniques	3	0	0	3	50	50	45
8	SMB1611	Biostatistics and probability	3	0	0	3	50	50	46
9	SMB1612	Human Physiology	3	0	0	3	50	50	47
10	SBB1615	Bioethics, Biosafety and IPR	3	0	0	3	50	50	48
11	SBB1607	Genomics and Proteomics	3	0	0	3	50	50	49
12	SBB1605	Cancer biology	3	0	0	3	50	50	50
13	SBB1602	Biopharmaceutical Technology	3	0	0	3	50	50	51
14	SBB1604	Protein engineering	3	0	0	3	50	50	52
15	SBB1608	Metabolic Engineering	3	0	0	3	50	50	53
16	SBB1616	Nanobiotechnology	3	0	0	3	50	50	54

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SBC2102	ENZYMES	L	T	P	Credits	Total Marks
		4	0	0	4	100

COURSE OBJECTIVES

- The objective of the course is to provide a deeper insight into the fundamentals, classification, structure, function and kinetics of enzymes. Also know about current applications and future potential of enzymes.

UNIT 1 INTRODUCTION TO ENZYMES**12 Hrs.**

Historical perspective, Nomenclature and Classification of Enzymes – Properties of Enzymes, Enzyme Activity and Units, Specific Activity, Catalytic Power and Specificity, Lock and Key Theory, Induced Fit Model, Transition State and Strain Theory of Enzyme Action.

UNIT 2 ENZYME KINETICS AND INHIBITION**12 Hrs.**

Relationship between initial velocity and substrate concentration, steady state kinetics, equilibrium constant, monosubstrate reactions. Michaelis-Menten equation, Lineweaver-Burk plot, Eadie-Hofstee, Hanes-Woolf, and Cornish-Bowden Plots – K_m and V_{max} , K_{cat} and turnover number, Effect of pH, temperature and metal ions on the activity of enzyme, Bi-substrate Reactions, Enzyme Inhibition, Irreversible, Reversible, Competitive, Uncompetitive – Mixed and Non-Competitive inhibition, graphical analysis.

UNIT 3 ENZYMATIC CATALYSIS & COENZYMES**12 Hrs.**

Acid-Base Catalysis, Covalent Catalysis, Metal ion Catalysis, Electrostatic Catalysis, Catalysis through Proximity and Orientation effects, Catalysis by Transition State Binding. Catalysis in Model Enzymes – Ribonuclease A – Chymotrypsin, Carbonic anhydrase – Carboxypeptidase A, Lysozyme. Coenzymes – NAD(P)⁺, FMN & FAD, CoA-SH, TPP, PLP, Biotin, THF, Methylcobalamin, Structure & Function.

UNIT 4 ENZYME REGULATION AND PURIFICATION**12 Hrs.**

Product inhibition, feedback control, enzyme induction and repression and covalent modification. Allosteric regulation. Enzyme isolation and purification, Preliminary and Advanced techniques.

UNIT 5 APPLICATIONS OF ENZYMES**12 Hrs.**

Immobilized enzymes, methods and applications in industry, medicine, Isoenzymes, properties and physiological significance (lactate dehydrogenase). Application of enzymes in diagnostics (SGPT, SGOT, creatine kinase, alkaline and acid phosphatases), enzyme immunoassay (HRPO), enzyme therapy (Streptokinase).

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Lehninger's Principle of Biochemistry by D. L. Nelson and M.M. Cox. 4th ed. Freeman, 2004
2. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry by Trevor Palmer, Philip L.R. Bonner, 2nd Edition, Horwood Publishing Ltd, 2007. Nicholas Price and Lewis Stevens, Fundamentals of Enzymology: Cell & Molecular Biology of Catalytic Proteins by, Third Edition, Oxford University Press. 1999.
3. Dixon & Webb. Enzymes. 3rd Edition Longmans, 1979.
4. Donald Voet, Judith G. Voet, Biochemistry. John Wiley and Sons. 2011.
5. Gray, Calvin and Bhatia, Enzyme Biotechnology, 1st edition, CBS Publishers & Distributors, 2012.
6. Shanmugam, Sathishkumar and Shanmugaparakash, Enzyme Technology, 2nd edition, Ik International Publishing, 2012.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each unit of internal choice; each carrying 16 marks****80 Marks**

SBC2201	INTERMEDIARY METABOLISM I	L	T	P	Credits	Total marks
		4	0	0	4	100

COURSE OBJECTIVES

This course aims at understanding the essential metabolic functions of the organism as well as consumption and storage of energy intermediary metabolism of main biomolecules and its regulatory mechanisms.

UNIT I THERMODYNAMIC PRINCIPLES**12 Hrs.**

Laws of Thermodynamics, Enthalpy, enthalpy free energy, forward and reverse reaction equilibrium state, oxidation and reduction, redox reactions, redox potential. Anabolism – catabolism. High energy compounds.

UNIT II METABOLIC PRINCIPLES**12 Hrs.**

Linear and Non-linear metabolic pathways and its types, ATP as the energy currency of the cell. Role of secondary messengers in cell. Metabolites, secondary metabolites and intermediates.

UNIT III PHOTOSYNTHESIS**12 Hrs.**

Photophosphorylation: Cyclic and Non-cyclic photophosphorylation. Central photochemical event. Light driven electron flow, ATP synthesis by photophosphorylation.

UNIT- IV CARBOHYDRATE METABOLISM**12 Hrs.**

Glycolysis and oxidation of pyruvate, Pentose phosphate pathway, Glycogen metabolism: Glycogenesis and glycogenolysis, gluconeogenesis - illustrations, regulation and energetics.

UNIT- V ENERGY PRODUCTION**12 Hrs.**

Tricarboxylic acid cycle, convergence of all metabolic pathways into TCA, Respiratory chain in mitochondria, chemiosmotic theory, oxidative phosphorylation, uncouplers, transport systems in inner mitochondrial membrane.

Max Hours.60**TEXT / REFERENCE BOOK**

1. D. L. Nelson and M. M. Cox, *Lehninger Principles of Biochemistry*. WH Freeman, 2017.
2. J. M. Berg, J. L. Tymoczko, and L. Stryer, *Biochemistry, Fifth Edition: International Version*. W. H. Freeman, 2002.
3. R. K. Murray, D. K. Granner, P. A. Mayes, and V. W. Rodwell, *Harper's Illustrated Biochemistry*. Mcgraw-hill, 2003.
4. P. C. Champe, R. A. Harvey, and D. R. Ferrier, *Biochemistry*. Lippincott Williams & Wilkins, 2005.
5. D. Voet and J. G. Voet, *Biochemistry*. Wiley, 2004.
6. J. L. Jain, S. Jain, and N. Jain, *Fundamentals of Biochemistry*. S. Chand Limited, 2005.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**