B. Sc., BIOCHEMISTRY

Course Structure

Programme Code : 3USBIC

2023-2026

SENGAMALA THAYAAR EDUCATIONAL TRUST
WOMEN'S COLLEGE (AUTONOMOUS)
(Affiliated to Bharathidasan University, Tiruchirappalli)
(Accredited by NAAC & An ISO 9001:2015 Certified Institution)
Sundarakkottai, Mannargudi–614 016,
Thiruvarur (Dt.), Tamil Nadu, India.

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

(Accredited by NAAC & An ISO 9001:2015 Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI–614016.

TAMILNADU, INDIA.

B.Sc., BIOCHEMISTRY

CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED CURRICULUM FRAME WORK (CBCS–LOCF)

(For the candidates admitted in the academic year 2023–2024)

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

OUTCOME-BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses with in a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education Course: is defined as a theory, practical or theory cum practical subject studied in a semester. **Course Outcomes (COs):** are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weight age.

Programme: is defined as the specialization or discipline of a Degree. **Programme Outcomes (POs):** Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes. **Programme Specific Outcomes (PSOs):** PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline. **Some important terminologies repeatedly used in LOCF.Core Courses (CC)** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding oftheir main discipline. In order to maintain a requisite standard certain core courses must be includedin an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE) Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Non Major Elective (NME). A student shall choose at least two Non – major Elective Courses (NME) from outside his /her department. Non –Major Elective I – Those who choose Tamil in Part I can choose a non –major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studies in school level or b) Special Tamil if Tamil language was studies up to 10^{th} & 12^{th} standard.

Skill Enhancement Courses (SECs) These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge**.**

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Under graduate Programme:

Programme Pattern: The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III: Core Course (Theory, Practicals, Generic Elective courses, Discipline Specific Elective courses, Compulsory and Optional Allied courses, Project)

Part-IV: Non Major Elective, Foundation Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

Part –V

Extension activity, Gender studies

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks

Passing Minimum: 40 %

Assisgnment-3	=	30%
Test-2	=	50%
Seminar	=	10%
Attendance	=	10%

Question Paper Pattern

Part A:

Part A 1 (10X1=10 marks)
One word question/ Fill in /True or False/ Multiple Choice QuestionsTwo Questions from Each unit

Part A 2 (5X2=10 marks)
Short Answers/ Match the following
One question from each unit
Total Marks – 20
Part B: (5X5=25 marks)
Paragraph Answers
Either/ or type, One Question from each unit
Part C: (10X3=30)
Essay Type Answers
Answer 3 out of 5 Questions
One Question from each unit
Part A: K1 Level
Part B: K2, K3 and K4 Level
Part C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/ Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS →	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20	25			30		**75**
Continuous Internal Assessment (CIA)	20	25			30		**75**

QUESTION PATTERN FOR END SEMESTER EXAMINATION/Continuous Internal Assessment

PART		MARKS
PART –A I. (No choice ,One Mark) **TWO** questions from each unit **II.** (No choice ,Two Mark) **ONE** question from each unit	(10x1 =10) (5x2 =10)	20
PART -B (Either/ or type ,5-Marks) **ONE** questions from each unit	(5x5 =25)	25
PART -C (3 out of 5) (10 Marks) **ONE** question from each unit	(3x10 =30)	30
	Total	**75**

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION

DURATION: 3. 00 Hours. **Max Mark : 75**

K- LEVELS / PART	K1	K2	K3	K4	K5	K6	Total Marks
PART –A (One Mark, No choice) (10x1 =10)	10						10
(2-Marks, No choice) (5x2=10)	10						10
PART –B (5- Marks) (Either/or type) (5x5=25)		5	10	10			25
PART -C (10 Marks) (3 out of 5) (3x10=30) Courses having only **K5, K6** levels, K5 level- 3 Questions, K6 level- 2 Questions **(One K6 level question is compulsory)**					20	10	30
Total	**20**	**05**	**10**	**10**	**20**	**10**	**75**

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) , respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{I=1}^{n} C_i}$	$WAM\,(\text{Weighted Average Marks}) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1}^{n} C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses **Passed** in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

1. For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
2. For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
3. Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
4. A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
5. Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses - UG

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including pervious semester /s is indicated by **Cumulative Grade Point Average (CGPA).**

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

VISION

Imparting quality education in Biochemistry to make the students to document the biological resources with scientific validation so as to enhance the quality of life.

MISSION

- To provide a learning environment to the students to understand, analyze and augment the basic analytical skills in Biochemistry.
- To expose the students and make them well versed in the various biochemical processes and update their knowledge and skills in advanced biochemical techniques.

PROGRAMME OUTCOMES FOR B.Sc., DEGREE PROGRAMMES

PO No.	Programme Outcomes (*Upon completion of the B.Sc., Degree Programme, the Under graduate will be able to)*
PO-1	**Disciplinary knowledge**: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an under graduate Program of study in Bachelor of Science.
PO-2	**Critical thinking, Problem Solving and Reflective thinking:** Think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, with self-awareness and reflexivity of both self and society.
PO-3	**Analytical & Scientific Reasoning:** Evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesized from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO-4	**Research-related Skills:** Develop a sense of capability for relevant/ appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO-5	**Digital literacy and Effective Communication:** Use ICT in a variety of learning situations and **s**peak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology; Efficiently communicate thoughts and ideas in a clear and concise manner.
PO-6	**Individual and Team Work:** Effectively accomplish tasks individually as wellas work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interest so for a common cause and work efficiently as a member of a team.

PO-7	**Multicultural Competence and Social Interaction:** Understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO-8	**Awareness of Ethical issues, Human values and Gender Issues:** Embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning women and society.
PO-9	**Awareness of Environment and Sustainability:** Understand the impacts of technology and business practices in societal and environmental contexts, and Sustainable development.
PO-10	**Self directed and Lifelong learning:** Acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the Broadest context of socio-technological changes.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO No.	Program Specific Outcomes (B.Sc., Biochemistry)
PSO1	Comprehend the knowledge in the biochemical, analytical, biostatistical and Computational areas
PSO2	Ability to understand the technical aspects of existing technologies that help in Addressing the biological and medical challenges faced by human kind
PSO3	Acquiring analytical and hands on skills to perform research in multidisciplinary environments
PSO4	Use library search tools and online databases and sources to locate and retrieve scientific information about a topic and techniques related to biochemistry

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SUNDARAKKOTTAI, MANNARGUDI–614 016.
TAMIL NADU, INDIA.

B.Sc., BIOCHEMISTRY COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED CURRICULUM FRAME WORK(CBCS-LOCF)

(For the candidates admitted from the academic year 2023-2024)

ELIGIBILITY: A Pass in 10+2 with Chemistry

Semester	Part	Course	Course Code	Title of the Course	Ins. Hours/ Week	Ins.Hours/ Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
I	I	Language Course-I	U23LC101	Pothu Tamil– I	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-I	U23ELC101	General English -I	6	5	1	0	0	3	3	25	75	100
	III	Core Course-I	U23BC101	Nutritional Biochemistry	5	4	1	0	0	5	3	25	75	100
		Core Practical-I	U23BC102P	Nutritional Biochemistry Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-I	U23ACH101	Allied Chemistry-I	3	2	1	0	0	2	3	25	75	100
		Allied Practical-I	U23ACH102P	Allied Chemistry Practical	2	0	0	2	0	--	--	---	--	--
	IV	Non Major Elective-I	-	-	2	1	1	0	0	2	3	25	75	100
		Foundation Course	U23FCBC11	Introduction to Biochemistry	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**21**	-	-	-	**700**
II	I	Language Course-II	U23LC202	Pothu Tamil– II	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-II	U23ELC202	General English -II	6	5	1	0	0	3	3	25	75	100
	III	Core Course–II	U23BC203	Cell Biology	5	4	1	0	0	5	3	25	75	100
		Core Practical-II	U23BC204P	Cell Biology Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-II	U23ACH203	Allied Chemistry- II	3	2	1	0	0	2	3	25	75	100
		Allied Practical-I	U23ACH102P	Allied Chemistry Practical	2	0	0	2	0	2	3	25	75	100
	IV	Non Major Elective-II	-	-	2	1	1	0	0	2	3	25	75	100
		Skill Enhancement Course-I	U23SEBC21	Biomedical Instrumentation	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**23**	-	-	-	**800**
III	I	Language Course-III	U23LC303	Pothu Tamil-III	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-III	U23ELC303	General English -III	6	5	1	0	0	3	3	25	75	100
	III	Core Course-III	U23BC305	Biomolecules	5	4	1	0	0	5	3	25	75	100
		Core Practical-III	U23BC306P	Biomolecules Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-III	U23AMI301	Basic Microbiology	3	2	1	0	0	2	3	25	75	100
		Allied Practical-II	U23AMI302P	Microbiology Practical	2	0	0	2	0	-	--	--	--	--
	IV	Skill Enhancement Course–II	U23SEBC32	First Aid	2	1	1	0	0	2	3	25	75	100
		Skill Enhancement Course –III	U23SEBC33	Basics of Forensic Science	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**21**	-	-	-	**700**
	I	Language Course-IV	U23LC404	Pothu Tamil-IV	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-IV	U23ELC404	General English-IV	6	5	1	0	0	3	3	25	75	100

Semester	Part	Course	Course Code	Title of the Course	Ins. Hours/ Week	Ins.Hours/ Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
IV	III	Core Course-IV	U23BC407	Biochemical Techniques	5	4	1	0	0	5	3	25	75	100
		Core Practical-IV	U23BC408P	Biochemical Techniques Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-IV	U23AMI403	Medical Microbiology	3	2	1	0	0	2	3	25	75	100
		Allied Practical-II	U23AMI302P	Microbiology Practical	2	0	0	2	0	2	3	25	75	100
	IV	Skill Enhancement Course–IV	U23SEBC44	Medical Coding	2	1	1	0	0	2	3	25	75	100
		Skill Enhancement Course–V	U23SEBC45	Medical Laboratory Techniques	2	1	1	0	0	2	3	25	75	100
		TOTAL			**30**	**18**	**6**	**6**	**0**	**23**	-	-	-	**800**
V	III	Core Course-V		Enzymes	5	4	1	0	0	5	3	25	75	100
		Core Course-VI		Intermediary Metabolism	5	4	1	0	0	4	3	25	75	100
		Core Course-VII		Clinical Biochemistry	6	5	1	0	0	5	3	25	75	100
		Core Practical-V		Clinical Biochemistry Practical	4	0	0	4	0	4	3	25	75	100
		Elective Course–I		Human Physiology/ Plant Biochemistry and Plant therapeutics/ Food and Nutrition	4	3	1	0	0	3	3	25	75	100
		Elective Course–II		Research Methodology/ Biotechnology/ Genetic Engineering	4	2	1	1	0	3	3	25	75	100
	IV	EVS		Environmental Studies	2	2	0	0	0	2	3	25	75	100
		Internship/ Industrial Visit/ Field Visit		Internship/ Industrial Visit/ Field Visit	0	0	0	0	0	2	-	-	-	-
		TOTAL			**30**	**20**	**5**	**5**	**0**	**28**		-	-	**700**
VI	III	Core Course-VIII		Molecular Biology	6	5	1	0	0	4	3	25	75	100
		Core Practical-VI		Molecular Biology Practical	6	0	0	6	0	4	3	25	75	100
		Core Project		Project with viva-voce/ Group Project	5	0	1	4	0	5	3	25	75	100
		Elective Course-III		Endocrinology/ Biochemical Pharmacology/ Genetics	4	3	1	0	0	3	3	25	75	100
		Elective Course-IV		Immunology/ Bioinformatics/ Pharmaceutical Biochemistry	4	3	1	0	0	3	3	25	75	100
	IV	Value Education		Value Education	2	2	0	0	0	2	3	25	75	100
		Professional Competency Course		Bioentrepreneurship	2	2	0	0	0	2	3	25	75	100
	V	Gender Studies		Gender Studies	1	1	0	0	0	1	3	25	75	100
		Extension activity		Extension activity	0	0	0	0	0	1	-	-	-	-
		TOTAL			**30**	**16**	**4**	**10**	**0**	**25**	-	-	-	**800**
		GRAND TOTAL			**180**	**108**	**33**	**39**	**0**	**141**	-	-	-	**4500**
Extra Credit				MOOC/SWAYAM/NPTEL	**-**	-	**-**	**-**	**-**	**2**	-	-	-	**-**
				Value Added Courses (Atleast One Per Year)	**-**	-	**-**	**-**	**-**	**2**	-	-	-	**-**

L-Lecture **T-Tutorial** **P-Practical** **S-Seminar**

CREDIT DISTRIBUTION FOR UG PROGRAMME

S.No.	Part	Courses	No. of Courses	Total Credits
1	I	Language Course	4	12
2	II	English Language Course	4	12
3	III	Core Course-Theory	8	38
4		Core Practical	6	24
5		Core Project	1	05
6		Allied Course-Theory	4	08
7		Allied Course-Practical	2	04
8		Elective Course	4	12
9	IV	Non-Major Elective	2	04
10		Foundation Course	1	02
11		Skill Enhancement Course	5	10
12		Internship/ Industrial Visit/ Field Visit	1	02
13		Environmental Studies	1	02
14		Value Education	1	02
15		Professional Competency Course	1	02
16	V	Gender Studies	1	01
17		Extension Activity	1	01
Total			**47**	**141**

Note:

		CIA	ESE
1	Theory	25	75
2	Practical	25	75

3 Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

NME OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of the Course
I	IV	NME-I	U23NMEBC11	Health and Nutrition
II		NME-II	U23NMEBC22	Life Style Diseases

SEMESTER-III

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-CC- III: Biomolecules

Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: U23BC305**

UNIT-I: Carbohydrates **(15 Hours)**

Carbohydrates-Classification and biological significance, physical properties – stereo isomerism, optical isomerism, anomers, epimers and mutarotation. Monosaccharides: Occurrence, linear and cyclic structure, Reactions of mono saccharides due to the presence of hydroxyl, aldehyde and keto groups. Disaccharides: Structure and properties of reducing disaccharides (lactose and mannose), non-reducing disaccharide (sucrose).Polysaccharides: Homo polysaccharides - Occurrence, structure and biological significance of starch, glycogen and cellulose. Heteropolysaccharides-Structure and biological significance of muco polysaccharides-hyaluronicacid, chondroitin sulphate and heparin. (Structural elucidation not needed).

UNIT –II: Amino acids **(15 Hours)**

Amino acids -Classification based on composition of side chain and nutritional significance. General structure of amino acids. 3 - and 1- letter abbreviations. Modified amino acids in protein non - protein amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids.

UNIT- III: Proteins **(15 Hours)**

Proteins-Classification based on shape, composition, solubility and functions. Properties of proteins - Ampholytes, isoelectric point, salting in and salting out, denaturation and renaturation, UV absorption. Levels of Organization of protein structure- Primary structure, Formation and characteristics of peptide bond, phi and psi angle, Secondary structure-α helix (egg albumin), β- pleated sheath (keratin), triple helix (collagen). Tertiary structure with reference to myoglobin. Quaternary structure with reference to haemoglobin.

UNIT-IV: Lipids **(15 Hours)**

Lipids: Bloor's classification, chemical nature and biological functions. Fatty acids: classification, nomenclature, structure and properties of fatty acids. Simple and mixed triglycerides: structure and general properties, Characterization of fats- iodine value, saponification value, acid number, acetyl number, polensky number, Reichert –Meissl number along with their significance. Compound lipids-Structure and functions of phospholipids and glycolipids. Derived lipids-Structure and functions of cholesterol, bile acids and bile salts.

UNIT-V: Nucleic acids **(15 Hours)**

Nucleic acids-Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, C, Z DNA, structure and biological significance, superhelicity. Types of RNA: mRNA, tRNA, rRNA, hnRNA, snRNA, Secondary and tertiary structure of tRNA. Properties of DNA-Hypochromic and hyperchromic effect, melting temperature, viscosity. Denaturation and annealing.

Total Lecture Hours-75

COURSE OUTCOME

The students are able to,

1. Classify, illustrate the structure and explain the physical and chemical properties of carbohydrates.
2. Indicate the classification, structure, properties and biological functions of amino acids
3. Explain the classification and elucidate the different levels of structural organization of proteins
4. Elaborate on classification, structure, properties, functions and characterization of lipids
5. Describe the structure, properties and functions of different types of nucleic acids

TEXT BOOK(S)

1. S. P. Bhutani, 2022, Chemistry of Biomolecules, 2nd Edition, CRC Press.
2. U.Sathyanarayana & U.Chakrapani, 2013, Biochemistry, 5th edition, Elsevier India Pvt. Ltd., Books & Allied Pvt. Ltd.
3. J.L.Jain, Sunjay Jain, Nitin Jain, 2013, Fundamentals of Biochemistry, 7th edition , S.Chand & Company Ltd.
4. M N Chatterjea, Rana Shinde, 2002, Text book of Medical Biochemistry, 8thedition, Jaypee Brothers.
5. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 2003. Harper's Illustrated Biochemistry, 26th edition, McGraw-Hill Medical Publishers, New York.
6. Vasudevan DM. 2018. Biochemistry. 9th edition. Aypee Brothers Medical Publishers, New Delhi.

REFERENCE BOOK(S)

1. David L.Nelson, Michael M.Cox, 2017, Principles of Biochemistry, 7thedition, W.H.Freeman and Company.
2. Voet.D,Voet.J.G.and Pratt,C.W, 2004, Principles of Biochemistry, 4th edition John Wiley & Sons, Inc.
3. Zubay G.L,*et.al*.,1995,PrinciplesofBiochemistry,1stedition,WmC.Brown Publishers.
4. Ambika Shanmugam, 2016, Fundamendals of Biochemistry, 8th Edition. Wolters Kluwer India Pvt Ltd
5. Nelson, D. L. and Cox, M. M. 2008, Lehninger Principles of Biochemistry, Freeman, 5th edn.

E-RESOURCES

1. https://www.britannica.com/science/biomoleculehttps://en.wikipedia.org/wiki/Biomolecule https://www.khanacademy.org/science/biology/macromolecules
2. http://www1.biologie.uni-hamburg.de/b online/library/biology107/bi107vc/fa99/terry /sugars.html
3. https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod10.pdf
4. https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod11.pdf
5. https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod12.pdf
6. https://www.pdfdrive.com/biochemistry-books.html

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-CP- III: Biomolecules Practical

Ins. Hrs. /Week: 4 **Course Credit: 4** **Course Code: U23BC306P**

I. Qualitative test for

1) Carbohydrates - a) Glucose b) Fructose c) Arabinose d) Maltose e) Sucrose f) Lactose g) Starch

2) Amino acids - a) Arginine b) Cysteine c) Histidine d) Proline e) Tryptophan f) Tyrosine g) Methionine

II. Titrimetric methods

1) Determination of Saponification value of edible oil
2) Determination of Iodine number of edible oil
3) Determination of Acid number of edible oil

III. Group Experiments

1) Isolation of DNA from plant/animal source.
2) Isolation of RNA from Yeast/Ecoli.

Total Lecture Hours-60

COURSE OUTCOME

The students are able to,

1. Qualitatively analyse the carbohydrates and report the type of carbohydrate based on Specific tests
2. Qualitatively analyse amino acids and report the type of amino acids based on specific Tests
3. Determine the Saponification, Iodine and acid number of edible oil
4. Isolate the nucleic acid from biological sources.

TEXT BOOK(S)

1. David T Plummer, 2017, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw- Hill Edition.
2. J. Jayaraman, 2015, Laboratory Manual in Biochemistry, New Age International (P) Limited Fifth edition.
3. S. Sadasivam A. Manickam, 2018,Biochemical Methods New age International Pvt Ltd,publisher's third edition.
4. Bhavya D K, Sujana J, Swarnalatha B N, 2023, Practical Manual of Chemistry & Biochemistry for UG & PG students, Walnut Publication.

REFERENCE BOOK(S)

1. Rageeb, Kiran Patil, M. Bakshi Rahman, Sufiyan Ahmad Raees, 2019, A Practical book on Biochemistry Everest publishing house1st Edition,
2. S.K. Sawhney, Randhir Singh, 2005, Introductory practical Biochemistry, 2nd edition.
3. Anil Kumar, Sarika Garg and NehaGarg. 2012,Biochemical Tests – Principles and Protocols Vinod Vasishtha Viva Books Pvt Ltd,.
4. Harold Varley, 2006, Practical Clinical Biochemistry, CBS. 6th edition.
5. Keith Wilson and John Walker, 2005,Principles and Techniques of Practical Biochemistry, 6th edition, Cambridge University press, Britain.

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DEPARTMENT OF MICROBIOLOGY

B.Sc., BIOCHEMISTRY

Semester: III-AC-III: Basic Microbiology

Ins. Hrs. / Week: 3 **Course Credit: 2** **Course Code: U23AMI301**

UNIT–I:Introduction and classification **(09 Hours)**

Definition, scope and History of microbiology. Germ theory of disease. Differences between prokaryotic and eukaryotic microorganisms. Classification of Bacteria: based on Gram's staining, temperature and oxygen requirement. Brief overview of Archaea.

UNIT – II: Viruses, fungi, algae and protozoans **(09 Hours)**

Structure, General characteristics , Classification and economic importance of viruses, fungi, Algae and Protozoa

UNIT – III: Microbial growth **(09 Hours)**

Microbial growth. Factors affecting microbial growth: nutrient factors (C, H, N, O, P, S and trace elements) and non-nutrients (temperature, hydrostatic pressure, pH, osmotic strength). Types of nutrient media and special nutrient media. Differential media, Streak plate, pour plate, Antibiotic sensitivity test.

UNIT – IV: Food and industrial microbiology **(09 Hours)**

Quality control of drinking water: total coli form count. Microorganisms in milk and milk products, and the preservation of milk. Role of microbes in industrial production of fermented foods: alcoholic beverages, dairy products, coffee and chocolate. Preservation of wine. Single-cell proteins, microbial biofuel and biofertilizers.

UNIT – V: Microbial diseases and antimicrobial agents **(09 Hours)**

Diseases caused by bacteria, viruses, protozoa and fungi: airborne diseases, water-borne diseases and milk-borne diseases. Prion diseases. Principles and methods of sterilization and disinfection. History, and brief overview of antibiotics, their mechanisms of action, and antibiotic resistance.

Total Lecture Hours-45

COURSE OUTCOME:

The students are able to,

1. Recall the Foundational and horizontal knowledge in microbiology
2. Compare the characteristics of diverse kinds of microorganisms
3. Develop skills for the preparation of different types of media.
4. Evaluate the microbial quality of water, milk and fermented food products
5. Identify the methods of sterilization and disinfection.

TEXT BOOK(S)

1. Joanne Willey, Kathleen Sandman and Dorothy Wood, 2023, Prescott's Microbiology, 12th Edition, McGraw Hill, New Delhi.
2. Leboffe MJ and Pierce BE, 2011,A photographic atlas for the microbiology laboratory (4^{th} ed.), Englewood: Morton Publishing, Colarodo.
3. Ananathanarayanan and Panikar, 2017.Text book of microbiology,10^{th} Edition, NewDelhi: The Orient Blackswan.
4. Dubey R.C. and Maheshwari D. K. 2022, Textbook of Microbiology. 5^{th} Edition S. Chand, Limited, Visakhapatnam.

REFERENCE BOOK(S)

1. Tortora G. J., Funke B. R. and Case C. L. 2015. Microbiology: An Introduction, 12th Edition.Pearson, London, United Kingdom.
2. Webster J. and Weber R.W.S. 2007, Introduction to Fungi. 3rd Edition, Cambridge University Press, Cambridge.
3. Schaechter M. and Leaderberg J. 2004, The Desk encyclopedia of Microbiology. Elseiver Academic Press, California.
4. Ingraham, J.L. and Ingraham, C.A. 2000, Introduction to Microbiology, 2nd Edition, Books/ Cole Thomson Learning, UK
5. Madigan M. T., Bender K.S., Buckley D. H. Sattley W. M. and Stahl, 2018, Brock Biology of Microorganisms,15th Edition, Pearson, UK

E-RESOURCES

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2. https://www.microbes.info/
3. https://www.asmscience.org/VisualLibrary
4. https://open.umn.edu/opentextbooks/BookDetail.aspx?bookId=404
5. https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf

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DEPARTMENT OF MICROBIOLOGY

B.Sc., BIOCHEMISTRY

Semester: III&IV-AP- II: Microbiology Practical

Ins. Hrs. /Week: 2 **Course Credit: 2** **Course Code: U23AMI302P**

1. Introduction to sterilization techniques- sterilization of glass wares, autoclaving.
2. Preparation of liquid and solid media
3. Isolation of Bacteria and fungi from soil samples – serial dilution technique
4. Measurement of bacterial population
5. Pure culture techniques: spread plate, streak plate technique and pour plate
6. Methylene blue reductase test (MBRT).
7. Determination of Bacterial growth curve
8. Identification of bacteria by morphological and Biochemical characteristics
9. Smear preparation and staining of bacteria: simple staining, Grams staining and spore Staining
10. In vitro antibiotic sensitivity tests for selected bacterial cultures
11. Methods for preserving microbial cultures: slant, glycerol stock and lyophilisation.

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Acquire skills on sterilization and disinfection techniques.
2. Understand the microbial culture techniques.
3. Develop knowledge on isolation and characterization techniques.
4. Analyse the biochemical characteristics of bacteria.
5. Compare the antibiotic sensitivity of the bacteria.

TEXT BOOK(S)

1. Gunasekaran P. 2007, Laboratory Manual in Microbiology. New Age International. New Delhi.
2. James G Cappucino and Natalie Sherman, 2016, Microbiology – A Laboratory manual. (5th Edition). The Benjamin publishing company. New York.
3. Hurst, C.J., Crawford R.L., Garland J.L., Lipson D.A., Mills A.L. and Stetzenbach L.D. 2007, Manual of Environmental Microbiology. (3rd Edition). American Society for Microbiology, Washington, D.C.
4. Shukla Das and Rumpa Saha, 2024, Microbiology Practical Manual, CBS Publishers and Distributors Pvt. Ltd, Chennai.

REFERENCE BOOK(S)

1. Sherman, N. and Cappuccino, J.G. 2004, Microbiology A Laboratory Manual,
2. Benjamin Cummings Publishing Company, San Francisco.
3. Dubey R.C. and Maheshwari D. K. 2022, Practical Microbiology. S. Chand Publisher, Bangalore
4. Cappuccimo, J. and Sherman, N. 2002, Microbiology: A Laboratory Manual, (6th Edition). Pearson Education, Publication, New Delhi.
5. Cullimore D. R.2010, Practical Atlas for Bacterial Identification. (2nd Edition). -Taylor &Francis, New Delhi
6. Rich R. R., Fleisher T. A., Shearer W. T., Schroeder H, Frew A. J. and Weyand C. M. 2018, Clinical Immunology: Principles and Practice. (5th Edition). Elsevier, UK
7. Glick B. R. and Patten C.L.2018, Molecular Biotechnology – Principles and Applications of Recombinant DNA. (5th Edition). ASM Press, California, USA

E-RESOURCES

1. http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-and-principles-microbiology/24403.
2. https://www.ebooks.cambridge.org/ebook.jsf?bid=CBO9781139170635
3. https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf
4. https://microbiologyinfo.com/top-and-best-microbiology-books/
5. https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

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(For the Candidates admitted in the academic year 2023– 2024)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-SEC-II: First aid

Ins. Hrs. / Week:2 **Course Credit: 2** **Course Code: U23SEBC32**

UNIT- I: First aid technique **(06 Hours)**

Aims and important rules of first aid, dealing with emergency, types, content and uses of a first aid kit. First aid technique – Dressing and Bandages, fast evacuation technique, transport techniques.

UNIT-II: First aid techniques of respiratory Problems **(06 Hours)**

Basics of Respiration **-** CPR, first aid during difficult breathing, drowning, choking, strangulation and hanging, swelling within the throat, suffocation by smoke or gases and asthma.

UNIT-III: Common medical aid **(06 Hours)**

First aid for wounds, cuts, head, chest, abdominal injuries, shocks, burns, amputations, fractures, dislocation of bones.

UNIT-IV: First aid for neural problems **(06 Hours)**

First aid related to unconsciousness, stroke, fits, convulsions- seizures, epilepsy.

UNIT-V: First aid for insect bites and chemicals poisoning **(06 Hours)**

First aid in poisonous bites (Insects and snakes), honey bee stings, animal bites, disinfectant, acid and alkali poisoning.

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Discuss on the rules of first aid, dealing during emergency and first aid techniques
2. Understand the first aid techniques to be given during different types of respiratory Problems
3. Provide first aid for injuries, shocks and bone injury
4. Detail on the first aid to be given for unconsciousness, stroke, fits and convulsions
5. Gain expertise in giving first aid for insect bites and chemical poisoning

TEXT BOOK(S)

1. Alton L. Thygerson, 2006, First Aid, 5th edition, Jones Bartlett Publishers, London ISBN: 07-637-4244-9.
2. Jon R. Kroner, 2004, First Aid Manual, 2nd edition. D.K. Publications, London, ISBN: 07–566 -0195-9.
3. Doring Kindersley, 2002, First Aid Manual 9th edition, A publication of St. John Ambulance & British Red Cross Society, ISBN: 07-5136- 9438.
4. Kathleen Handel,1992, The American Red Cross First Aid Safety Hand book, Little brown, United Kingdom, ISBN 03 -167-3646-5.
5. First Aid to the injured, 2009, 5th edition, St. John Ambulance, New Delhi.
6. Popli Sharma, 2021, Emergency First-Aid Safety Oriented, CBS publishers and distributors pvt ltd, New Delhi.

REFERENCE BOOK(S)

1. The authorized manual of St. John Ambulance, St. Andrew's Ambulance association and the British red cross society, First Aid manual, 9th edition, Dorling Kindersley, London.
2. American college of emergency physicians, First Aid manual, 5th edition, Dorling Kindersley, London.
3. Clement I, 2012 , Text book on First Aid & Emergency Nursing, First edition, JP brothers.
4. Philip Jevon, 2007, Emergency care and First Aid for Nurses, A practical guide, Churchill Living Stone.

E-RESOURCES

1.https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online.

2.https://www.firstaidforfree.com/

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2023– 2024)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-SEC-III: Basics of Forensic Science

Ins. Hrs. / Week: 2 **Course Credit: 2** **Course Code: U23SEBC33**

UNIT- I: Forensic Science: **(06 Hours)**

Definition, History and Development. Crime scene management and investigation; collection, preservation, packing and forwarding of physical and trace evidences for analysis.

UNIT-II: Blood **(06 Hours)**

Blood – grouping and typing of fresh blood samples including enzyme .Cases of disputed paternity and maternity problems, DNA profiling.

UNIT-III: Analysis of body fluids **(06 Hours)**

Analysis of body fluids- Analysis of illicit liquor including methyl and ethyl alcohol in body fluids and breathe. Chemical examination, physiology and pharmacology of Insecticides and pesticides.

UNIT-IV: Psychotropic drugs **(06 Hours)**

Psychotropic drugs -Sedatives, stimulants, opiates and drugs of abuse. Identification of poisons from viscera, tissues and body fluids.

UNIT-V: Identification tests **(06 Hours)**

Identification tests- Identification of hair, determination of species origin, sex, site and individual identification from hair. Classification and identification of fibers. Examination and identification of saliva, milk, urine and faecal matter

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Gain knowledge on basics of forensic science and method for collection and preservation of samples
2. Assess the paternity, maternity problems and DNA profiling
3. Identify the presence of alcohol, insecticides and pesticides in body fluids
4. Detail on the test performed to identify the presence of drugs and poisons in body fluids
5. Identify species and sex from the available body fluids

TEXT BOOK(S)

1. Henry C Lee, 2001, Henry Lee's Crime Scene Handbook: Academic Press, 1st Edition.
2. Forensic Biology: Shrikant H. Lade
3. Patric Jones, 2020, Crime Scene Processing and Laboratory Work Book : CRC Press.
4. Stuart H. James, 2015, Forensic Science: An Introduction to Scientific and Investigative Techniques 4th edition.
5. Richard Saferstein, 2007, Criminalistics: An Introduction to Forensic Science, 9th edition.
6. Dr. R.K. Tiwari , 2002,Computer Crime and Computer Forensic: Selective & Scientific Books.
7. Brent E.Turvey, 2011, Criminal Profiling: An Introduction to a Behavioral Evidence Analysis,Academic Press,3rd edition.

REFERENCE BOOK(S)

1. Norah Rudin & Keith Inman, 2001, An Introduction to Forensic DNA Analysis by USA, Second edition.
2. Saferstein, Richard E. 2001, Forensic Science Handbook, Volume 2 & 3.
3. Embar-Seddon, Ayn and Pass. Allan D. 2008, Forensics by Pearson, 1st Edition.
4. Adelman, Howard C & Kobilinsky, Lawrence, 2007, Forensic Medicine by Chelsea House Publications ; Illustrated edition.
5. B.R. Sharma, 2019, Forensic Science in Criminal Investigation and Trial, Lexis Nexis, 6th edition.
6. Handbook of Forensic Psychology: Dr. Veerraghavan crime scene, sketching of crime scene, searching, collection, preservation, packing of physical evidence, documentation of crime scene, forwarding or dispatch of exhibit in to the laboratory, chain of custody, collection of standard/reference samples.
7. Dr.Rukmani Krishnamurthy, 2021, Crime Scene Management with Special Emphasis on National level Crime Cases: 3rd Edition.
8. Parikh C.K. 2019, Text Book of Medical Jurisprudence, Forensic Medicine and Toxicology: CBS publishers and distributors Pvt. ltd, 8th Edition.
9. Barrard and Gerald, 1962, The Identification of Firearms and Forensic ballistics: Barnes, 1st Edition.

E-RESOURCES

1. http://www.crcnetbase.com/page/forensic_ebooks
2. https://www.fbi.gov/file-repository/handbook-of-forensic-services-pdf.pdf/view
3. http://www.forensic-science-society.org.uk/

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SEMESTER-IV

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-CC- IV: Biochemical Techniques

Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: U23BC407**

UNIT-I: Centrifugation **(15 Hours)**

Centrifugation - Basic principles, RCF**,** Sedimentation coefficient, Svedberg constant. Types of rotors. Preparative centrifugation- differential and density gradient centrifugation, Rate zonal and Isopycnic techniques, construction, working and applications of analytical ultracentrifuge- Determination of molecular weight (Derivation excluded)

UNIT –II: Chromatography **(15 Hours)**

Chromatography - adsorption, partition. Principle, instrumentation and applications of paper chromatography, thin layer chromatography, ion-exchange chromatography, gel permeation chromatography ,affinity chromatography,GC-MS,LC-MS,HPLC and HPTLC.

UNIT- III: Electrophoresis **(15 Hours)**

Electrophoresis – General principles, factors affecting electrophoretic mobility. Tiselius moving boundary electrophoresis. Electrophoresis with paper and starch. Principle, instrumentation and applications of agarose gel electrophoresis and SDS-PAGE.

UNIT-IV: Basics of Electromagnetic radiations **(15 Hours)**

Basics of Electromagnetic radiations- Energy, wavelength, wave number and frequency. Absorption and emission spectra, Lambert – Beer Law, Light absorption and transmittance. Colorimetry - Principle, instrumentation and applications. Visible and UV spectrophotometry – Principle, instrumentation and applications –enzyme assay, structural studies of proteins and nucleicacids.

UNIT-V: Radioactivity and Field Work **(15 Hours)**

Radioactivity **-** Types of Radioactive decay, half-life, units of radioactivity, Detection and measurement of radioactivity - Methods based upon ionization -Geiger Muller Counter. Methods based upon excitation - Solid &Liquid scintillation counters. Autoradiography. Biological applications and safety aspects of radioisotopes.

Total Lecture Hours-75

COURSE OUTCOME

The students are able to,

1. Describe types of rotors and identify the centrifugation technique for the separation of biomolecules.
2. Demonstrate the principles, operational procedure and applications of planar and column chromatography.
3. Specify the factors and explain the separation of DNA and protein using electrophoretic technique.
4. State Beer's Law and illustrate the instrumentation and uses of colorimeter and Spectrophotometer
5. Enumerate various methods of measurement of radio activity and safety aspects of radioactive isotopes.

TEXT BOOK(S)

1. Avinash Upadhyay, Kakoli Upadhyay & Nirmalendu Nath, 2002, Biophysical Chemistry, Principles and Techniques, 3rd edition, Himalaya Publishing House.
2. L.Veerakumari, 2009, Bioinstrumentation, 1st edition, MJP Publishers.
3. Keith Wilson & John Walker, 2018, Practical Biochemistry-Principles and techniques, Cambridge UniversityPress,8th edition.
4. C. Kalidas, M.V. Sangaranarayanan, 2023, Biophysical Chemistry, Springer Cham, 1st Edition.
5. Priyanka Pandey, 2023, A text book of Bioinstrumentation, Walnut Publication, Kolkata.

REFERENCE BOOK(S)

1. Terrance G. Cooper The tools of Biochemistry, 1977, John Wiley &Sons, Singapore.
2. Gurumani, Research Methodology for Biological Sciences, 2011, 1st edition, MJP publishers.
3. Saroj Dua, Neera Garg, Biochemical Methods of Analysis,2010, 1st edition, Narosa publishing house.

E-RESOURCES

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2.https://www.youtube.com/watch?v=xgxFBQZYXlE
3.https://www.youtube.com/watch?v=7onjVBsQwQ8

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-CP- IV: Biochemical Techniques Practical

Ins. Hrs. /Week: 4 **Course Credit: 4** **Course Code: U23BC408P**

I. Colorimetry

1. Estimation of amino acid by Ninhydrin method.
2. Estimation of protein by Biuret method.
3. Estimation of DNA by Diphenylamine method.
4. Estimation of RNA by Orcinol method.
5. Estimation of Phosphorus by Fiske and Subbarow method.

II. Chromatography

1. Separation and identification of sugars and amino acids by paper chromatography.
2. Separation and identification of amino acids and lipids by thin layer chromatography.

III .Demonstration

1. Separation of serum and plasma from blood by centrifugation.
2. Separation of serum proteins by Agarose gel electrphoresis.
3. Separation of serum proteins by SDS-PAGE.

Total Lecture Hours-60

COURSE OUTCOME

The students are able to,

1. Estimate the amount of biomolecules by Colorimetric method
2. Quantify the amount of minerals by Colorimetric method
3. Separate and identify sugars, lipids and amino acids by chromatography
4. Operate centrifuge for the separation of serum and plasma
5. Demonstrate the separation of proteins electrophoretically

TEXT BOOK(S)

1. J. Jayaraman, 2015,Laboratory Manual in Biochemistry New Age International (P) Limited, Fifth edition.
2. S.Sadasivam A.Manickam, 2018, Biochemical Methods New age International Pvt Ltd Publishers, Third edition.
3. KeithWilson and JohnWalker, 2018, Principles and techniques of Practical Biochemistry Cambridge University Press, 8th edition.

REFERENCE BOOK(S)

1. S. K. Sawhney and Randhir Singh, 2005, Introductory Practical Biochemistry. Alpha Science International, Ltd 2nd edition.

2. David T. Plummer, 2001, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw- Hill publishing company limited.

3. Alan H Gowenlock ,1988,Varley's Practical Clinical Biochemistry published by CBS Publishers and distributors, India Sixth Edition.

E-RESOURCES

1.https://www.pdfdrive.com/biochemistry-books.html

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DEPARTMENT OF MICROBIOLOGY

B.Sc., BIOCHEMISTRY

Semester: IV-AC-IV: Medical Microbiology

Ins. Hrs. / Week: 3 **Course Credit: 2** **Course Code: U23AMI403**

UNIT – I: Microflora of the human body and host pathogen interaction (08 Hours)

Normal micro flora of the human body. Importance of normal microflora, - Skin, Throat, Gastrointestinal tract, Urogenital tract. Host pathogen interaction: Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence and Toxigenicity.

UNIT – II: Bacterial disease and Fungal diseases (10 Hours)

Bacteria: Causative agent,Symptoms, mode of transmission,laboratory diagnosis, prophylaxis and control of Respiratory Diseases*: S.pyogenes*, *M.tuberculosis*. Gastrointestinal Diseases: *S.typhi*, *Vibrio cholerae*, *H.pylori*,*Clostridium botulinum*. Fungi: Causative agent, Symptoms, mode of transmission, laboratory diagnosis, prophylaxis and control of Cutaneous mycoses:Tinea pedis (Athlete's foot) Systemic mycoses: Histoplasmosis,Opportunistic mycoses:Candidiasis.

UNIT – III: Viral diseases and Protozoan diseases (10 Hours)

Viruses : Causative agent, Symptoms, mode of transmission, laboratory diagnosis , prophylaxis and control of Polio, Herpes, Hepatitis, Rabies, Dengue, AIDS, Influenza, swine flu, Ebola, Chikungunya. Protozoan diseases. Symptoms, mode of transmission, prophylaxis and control Malaria, Kala-azar.

UNIT – IV: Antimicrobial agents (09 Hours)

General characteristics and mode of action of Antibacterial agents and Antifungal agents: Mechanism of action of Amphotericin B, Griseofulvin and Antiviral agents such as Amantadine, Acyclovir, Antibiotic resistance.

UNIT – V: Sample collection, transport and diagnosis (08 Hours)

Sample collection, transport and diagnosis of clinical samples. Principles of different diagnostic tests, Diagnostic kits. (ELISA, Immunofluorescence, Agglutination based tests, Complement fixation, PCR, DNA probes).

Total Lecture Hours-45

COURSE OUTCOME

The students are able to,

1. Understand Mechanisms of host pathogen interactions.
2. Acquire the knowledge on the mechanisms of causation of bacterial and fungal diseases.
3. Identify the various types of viral infections.

4. Illustrate the significance of antimicrobial agents.
5. Develop employability skills in diagnostic and research institutes.

TEXT BOOK(S)

1. Ananthanarayan R. and Paniker C.K.J.2009,Textbook of Microbiology. 8th edition, University Press Publication, London.
2. Jawetz, Melnick and Adelberg's Medical Microbiology.2015, 26th edition. McGrawHill Publication, New Delhi.
3. Goering R., Dockrell H., Zuckerman M. and Wakelin D.2007, Mims' Medical Microbiology. 4th edition.
4. Elsevier 4. Willey JM, Sherwood LM, and Woolverton CJ.2013, Prescott, Harley and Klein's Microbiology. 9th edition. New Delhi. McGraw Hill Higher Education
5. Madigan MT, Martinko JM, Dunlap PV and Clark DP.2014.Brock Biology of Microorganisms. 14th edition. Pearson International Edition. Singapore.
6. Dubey R.C. and Maheshwari D. K.2022, Textbook of Microbiology. 5th Edition S.Chand, Limited, Visakhapatnam.

REFERENCE BOOK(S)

1. Ananthanarayan R. and Paniker C.K.J. 2017, Textbook of Microbiology. 10th edition, Kanungo, Reba (Ed).Orient Blackswan Publication. Hyderabad.
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. 2016, Jawetz, Melnick and Adelberg's Medical Microbiology. 27th edition. McGraw Hill Publication. New Delhi.
3. Willey JM, Sherwood LM and Woolverton CJ. 2017, Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education. New Delhi.
4. Madigan , Bender, Buckley, Sattley and Stahl. 2018, Brock Biology of Microorganisms. 15th edition. Pearson Global Edition. Singapore.
5. Tortora GJ, Funke BR, and Case CL.2016, Microbiology: An Introduction. 11th edition Pearson Education India.

E-RESOURCES

1. https://mechpath.com/2015/12/01/mycobacterium-leprae/ 7. https://www.slideshare.net/El_Omda/anthrax-1573
2. https://microscopemaster.com
3. https://cartercenter.com
4. https://microbesnotes.com
5. https://microbiology info.

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-SEC-IV: Medical Coding

Ins. Hrs. / Week: 2 **Course Credit: 2** **Course Code: U23SEBC44**

UNIT-I: Introduction to Medical coding **(06 Hours)**

Introduction to Medical coding, coding theory, Healthcare Common Procedure Coding, First Aid and CPR.

UNIT–II: Introduction to Medical Terminology **(06 Hours)**

Introduction to Medical Terminology, specialization I & II, Diagnostic coding, factors affecting diagnostic coding.

UNIT- III: Documenting medical records **(06 Hours)**

Documenting medical records- Importance of Documentation, Types of dictation formats.

UNIT-IV: Coding **(06 Hours)**

Introduction to Human Anatomy and Coding, ICD-10- CM classification system.

UNIT-V: Law and Ethics **(06 Hours)**

Introduction to CPT coding, types of CPT coding Medical Law and Ethics.

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Explain the basic concept of coding and its application. Possess the knowledge about the First aid and CPR
2. Possess the knowledge about medical terminology used in Medical coding industry
3. Possess the knowledge about the ICD-10 CM international classification of diseases based on WHO
4. Possess the knowledge about the CPT codes used for diseases as per American Medical Association (AMA)
5. Understand CPT coding and its types

TEXT BOOK(S)

1. Sandra L. Johnson, Robin Linker, 2016,Understanding Medical Coding, A comprehensive guide,Cengage Learning Custom Publishing,4th Edition.
2. Elsevier, 2024, Buck's Step – by – step Medical Coding, Churchill Livingstone.
3. Robin Peltonen,2023, Medical billing & coding for beginners, ISBN-13, 979-8865475071.

REFERENCE BOOK(S)

1. Terry Tropin M Shai, 2017, RHIA, CCS-P, AHIMAICD-10-CM coding guidelines made easy.
2. Besty J Shiland, 2011, Medical terminology and anatomy for ICD-10, Saunders publication.

E-RESOURCES

1. https://ijcrt.org/papers/IJCRT2212449.pdf
2. https://resources.uscareerinstitute.edu/eBooks/usci/1693/e0201693TB01B-53_MedicalCoding_1-11.pdf
3. http://www.ehealthwork.eu/FC/Presentations/Clusters_3-4/19-FC-C4M6U5-Introduction_to_Medical_Coding.pdf

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(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-SEC-V: Medical Laboratory Techniques

Ins. Hrs. / Week: 2 **Course Credit: 2** **Course Code: U23SEBC45**

UNIT-I: Collection, transport, analysis of specimen **(06 Hours)**

Collection, transport, analysis of specimen – blood, routine urine, feces, sputum, semen, CSF Documentation of samples & results. Disposal of laboratory/ hospital waste-Non infectious waste, biomedical waste, infected sharp waste disposal, infected non sharp disposal – color coding as per guidelines.

UNIT–II: Hamatology **(06 Hours)**

Determination of Blood group and Rh factor, Estimation of Hb,Determination of RBC,WBC and Platelets. Basic blood banking procedures- cross matching, screening test. Blood transfusion and hazards.

UNIT-III: Blood and Urine analysis **(06 Hours)**

Estimation of blood sugar – Enzymatic method, HbA1C, Qualitative and quantitative analysis of urine sample- NPN-urea, uric acid, creatinine. Mineral, vitamin and CSF analysis.

UNIT-IV: Immuno diagnostics **(06 Hours)**

Immuno diagnostics -Widal test, VDRL test, ASO, RA, CRP and Complement fixation Test. RIA, ELISA,Skin test – Montaux and Lepramin test.

UNIT-V: Assay of enzymes and hormones **(06 Hours)**

Assay of clinically important enzymes- SGOT, SGPT, ALP and CK-MB. Estimation of clinically important hormones – Insulin, Thyroid and Reproductive hormones and its clinical significance

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Collect & preserve of biological samples
2. Estimate the various constituents in biological sample
3. Perform the routine procedures adopted in blood bank
4. Analyze and interpret the values for both normal and disease conditions
5. Assay the enzymes and hormones &interpret clinical implications

TEXT BOOK(S)

1 Kanai L Mukherjee and Anuradha Chakravarthy Medical Laboratory Technology IV edition, Vol I, 2022

2. Ramnik Sood, Text Book of Medical Laboratory Technology, Jaypee Publishers, 2006

3. Tietz, N. (2018) Fundamentals of Clinical Chemistry and Molecular Diagnostics 8th edition, W.B. Saunders Company

REFERENCE BOOK(S)

1. Bergey's manual of determinative bacteriology by Edited by John G. Holt REF Desk QR81.A5 1994ISBN: 0683006037.
2. Laboratory test handbook : concise, with disease index by David S. Jacobs, REF RB38.2 L327 2004 ISBN: 9781591950806.

E-RESOURCES

1. https://www.youtube.com/watch?v=QNYlX5Ne9lQ
2. https://www.slideshare.net/doctorrao/ agglutination-tests-and-immunoassys
3. https://microbenotes.com/introduction-to-precipitation-reaction/

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