B. Sc., BIOCHEMISTRY

SYLLABUS

Programme Code : 3USBIC

2022-2025

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.

PROGRAMME OUTCOMES FOR B.Sc., DEGREE

PO No.	Program Outcomes (Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)
PO-1*	**Disciplinary knowledge**: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study in Bachelor of Science.
PO-2*	**Critical thinking and Problem Solving:** 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.
PO-3*	**Scientific reasoning:** Analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO-4*	**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.
PO-5	**Individual and Team Work:** Effectively accomplish tasks individually as well as 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 interests of a common cause and work efficiently as a member of a team.
PO-6*	**Environment and Sustainability:** Understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-7	**Human values and Gender Issues:** Understand major ideas, values, beliefs, the nature of the individual and the relationship between self and the community and aware of the various issues concerning women and society
PO-8*	**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.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc., BIOCHEMISTRY

PSO No.	Program Specific Outcomes (Upon completion of the B.Sc., Biochemistry Degree Programme, the Undergraduate will be able to)
PSO-1	Acquire and understand the basic concept behind the biochemical processes, metabolism and interactions in plants, animals, and microorganisms to understand the concept behind cell biology, molecular biology, genetics, enzymology, metabolism immunology, plant biochemistry and endocrinology.
PSO-2	Understand the basic skills and knowledge on instrumentation and laboratory techniques to analyse and monitor various biochemical and pathological parameters.
PSO-3	Illustrate the basic knowledge in the biochemical basis of diseases, regulation of metabolic pathways and gene expression regulation.
PSO-4	Interpret the Biochemical basis of human diseases, protein structure and conformation, regulatory metabolic pathways, drug development, diagnostic and therapeutic mechanisms.
PSO-5	Acquire the ability of leadership skills to manage projects in Science and Technology.

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SUNDARAKKOTTAI, MANNARGUDI – 614016.

TAMIL NADU, INDIA.

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

(For the candidates admitted in the academic year 2022–2023)

ELIGIBILITY: A Pass in 10+2 with Chemistry & Biology

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hour/ Week	Credit	Exam Hours	Marks		
								CIA	ESE	Total
I	I	Language Course (LC)-I-Tamil*/Other Languages ** #	22LC101	Ikkala Ilakkiyam	6	3	3	25	75	100
	II	English Language Course (ELC) – I	21ELC101	Language through Literature I (Prose and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC)-I	22BC101	Cell Biology	6	5	3	25	75	100
		Core Practical (CP) -I	22BC102P	Cell Biology Practical	3	2	3	40	60	100
		Allied Course (AC)-I	22ACH101	Allied Chemistry I	4	3	3	25	75	100
		Allied Practical (AP)-I	22ACH102P	Allied Chemistry Practical I	3	2	3	40	60	100
	IV	Value Education	22UGVED	Value Education	2	2	3	25	75	100
		TOTAL			**30**	**20**	**-**	**-**	**-**	**700**
II	I	Language Course (LC) –II-Tamil*/ Other Languages **	22LC201	Idaikkala Ilakkiyamum Pudhinamum	6	3	3	25	75	100
	II	English Language Course (ELC)-II	21ELC201	Language through Literature II (Poetry and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC)-II	22BC203	Molecules of Life	6	5	3	25	75	100
		Core Practical (CP) -II	22BC204P	Molecules of Life Practical	3	2	3	40	60	100
		Allied Course (AC)-II	22ACH203	Allied Chemistry II	4	3	3	25	75	100
		Allied Practical (AP)-II	22ACH204P	Allied Chemistry Practical II	3	2	3	40	60	100
	IV	Environmental Studies	22UGCES	Environmental Studies	2	2	3	25	75	100
		TOTAL			**30**	**20**	**-**	**-**	**-**	**700**
III	I	Language Course (LC) -III Tamil*/Other Languages **	22LC301	Kaapiyamum Naadakamum	6	3	3	25	75	100
	II	English Language Course (ELC)-III	22ELC301	Language through Literature III (Drama and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) -III	23BC305	Biochemical Techniques	6	5	3	25	75	100
		Core Practical (CP)-III	23BC306P	Biochemical Techniques Practical	3	2	3	40	60	100
		Allied Course (AC)-III	23ABC301	Biology I	4	3	3	25	75	100
		Allied Practical (AP)-III	23ABC302P	Biology Practical I	3	2	3	40	60	100

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hour/ Week	Credit	Exam Hours	Marks		
								CIA	ESE	Total
	IV	Non Major Elective I- for those who studied Tamil under Part-I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	-	-	2	2	3	25	75	100
		TOTAL			**30**	**20**	**-**	**-**	**-**	**700**
IV	I	Language Course (LC) -IV - Tamil* /Other Languages **	22LC401	Pandaiya Ilakkiyam	6	3	3	25	75	100
	II	English Language Course(ELC) -IV	22ELC401	Language through Literature IV (Short stories and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) -IV	23BC407	Human Physiology	5	4	3	25	75	100
		Core Practical (CP)-IV	23BC408P	Human Physiology Practical	3	2	3	40	60	100
		Allied Course (AC)-IV	23ABC403	Biology II	3	3	3	25	75	100
		Allied Practical (AP)-IV	23ABC404P	Biology Practical II	3	2	3	40	60	100
	IV	Non Major Elective (NME)-II– for those who studied Tamil under Part I a). Basic Tamil for other language students b). Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	-	-	2	2	3	25	75	100
		Skill Based Elective (SBE)- I	23SBEBC1	Phytotherapeutics	2	2	3	25	75	100
		TOTAL			**30**	**21**	**-**	**-**	**-**	**800**
V	III	Core Course (CC) -V	R23BC509	Enzymes	5	5	3	25	75	100
		Core Course (CC) -VI	R23BC510	Intermediary Metabolism	6	5	3	25	75	100
		Core Course (CC)-VII	R23BC511	Molecular Biology	5	5	3	25	75	100
		Core Practical (CP)-V	R23BC512P	Enzymes and Molecular Biology Practical	3	3	3	40	60	100
		Major Based Elective (MBE)-I	R23MBEBC1	Genetics	5	5	3	25	75	100
	IV	Skill Based Elective (SBE)- II	R23SBEBC2	Herbal Cosmetics	2	2	3	25	75	100
		Skill Based Elective (SBE)- III	R23SBEBC3	Clinical Lab Technology	2	2	3	25	75	100
		Soft Skills Development	23UGSDC	Soft Skills Development	2	2	3	25	75	100
		TOTAL			**30**	**29**	**-**	**-**	**-**	**800**
VI	III	Core Course (CC)-VIII	R23BC613	Immunology	6	6	3	25	75	100
		Core Course (CC)-IX	R23BC614	Clinical Biochemistry	6	6	3	25	75	100
		Core Practical (CP)-VI	R23BC615P	Immunology and Clinical Biochemistry Practical	6	5	3	40	60	100
		Core Project (CP)-X	R23BCPW	Group Project	6	6	3	25	75	100
		Major Based Elective (MBE)-II	R23MBEBC2	Endocrinology	5	5	3	25	75	100
	V	Extension Activities	-	**Extension Activities-	-	1	-	-	-	-
		Gender Studies	23UGGS	-	1	1	3	25	75	100
		TOTAL			**30**	**30**	**-**	**-**	**-**	**600**
G. TOTAL					**180**	**140**	**-**	**-**	**-**	**4300**

CURRICULUM DESIGN

LIST OF ALLIED COURSES

ALLIED COURSE I-CHEMISTRY ALLIED COURSE II-BIOLOGY

Subject	No. of Courses	Total Credits	Marks
Language Part – I	4	12	400
English Part –II	4	12	400
Core Course	9	45	900
Core Practical	6	18	600
Allied Course	4	12	400
Allied Practical	4	08	400
Non-Major Elective	2	04	200
Skill Based Elective	3	06	300
Major Based Elective	2	10	200
Core Project	1	05	100
Environmental Studies	1	02	100
Value Education	1	02	100
Soft Skill Development	1	02	100
Gender Studies	1	01	100
Extension Activities	-	01 (Credit only)	---
Total	**43**	**140**	**4200**

* For those who studied Tamil upto 10^{th} +2 (Regular Stream);

+ Syllabus for other Languages should be on par with Tamil at degree level;

those who studied Tamil upto 10^{th} +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV;

** Extension Activities shall be outside instruction hours.

Note:

	CIA	ESE
1. Theory	25	75
2. Practical	40	60
3. Project	25	75

Separate passing minimum is prescribed for CIA and ESE

FOR THEORY

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

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

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
The passing minimum for ESE shall be 40% out of 60 marks [i.e. 24 marks]

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Nature of the Course	Course Code	Title of the Course
III	**IV**	NME -I	23NMEBC31	Health and Diseases
IV	**IV**	NME -II	23NMEBC42	Health Education and Community Pharmacy

SKILL BASED ELECTIVE (SBE) OFFERED BY THE DEPARTMENT

Semester	Part	Nature of the Course	Course Code	Title of the Course
IV	**IV**	SBE-I	23SBEBC1	Phytotherapeutics
V	**IV**	SBE-II	R23SBEBC2	Herbal Cosmetics
V	**IV**	SBE-III	R23SBEBC3	Clinical Lab Technology

VALUE ADDED COURSE OFFERED BY THE DEPARTMENT

Semester	Nature of the Course	Course Code	Title of the Course
-	Value Added Course	22BCVA1	Biochemical changes in Lifestyle disorders
-	Value Added Course	22BCVA2	Know Your Medicine

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DEPARTMENT OF BIOCHEMSITRY

B.Sc., BIOCHEMISTRY

(For the candidates admitted in the academic year 2022–2023)

Question Paper Pattern- (Theory)

Max time: 3 Hours **Max Marks: 75**

Section – A (10 x 2 = 20)
Answer all the questions
Answer in One or Two sentences each

1.
2. } **Unit I**
3.
4. } **Unit II**
5.
6. } **Unit III**
7.
8. } **Unit IV**
9.
10. } **Unit V**

Section – B (5 x 5 = 25)
Answer all the questions
Each answer should not exceed 500 words

11.a. or
b. } **Unit I**
12.a. or
b. } **Unit II**
13.a. or
b. } **Unit III**
14.a. or
b. } **Unit IV**
15.a. or
b. } **Unit V**

Section – C (3 x 10= 30)
Answer any THREE questions in 1200 words

16. Unit I
17. Unit II
18. Unit III
19. Unit IV
20. Unit V

SEMESTER I

Semester: I-CC-I: Cell Biology

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**: 22BC101

UNIT -I: Basics of Cell Biology (12 Hours)

Discovery of Cell and Cell theory, Chemical Components of Cell. Structure of prokaryotic and eukaryotic cell and its differences, Comparison between plant and animal cell. General structure of cytoskeleton - structure, composition and functions of microfilaments, microtubules and intranuclear filaments.

UNIT -II: Cell Organelles (18 Hours)

Structure and functions of cell organelles: cell wall, nucleus, mitochondria, golgi bodies, lysosomes, endoplasmic reticulum (rough and smooth), microbodies, glyoxysome, peroxisome, vacuoles, plastids, chloroplast, chromatin, ribosomes, centrioles, chromosomes.

UNIT-III: Cell Membrane (15 Hours)

Chemical composition, structure, models, functions and specialization of plasma membrane. Lipid bilayer. Membrane pump (sodium – potassium Pump), solute transport by simple diffusion, facilitated diffusion and active transport (mechanism, types of active transport), osmosis. Electrical properties of membrane.

UNIT-IV: Cell Cycle, Cell Death and Cell Renewal (14 Hours)

Cell division, mitosis, meiosis, cytokinesis and their significant. Cell cycle: phases of cell cycle, Functional importance of each phase, Even during cell cycle. Checkpoints. Methods to study cell cycle - labelled mitotic curve, flow cytometry. Aging (senescence): symptoms, causes and theory. Cell death: Necrosis and apoptosis.

UNIT-V: Tools of Cell Biology (16 Hours)

Cell Fractionation techniques: Principle of centrifugation, Sedimentation Coefficient, Differential and Density Gradient centrifugation. Cell Visualization techniques: Principle of Light microscope and Electron microscope. Staining techniques – dye and fluorescent based techniques.

Total Lecture Hours- 75

COURSE OUTCOME

The students should be able to

1. Understand the cell theory and basic cell structure
2. Acquire knowledge on cell fractionation and cell visualization techniques
3. Illustrate the structure and function of various cellorganelles in cell.
4. Describe the structure, function and composition of cell membrane.
5. Understand the mechanism of cell division and cell death

TEXT BOOK(S)

1. Cooper, G.M. and Hausman, RE. 2009. The Cell .A Molecular Approach. (5" ed) Sunderland
2. Krebs.JE, Kilpatrick.S.T and Goldstein. E.S,2013, Lewin GENES XI, JONES & Bartlett Learning, Burlington, Massachusetts.
3. Lodish. H,.A, Berk.C.A, Kaiser.M, Krieger.MP, Scott.A Bretscher.H, Ploegh and p. Matsudaira, 2007, Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.
4. PS Verma and VK Agarwal 2004 Cell Biology, Genetics, Molecular Biology Evolution and Ecology (14" ed), S.Chand and Company Ltd.
5. Watson. JD, TA.Basker and Sp.Bell, 2008, Molecular Biology of the Gene, 5th Edition. Dorling Kindersley Pvt., Ltd., New Delhi.

REFERENCE BOOK(S)

1. Bruce Alberts and Dennis Bray 2013, Essential Cell Biology.(4" ed).Garland Science, New york.
2. De Robertis, EDP, and De Robertis, EM.F. 2010, Cell and Molecular Biology (8thed). Lippincott Williams and Wilkins, Philadelphia.
3. Geoffrey M. Cooper and Robert. E. Hausman, 2009 The Cell: A Molecular Approach:, Sinauer Associates, 5thEd, USA.
4. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiment (6th ed) John Wiley & Sons, Inc, United Kingdom.
5. Wayne M. Baker ,2008 The World of the Cell. (7th" ed). Pearson Benjamin Cummings Publishing, San Francisco.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://drive.google.com/file/d/1tghNWPyuqPiqKlrlllZzUrFwcoMiuoMa/
3. https://www.freebookcentre.net/biology-books-download/BASIS-ON MOLECULAR-BIOLOGY-(PDF-52P).html.
4. https://www.freebookcentre.net/biology-books-download/Basis-ofmolecular-cell-biology-(PDF-36P).html.
5. https://agrilif.org/gold/files/2012/09/Lecture-26.pdf

Semester: I-CP-I: Cell Biology Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 22BC102P

1. Study the components of a microscope
2. Cytochemical staining of proteins by Methylene blue
3. Cytochemical staining of RNA by Methyl green pyronin
4. Cytochemical staining of polysaccharides by PAS
5. Study on different stages of mitosis by temporary preparation in onion root tip
6. Study on different stages of meiosis by temporary preparation in onion flower buds/ grasshopper testes
7. Study of cell organelles by using electron micrographs
8. Isolation of mitochondria from cabbage.
9. Separation of chloroplast pigments by paper chromatography.

COURSE OUTCOME

The students should be able to,

1. Gain the knowledge about handling of microscope.
2. Identify the microscopic examination of cell organelles.
3. Obtain hands on training in basic separation techniques in Cell biology.
4. Differentiate the stages of mitosis and meiosis.
5. Evaluate the cellular biomolecules by staining techniques.

TEXT BOOK(S)

1. Bruce Alberts and Dennis Bray. 2013, Essential Cell Biology. (4"ed). Garland Science.
2. Cooper, G.M. and Hausman, R.E. 2009. The Cell. A Molecular Approach. (5" ed) Sunderland.
3. Ganesh M.K. and Shivashankara A.R. 2012. Laboratory Manual for Practical Biochemistry Jaypee publications, 2nd Ed .
4. Lodish H.A , Berk C.A, Kaiser M, Krieger M.P, Scott A, Bretscher H, Ploegh and Matsudaira. 2007. Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.
5. Watson J.D, Basker T.A. and Bell S.P. 2008. Molecular Biology of the Gene, 5th Edition. Dorling Kindersley Pvt., Ltd., New Delhi.

REFERENCE BOOK(S)

1. Bruce Alberts, 2008, Molecular Biology of the cell: Garland Publishing, 5th Ed.
2. Cooper, G.M. and Hausman, RE. 2009. The Cell .A Molecular Approach. (5" ed) Sunderland

3. Geoffrey M. Cooper and Robert. E. Hausman, 2009. The Cell: A Molecular Approach:, Sinauer Associates, 5thEd, USA
4. Lodish.H,.A , Berk.C.A, Kaiser.M, Krieger.MP, Scott.ABretscher.H, Ploegh and p. Matsudaira, 2007. Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.
5. Watson. JD, TA.Basker and Sp.Bell, 2008, Molecular Biology of the Gene, 5th Edition. Dorling Kindersley Pvt., Ltd., New Delhi.

E-RESOURCES

1. http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=The%20electron%20microscope%20is%20necessary,and%20small%20granules%20and%20vesicles.
2. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
3. https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-genetic-diversity/a/phases-of-meiosis
4. https://www.microscopemaster.com/organelles.html
5. https://www.pdfdrive.com/biochemistry-books.html

Semester: I-AC-I: Allied Chemistry I
Ins. Hrs./Week: 4 **Course Credit**: 3 **Course Code**: 22ACH101

Unit-I: Industrial Chemistry (10 Hours)
Industrial Chemistry: Fuel gases –Watergas- producergas- LPGgas- Gobargas and naturalgas. Fertilizers– NPK and mixed Fertilizers –soaps and detergents. Cumene process for phenol manufacturing; Manufacturing of Paracetamol, Chloramphenicol-Preparation of Shampoo.

Unit-II: Electron Displacement Effects and Halogen Compounds (15 Hours)
Polar effects: Inductive effect – Relative Strength of Aliphatic mono carbocylic acid andaliphatic amines. Resonance–Condition for resonance. Consequences of resonance–resonance of energy. Basic property of aniline and acidic property of phenol. Hyperconjugation – Heat of hydrogenation - Bond length and dipole moment- Steric effect. Halogen containing compounds: Important chlorohydrocarbonsusedas solvents. Pesticides. Dichloromethane -chloroform - carbon tetrachloride-DDT and BHC Types of solvents: -Polar, Nonpolar.

Unit-III: Aromatic Compounds and Organic reactions (13 Hours)
Aromatic compounds: Structure, stability resonance and aromaticity of benzene. Substitution reaction: Nitration, Halogenations, Alkylation. Naphthalene–Isolation, properties and uses. Organic reaction: Biuret, Decarboxylation, Benzoin, Perkin, Cannizaro, Claisen and Haloform reactions. Chemotherapy: Explanation with two examples each for analgesics, antibacterial, anti- inflammatory, antibiotics, antiseptic and disinfectant, anesthetics local and general (Structures not necessary).

Unit- IV: Solid State, Energetics and Phase Rule Reactions (12 Hours)
Solidstate: Typical crystallattices- unit cell, elements of symmetry, Bragg's equation, Weiss Indices, Millerindices, simple body centered and face centered lattices. Energetics: First law of thermodynamics–state and path function–need for the second law. Carnot's cycle and thermodynamic scale of temperature, spontaneous and Non – spontaneous processes–entropy–Gibbs free energy. Phaserule: Phase, component, degree of Freedom, and phase rule definitions- one component system–water system.

Unit-V: Chemical Equilibrium and Chemical Kinetics (10 Hours)
Chemical equilibrium: Criteria of homogeneous and eterogeneous equilibria, decomposition of HI, N_2O_4, $CaCO_3$, PCl_5. Chemical Kinetics: Order of reaction and their determinations – activation energy, effects of temperature on reaction.

Total Lecture Hours-60

COURSEOUTCOME

The student should able to,

1. Achieve the skills required to the chemical industry like cement industries, agro product, Paint industries etc.
2. Define the permanent displacement of electron forming a covalent bond towards the more electronegative element or group.
3. Interpret the concept of aromaticity and the main properties of aromatic compounds.
4. Explain crystal systems, diffraction and reciprocal space and can explain bonding types in crystals.
5. Describe the difference between completion for irreversible chemical reactions and for reversible chemical reactions.

TEXT BOOK(S)

1. Biswas AK. 1989. Frontiers in Applied Chemistry, Narosa publishing house.
2. Jayashree Ghosh. 2008. Fundamental Concepts of Applied Chemistry, S.Chand & Company Ltd., New Delhi.
3. Thangamma Jacob, Macmillian.1990. Text book of Applied Chemistry, India Ltd. Mumbai.
4. Madan RD. 2000. Modern Inorganic Chemistry, 2nd edition, S. Chand & Company Ltd.,
5. Puri BR, Sharma LR, Kalia KK. 1993. Principles of Inorganic Chemistry, 23rd edition, New Delhi, Shoban Lal Nagin Chand & Co.,

REFERENCEBOOK(S)

1. Gopalan R. 2012, Text Book of Inorganic Chemistry, 2nd Edition, Hyderabad, Universities Press, India.
2. Morrison R.T. and Boyd R.N. Bhattacharjee S.K. 2011. Organic Chemistry, 7th edition, Pearson India.
3. Puri BR. Sharma LR, Pathania MS. 2013. Principles of Physical Chemistry, 35thedition, Shoban Lal Nag in Chand and Co New Delhi.
4. Madan R.D., Modern Inorganic Chemistry, 2ndedition, Chand .S & Company Ltd., 2000.
5. Soni P.L, Text book of Inorganic Chemistry, 20th revised edition, Sultan Chand & Sons, 2000.

E-RESOURCES

1. https://pubs.acs.org/journal/iecred
2. https://searchworks.stanford.edu/view/4500021
3. https://selfstudypoint.in/electron-displacement-effects-in-covalent-bonds/
4. https://study.com/academy/lesson/electronic-displacements-in-covalent-bonds.html
5. https://guides.lib.wayne.edu/chemistry/orgochem
6. https://fordham.libguides.com/Chemistry/OrganicChemistryReference
7. https://link.springer.com/content/pdf/10.1007%2F978-0-387-46271-4_25.pdf
8. https://link.springer.com/content/pdf/10.1007%2F978-0-387-46271-4_25.pdf
9. https://www.topperlearning.com/foundation-class-9/chemistry/chemical-kinetics-and-chemical-equilibrium

Semester: I-AP-I: Allied Chemistry Practical -I
Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 22ACH102P

I. Acidimetry and alkalimetry
(a) Strongacid VS strongbase
(b) Weakacid VS strongbase
(c) Determination of hardness of water

II. Permanganometry
(a) Estimation of ferroussulphate
(b) Estimation of oxalicacid

III. Iodometry
(a) Estimation of potassiumdichromate
(b) Estimation of potassiumpermanganate

Scheme for Practical Evaluation.

Volumetric Estimation	-	50 marks
Record	-	10 marks
Internal Assessment	–	40 marks

Volumetric Analysis:	**-**	**50 marks**
Procedure	-	15 marks
Results		
<2%	-	50 marks
2-3%	-	40 marks
3-4%	-	30 marks
>4%	-	20 marks

COURSE OUTCOME
The student should able to**,**
1. Determine the strength of a solution of an acid by titration with a standard solution of a base is called acidimetry.
2. Enable to manage the neutralization titrations of acidimetry and *alkalimetry*.
3. Explain the parameters of water.
4. Understand the principles of volumetric and electrochemical analysis and Carryout various volumetric and electrochemical titration.
5. Finding the difference between iodometry and iodimetry by standardization of sodium thiosulphate using iodometric titration virtual lab simulation.

TEXT BOOK(S)

1. Gopalan R. 2000. Elements of analytical chemistry, S.Chand, New Delhi.
2. Gnanapragasam NS, Ramamurthy G. 1998. Organic Chemistry Lab Manual, S.Viswanathanand Co. Pvt. Ltd. Chennai.
3. Henry. W. Schimpf , A Text Book of Volumetric Analysis.
4. Venkateswaran V, Veerasamy R, Kulandaivelu AR. 2006. Basic principles Physical Chemistry Second edition, Sultan Chand & Sons, New Delhi.
5. McPherson Peter , Practical Volumetric Analysis.

REFERENCE BOOK(S)

1. Peter McPherson. 2014. Practical Volumetric Analysis, Royal Society of chemistry.
2. Vogel's Text Book of Qualitative Chemical Analysis, 5thedn. ELBS/ Longman England.

E-RESOURCES

1. https://www.accessengineeringlibrary.com/content/book/9780071745925/chapter/chapter25
2. https://chemistryvce.weebly.com/volumetric-analysis.html
3. https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Quantifying_Nature/Volumetric_Chemical_Analysis_(Shiundu)/14.2%3A_Learning_Activity
4. https://byjus.com/chemistry/volumetric-analysis/
5. https://www.researchgate.net/publication/344658899_Volumetric_Analysis_-Titration_for_Beginners

SEMESTER II

Semester: II-CC-II: Molecules of Life

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**: 22BC203

UNIT-I: Carbohydrates (16 Hours)

Definition, classification – monosaccharide, oligosaccharides and polysaccharides; occurrence, structure and functions of monosaccharide (glucose and fructose). General properties with reference to glucose, anomer, epimer, enantiomer and mutarotation. Structure, occurrence, properties and biological importance of disaccharides (sucrose, lactose, maltose) and Polysaccharides-Storage polysaccharides (starch, glycogen), Structural polysaccharides (cellulose, chitin), Heteropolyasaccharides (hyaluronic acid, heparin).

UNIT-II: Aminoacids and Proteins (14 Hours)

Aminoacids- Definition, Structure, properties and classification based on structure, chemical nature. Essential and non essential aminoacids. Proteins - Definition, classification based on shape, solubility, chemical composition, Properties and functions. Structure- Primary, Secondary, tertiary and quaternary.

UNIT- III: Lipids (16 Hours)

Structure, function and classification of lipids- simple, compound –glycolipids, phospholipids, spingolipids and derived lipids - steroids. Fatty acids- Definition, structure, classification– saturated fatty acids, unsaturated fatty acids. Essential and non essential fattyacids. Physical and Chemical properties-emulsification, saponification number, rancidity, acid number, iodine number and Reichert – Meissl number

UNIT- IV: Nucleic acids (15 Hours)

Bases, nucleosides and nucleotides, phosphodiester linkage. Types of Nucleic acids – DNA and RNA; DNA – types-A, B, Z, double helical structure, properties and functions. Denaturation and renaturation. RNA – types-mRNA, tRNA, rRNA – structure and functions.

UNIT- V: Vitamins and Minerals (14 Hours)

Source, classification, structure, daily requirement, deficiency manifestation and biological significances of fat soluble vitamins - A, D, E, K and water soluble vitamins- ascorbic acid, thiamine, riboflavin, pantothenic acid, niacin, pyridoxine, biotin, folic acid and cyanocobalamine. Minerals- Iron, Sodium, Potassium, Calcium, Phosphorus, Iodine, Zinc, Copper, Selenium.

Total Lecture Hours- 75

COURSE OUTCOME

The students should be able to,

1. Gain the knowledge about the classification, structure, properties and functions of carbohydrates
2. Understand the classification, structure, properties and importance of amino acids
3. Acquire knowledge about the classification of proteins, levels of structural organization of proteins and its properties
4. Gain insights about the types, structure and properties of nucleic acids
5. Acquire knowledge about the classification, structure and properties of different types of lipids

TEXT BOOK(S)

1. Deb AC. 2016. Fundamentals of Biochemistry. 7th edition, NCBA Publishers, New Delhi.
2. Jain JL, Sunjay Jain and Nitin Jain. 2018. Fundamentals of Biochemistry. Updated edition. 2020. S.Chand Publishers, New Delhi.
3. Poonam Agarwal. 2020. Review of Biochemistry. 5th edition. CBS Publishers, New Delhi.
4. 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.
5. Vasudevan DM. 2018. Biochemistry. 9th edition. Aypee Brothers Medical Publishers, New Delhi.

REFERENCE BOOK(S)

1. Ambika Shanmugam, 2016. Fundamendals of Biochemistry, 8th Edition. Wolters Kluwer India Pvt Ltd
2. Nelson, D. L. and Cox, M. M. 2008. Lehninger Principles of Biochemistry. Freeman, 5th edn.
3. Harper's Illustrated Biochemistry.30th edition -McGraw Hill
4. Sathayanarayana, U. 2006. Biochemistry. 3rd Edition by Books and Allied (P) Ltd., India.
5. Donald Voet and Judith Voet. 2017. Biochemistry, 2nd edition, John Wiley & Sons Inc, Newyork.

E-RESOURCES

1. http://www1.biologie.uni-hamburg.de/b-online/library/biology107/bi107vc/fa99/terry /sugars.html
2. https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod10.pdf
3. https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod11.pdf
4. https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod12.pdf
5. https://www.pdfdrive.com/biochemistry-books.html

Semester: II-CP-II: Molecules of Life Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 22BC204P

QUALITATIVE ANALYSIS

1. Weighing, reagents preparations – Normal, Molar and Percentage solutions, dilution (serial and Stock to working)
2. Qualitative analysis of carbohydrates (glucose, fructose, galactose, maltose, sucrose, lactose), Identification of both monosaccharides and disaccharides in mixtures.
3. Qualitative analysis of amino acids (Tryptophan, Tyrosine, Arginine, Proline, Phenylalanine and Histidine)
4. Qualitative analysis of Lipids- Solubility, Emulsification test, Saponification test, Acrolein test for Unsaturation, Test for Cholesterol-Salkowski test and Lieberman-Burchard test

QUANTITATIVE ANALYSIS

1. Estimation of reducing sugar by Benedict's quantitative method.
2. Estimation of amino acid by formal titration
3. Estimation of ascorbic acid by titrimetric method using 2, 6-dichlorophenol indophenol dye.
4. Estimation of acid number of edible oil.
5. Determination of saponification number of edible oil.
6. Estimation of iodine value of edible oil.

COURSE OUTCOME

The students should be able to,

- Acquire skills of performing basic biochemical tests important in clinical investigations
- Evaluate how to standardise various biomolecules

TEXT BOOK(S)

1. Jayaraman, J. 2011. Manuals in Biochemistry. New Age International Pub, Bangalore.
2. Plummer, 2000. Practical Biochemistry. Tata McGraw Hill Publishing Company, – New Delhi.
3. Sawhney S.K. and Randhir Singh, 2005. Introductory practical Biochemistry, 2nd ed,

REFERENCE BOOK(S)

1. Sadasivam, S. and Manickam V.A. 2006. Biochemical methods, 2ed New Age international Publishers.
2. Anil Kumar, Sarika Garg and Neha Garg. 2012. Biochemical Tests – Principles and Protocols. Vinod Vasishtha Viva Books Pvt Ltd.
3. Harold Varley. 2006. Practical Clinical Biochemistry, CBS. 6 edition
4. Keith Wilson and John Walker. 1995. Principles and Techniques of Practical Biochemistry, 4th edition, Cambridge University press, Britain.

E-RESOURCES

1. https://www.pdfdrive.com/principals-and-techiniques-of-biochemistry-and-molecular-biology-7th-e18725198.html
2. https://www.pdfdrive.com/practical-textbook-of-biochemistry-for-medical-students-e187182647.html
3. https://www.pdfdrive.com/introduction-to-practical-biochemistry-e33418060.html
4. https://www.pdfdrive.com/practical-biochemistry-e187196416.html
5. https://www.pdfdrive.com/introduction-to-practical-biochemistry-e33418060.html

Semester: II-AC-II: Allied Chemistry II
Ins. Hrs./Week: 4 **Course Credit**: 3 **Course Code**: 22ACH203

Unit-I: Carbohydrates, Aminoacids and Proteins (10 Hours)

Carbohydrates: classification–glucose and fructose–preparation and properties–structure of glucose Fischer and Haworth cyclic structures. Aminoacids and proteins: Aminoacids–Classification based on structure. Essential and non Essentials amino acids – preparation, properties and uses – peptides (elementary treatment only)–proteins–Classification based on physical properties and biological functions. Structure of proteins–primary and secondary (elementary treatment).

Unit-II: Heterocyclic Compounds, Vitamins and Drugs (14 Hours)

Heterocyclic compounds: Furan, pyrrole and pyridine – preparation, properties and uses – basic properties of pyridine and pyrrole. Vitamins: Biological activities and deficiency diseases of Vitamin A, B, C, D, E and K -Hormones - Functions of insulin and adrenaline. Drugs- Sulpha Drugs - Uses and Mode of action of Sulpha Drugs-Antibiotics- Uses of Penicillin, Chloramphenicaol, streptomycin.

Unit-III: Surface and Photochemistry (14 Hours)

Surface Chemistry: Introduction to surface chemistry absorption, adsorption physisorption-chemisorption's. Emulsions, gels–preparation, properties-Electrophoresis and applications. Photochemistry: Laws of photochemistry - Lambert and Beer's law, Grothus Drapper law and Stark Einstein law of photochemical equivalence its and applications.

Unit- IV: Chromatographic Techniques (12 Hours)

Introduction to Qualitative and Quantitative Analysis –Error Analysis- Mean, Median, Mode, Standard Deviation (Only Definition) Chromatographic separations-Principles and application of column, paper, thinlayer chromatography, HPLC and Gas Chromatography.

Unit –V: Food Adultration (14 Hours)

Adulteration Definition- Contamination of wheat, rice, dhal, milk, butter, etc. With clay, sand, stone, water and toxic chemicals (e.g. Kasseri dhal with mentanil yellow). Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), Chemical poisons (KCN). First aid and Antidotes for poisoned persons. Heavy metal (Hg, Pb, Cd) Contamination of Sea food. Use of neutron activation analysis in detecting poisoning (e.g., As in human hair)

Total Lecture Hours-60

COURSEOUTCOME

The student should able to

1. Explains the structure and properties of carbohydrates and describe the reducing action of sugars.
2. Describe the rules of nomenclature and describe structural, physical, and chemical properties and summarize and discuss various types of Heterocyclic Compounds.
3. Understand the thermodynamics and kinetics of chemical processes.
4. Gains the knowledge about theoretical as well as a practical introduction to the principles and techniques of chromatography.
5. Developing the knowledge of need of food processing and learn various techniques

TEXT BOOK(S)

1. Jain JL. 2017. Elementary Bio-Chemistry, 2nd revised edition, S.Chand & Company.
2. Sathyanarayana U. 2019. Essentials of Bio-Chemistry, 3rd edition, Books & Allied Pvt. Ltd.
3. Gobar.A. Samorjai Yimin L.I . 2010. Introduction to Surface Chemistry.
4. Goel .A .2006. Surface Chemistry
5. Avantia Sharma. 2017, 3rd edition, Text Book of Food Science and Technology.

REFERENCE BOOK(S)

1. Bahl BS, and Bahl A. 2010, Organic Chemistry, 12th edition, Sultan Chand & Co, New Delhi.
2. Puri B.R, Sharma LR, Kalia KC. 2004-2005. Principles of Inorganic Chemistry, 21st edition, Vallabh Publications.
3. Puri BR, Sharma LR, Pathania MS. 2013. Principles of Physical Chemistry, (35th edition), Shoban Lal Nagin Chand and Co, New Delhi.
4. Vaithyanathan S and others. 2019. Textbook of Ancillary Chemistry, 2nd Edition, Priya Publications, Karur.
5. Veeraiyan V. 2016. Text book of Ancillary Chemistry, High amount Publishing house, 14th Edition, (Both in Tamil and English) Chennai.

E-RESOURCES

1. https://edu.rsc.org/nuclear-chemistry-and-radioactivity/115037.subject
2. https://www.iancas.org.in/IANCAS-radiochemistry-resources.php
3. https://www.nal.usda.gov/legacy/fnic/protein-and-amino-acids
4. https://www.ncbi.nlm.nih.gov/books/NBK554545/
5. https://www.openaccessgovernment.org/vitamins-and-drugs-heterocyclic-chemistry-is-all-around-us-and-in-us/46656/
6. https://www.sciencedirect.com/topics/chemistry/heterocyclic-compound
7. https://www.annualreviews.org/doi/10.1146/annurev.pc.45.100194.000553
8. https://www.mdpi.com/journal/molecules/sectioneditors/photochemistry
9. https://www.chromatographyonline.com/view/chromatography-resources-for-online-learning
10. https://edu.rsc.org/resources/chromatography-techniques/4010255.article

Semester: II-AP-II: Allied Chemistry Practical - II
Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 22ACH204P

Organic Qualitative Analysis

Analyze the following organic Compounds.

1. Carbohydrate
2. Amide
3. Aldehyde
4. Ketone
5. Acid
6. Amine

The students may be trained to perform the specific reactions like tests for elements (nitrogen only), aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

Scheme of Evaluation

Organic Qualitative Analysis	50 marks
Identification of Nitrogen	05 marks
Saturated and unsaturated	05 marks
AliphaticorAromatic	05 marks
Preliminary reaction with Procedure	15 marks
Functional Group Identification	10 marks
Confirmative Test	10 marks
Record	10 marks

COURSE OUTCOME

The student should able to,

1. Analyze various organic compounds using documented procedures.
2. Exposure in the understanding and mechanisms of organic oxidations, reductions reactions.
3. Identify, classify, organize, analyze, and draw structures of organic molecules.
4. Understand the nomenclature, structure, bonding and chemical reactivities of carboxylic acid, nitro compounds etc…
5. Distinguish aliphatic and aromatic compounds.

TEXT BOOK(S)

1. ArthurI Vogel. 2010. Elementary Practical Organic Chemistry second edition, Pearson education.
2. Frederick George Mann, Bernard Charles Saunders. Practical Organic Chemistry, Longman London and NewYork.

3. Gnanapragasam N S and Ramamurthy G.1998.Organic Chemistry Lab Manual, S.Viswanathan and Co.Pvt.Ltd.Chennai.

REFERENCE BOOK(S)

1. Gopalan R. 2000. Elements of Analytical Chemistry, S.Chand, New Delhi,
2. Gnanapragasam NS and Ramamurthy G.1998. Organic Chemistry Lab Manual, S.Viswanathan and Co.Pvt.Ltd.Chennai.

E-RESOURCES

1. https://libguides.reading.ac.uk/chemistry/e-resources
2. https://organicchemistrydata.org/links/
3. https://guides.lib.wayne.edu/chemistry/orgochem
4. https://www.masterorganicchemistry.com/resource-guide/
5. https://hbu.libguides.com/c.php?g=323451&p=2170081

SEMESTER III

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-CC-III: Biochemical Techniques

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**: 23BC305

UNIT- I: Colorimetry (16 Hours)

Beer Lambert's Law, Light absorption and its transmittance, Absorption Spectroscopy - Principle, instrumentation and applications of colorimetry and UV-Vis spectrophotometer. Emission Spectroscopy – Spectrofluorimeter - Principle, instrumentation and applications. Flame photometry - principle and applications.

UNIT- II: Chromatographic Techniques with field project (19 Hours)

Chromatography - Partition and adsorption chromatography-Principle, method and applications of paper, thin layer, ion exchange, affinity chromatography, gel permeation chromatography and Gas liquid chromatography.

UNIT- III: Centrifugation Techniques (19 Hours)

Cell disruption and homogenization-Media for homogenization, methods of cell disruption. Centrifugation - principle- sedimentation coefficient, RCF. Types of centrifuges and rotors. Preparative centrifugation- differential, density gradient centrifugation, and Analytical ultra centrifugation – instrumentation and applications - Determination of molecular weight.

UNIT- IV: Electrophoretic techniques (19 Hours)

Electrophoresis - Principles and applications of electrophoresis, Factors affecting electrophoretic mobility. Types of electrophoretic techniques – zonal, capillary, paper and agarose gel. PAGE and SDS PAGE. Staining method used in electrophoretic technique, Isoelectric focusing.

UNIT- V: Radio isotopic techniques (17 Hours)

Types of radioactive decay, rate of radioactive decay, decay constant, Units of radio activity, measurement of radioactivity based on ionization- GM counter and excitation- Scintillation counter. Autoradiography. Applications of radioisotopes in biology.

Total Lecture Hours- 90

COURSE OUTCOME

The students are able to,

1. Acquire practical training to handle the instruments like colorimeter, spectrophotometer and to use them for biochemical determinations.
2. Acquire practical skill to separate proteins by gel filtration and PAGE, and are able to

separate amino acids and sugar using the techniques of paper/thin layer chromatography, students.

3. Learn about the principle and applications of spectrophotometry, different chromatographic techniques like gel filtration, Ion exchange, thin layer, etc.
4. Students also learn about various electrophoretic techniques such as cellulose acetate, gel, PAGE, etc. and their applications in analyzing proteins and nucleic acids.
5. Learn the basic principles of centrifugation, various types of centrifuges, rotors and methods for subcellular fractionation

TEXT BOOK(S)

1. West, E.S. and Todd, W.R., MacMillan, Textbook of Biochemistry, 1985 Germany.
2. Avinash Upadhyay, Kakoli Upadhyay and Nirmalendu Nath, 2014 Biophysical Chemistry (Principles and Techniques) 4th Edition Himalaya Publishing House, India.
3. Keith Wilson & John Walker, 2005, Principles and Techniques of Practical Biochemistry Cambridge University Press, India.
4. Rajan Katoch. 2011. Analytical Techniques in Biochemistry and Molecular Biology, 1st edition, Springer New York Dordrecht Heidelberg London Publishers, United Kingdom.
5. Sabari and Srivastava A. K., 2009, Fundamentals of Bio Analytical Techniques and Instrumentation .Ghosal PHI Learning Pvt. Ltd. India.

REFERENCE BOOK(S)

1. Abhilasha Shourie and Shilpa S Chapadgaonkar. 2015, Bioanalytical Techniques, The Energy and Resources Institute, TERI, India.
2. Kothari, C.R. 2004 Research Methodology, Methods and Techniques, 2nd ed, New Age International Publishers, India.
3. Braun, R.P, 1987, Introduction to Instrumental Analysis, Tata McGraw Hill, India.
4. Pavia, *et al*, 2000, Introduction to Spectroscopy, 3rd Edition, Brooks/Cole Pub Co., New Delhi, India.
5. Machve, K and Neha, K. 2010, Basic Instrumentation, Publishers & Distributors, India.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://www.chem.purdue.edu/courses/chm333/Spring%202013/Lectures/Spring%202013%20Lecture%202%20-%204.pdf
3. https://nptel.ac.in/content/storage2/courses/102103047/PDF/mod3.pdf
4. https://nptel.ac.in/content/storage2/courses/102103044/pdf/mod5.pdf
5. https://nptel.ac.in/content/storage2/courses/102103044/pdf/mod2.pdf

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-CP-III: Biochemical Techniques Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 23BC306P

PRACTICALS

1. Preparation of Buffers and measurement of pH.
2. Titrable acidity of Aminoacids
3. Measurement of Blood pressure
4. Calculate Body Mass Index (BMI)
5. Handling of Colorimeter and Spectrophotometer
6. Estimation of RNA by Orcinol method.
7. Estimation of DNA by Diphenylamine method.

DEMONSTRATION

1. Paper Chromatography for separations and detections of simple Sugars and Aminoacids.
2. Separation of plant pigments by Column Chromatography.
3. Thin Layer Chromatography of Aminoacids.

COURSE OUTCOME

The students are able to,

- Handling some specified equipments and their application
- Able to separate amino acids and sugars using chromatographic techniques

TEXT BOOK(S)

1. David Plummer. 1988. A Textbook of Practical Biochemistry.Tata McGraw- Hill Education.
2. Peramachi Palanivelu. 2018. Analytical Biochemistry and Separation Techniques - A Laboratory Manual, 4 th edition, Twenty first century Publishers, Srilanka.
3. Rajan Katoch. 2011. Analytical Techniques in Biochemistry and Molecular Biology, 1st edition, Springer New York Dordrecht Heidelberg London Publishers, United Kingdom.
4. Avinash Upadhyay, Kakoli Upadhyay and Nirmalendu Nath. 2014. Biophysical Chemistry (Principles and Techniques), 4th edition, Himalaya Publishers, Hyderabad.
5. Machve, K.K. 2015. Basic Instrumentation. 4th edition, Neha Publishers. India.

REFERENCE BOOK(S)

1. Methods in Enzymology Vol. I and II by S.P. Colowick and N.O. Kaplan eds. New York: Academia Press, 1955.
2. Jayaraman, J. 1981. Laboratory Manual in Biochemistry. New Age International

Publishers. 2nd Edition.1981.
3. Alan H Gowenlock, 1988. Varley's Practical Clinical Biochemistry, Sixth Edition, CBS Publishers and distributors, India.
4. Kothari, C.R. 2004. Research Methodology, Methods and Techniques, 2nd edition, New Age International Publishers, India.
5. Ghosal Sabari and Srivastava A, 2009. Fundamentals of Bio Analytical Techniques and Instrumentation, 2nd edition, PHI Learning Pvt. Ltd. India.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://www.cdc.gov/bloodpressure/materials_for_patients.htm
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4890841/
4. https://www.healio.com/cardiology/learn-the-heart/ecg-review/ecg-interpretation-tutorial/introduction-to-the-ecg
5. https://imotions.com/blog/what-is-eeg/

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-AC-III: Biology I

Ins. Hrs./Week: 4 **Course Credit**: 3 **Course Code**: 23ABC301

UNIT–I: Taxonomy **(11 Hours)**

Taxonomy, Types of taxonomy. Plants systematics:Taxonomy Vs Systematics. Principles and methods of taxonomy: concept of species of hierarchical taxa. Biological nomenclature (International code of Botanical nomenclature). Classical and quantitative methods of taxonomy. Classification of plants, animals and microorganisms.

UNIT-II: Inheritance Biology **(13 Hours)**

Inheritance biology – Mendalian principle, Chromosome theory of inheritance, allele, multiple allele, polygene inheritance, Linkage: Types, arrangement and theory. Crossing over: Mechanism, theory, sex linkage, sex limited and sex influenced characters, Mechanism of sex determination.

UNIT-III: Plant Physiology **(13 Hours)**

Plant physiology- Photosynthesis, C3, C4 pathway, photo respiration. Plant pigment:Chlorophylls, Carotenoids. Plant hormone: Auxins, Gibberelins, Cytokinins, Ethylene,Traumatic acid, phytochemicals,Alkaloids, Flavonoids, Saponins, Quinines, Terpenes,Phenols,Nitrogenouscompounds-functions.

UNIT-IV: Environmental Biology **(11 Hours)**

Environmental Biology–Physical environment, biotic and abiotic, concept of habitat and niche, Resource partitioning: character displacement Concept, structure and functions of an ecosystem. Energy flow and mineral cycling in ecosystem. Terrestrial ecosystem and aquatic ecosystem.

Unit–V:Evolutionary Biology **(12 Hours)**

Historical review of Evolutionary concept: concept of evolution, origin of life, theories of evolution. Evidences of evolution: Analogy and Homology, Embryological evidences. Paleontological evidences, molecular phylogeny. Population genetics: Hardy-Weinberglaw, Types of natural selection.

Total Lecture Hours- 60

COURSE OUTCOME

The students are able to,

1. Understand the Mendelian and Molecular Genetics, Cell Structure, Cell Physiology, and Molecular Processes of Cells.
2. Understand organisomal form, function, and diversity.
3. Acquire knowledge on the principles and theory of evolution, and concepts of ecology.
4. Explain the processes of growth and development in individuals and populations.
5. Correlate the relationships between organisms and their environment.

TEXT BOOK(S)

1. Irablei and George Odian, 2006, General, organic and Biochemistry, 2nd edition, W.H.Freeman Company, New York.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter, 2002, Molecular Biology of the Cell-4rd ed., Garland Science, New York.
3. Powar, C.B. 2010, Cell Biology, Himalaya publishing House, Hyderabad.
4. Sobti, R.C., Sharma,V.L. 2009, Essentials of Modern Biology, Ane Books, India.
5. Verma, P.S. and Agarwal, V.K. 2004. Cell Biology, Genetics, Molecular Biology,Evolutionand Ecology,S.Chand&CompanyLtd, New Delhi,

REFERENCE BOOK(S)

1. Hans–Walter Heldt, 2010, Plant Biochemistry, 4th ed, Academic Press, Elsevier Publications, Netherland.
2. Pandey, S.N, Sinha, B.K. 2009, Plantphysiology- 4th ed, Vikas Publishing House, New Delhi.
3. Verma,P.S. and Agarwal, V.K. 2012. Environmental Biology (Principles of Ecology) S.Chand & Company Ltd, New Delhi.
4. Sundara Rajan, S. 2008, Introductory Modern Biology, Anmol publications Pvt Ltd, New Delhi.
5. Verma,V. 2006. Text Book of Plant Physiology, Ane Books Pvt Ltd, New Delhi.

E-RESOURCES

1. https://www.sciencelearn.org.nz/resources/2000-mendel-s-principles-of-inheritance
2. https://library.viu.ca/c.php?g=188912&p=1247781
3. https://www.khanacademy.org/science/ap-biology/natural-selection/natural-selection-ap/a/darwin-evolution-natural-selection
4. https://www.biologydiscussion.com/ecosystem/ecosystem-its-structure-and-functions-with-diagram/6666
5. https://www.intechopen.com/books/herbal-medicine/plants-secondary-metabolites-the-key-drivers-of-the-pharmacological-actions-of-medicinal-plants

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-AP-III: Biology Practical I

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 23ABC302P

PRACTICALS

1. To prepare squash mounts of onion root tips to study mitosis.
2. Study of different modifications in roots, stems and leaves.
3. Observation of various stages of chick embryo.
4. Measurement of Physico–Chemical parameters in aquatic environment,
   - Dissolved Oxygen
   - Salinity
   - pH (Using pH paper (or) pH meter).
   - Free Carbon -di-oxide
   - Carbonates and Bicarbonates

COURSE OUTCOME

The students are able to,

1. Understand microscope, microcopy, and cytochemical techniques.
2. Acquire the knowledge of determining the water parameters using the laboratory equipment's and also learn the art of handling the equipment

TEXT BOOK(S)

1. Ravenand Hetal, P. 2006, Biology 7th edition, Tata McGraw Hill Publications, New Delhi.
2. Powar, C.B. 2010. Cell Biology, Himalaya publishing House, and Hyderabad.
3. Sobti, R.C. and Sharma,V.L. 2009. Essentials of Modern Biology, Ane Books, India
4. Sundara Rajan, S. 2008. Introductory Modern Biology, Anmol publications Pvt Ltd, New Delhi.
5. Verma, V. 2006. Text Book of Plant Physiology, Ane Books Pvt Ltd, New Delhi.

REFERENCE BOOK(S)

1. Griffiths, A.J.F, 2008, Introduction to Genetic Analysis, 9th edition, W.H.Freeman & Co. Narway.
2. Ross, F.C. 1986. Introductory Microbiology, Belland Howell Co, London.
3. Taylor, R.G.W. 2005. Practical Cytology, Academic Press, London.
4. Verma, P.S. and Agarwal, V.K. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Company Ltd, New Delhi.
5. Pandey, S.N. and Sinha, B.K. 2009. Plant physiology-4th ed, Vikas Publishing House, New Delhi.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
3. https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-genetic-diversity/a/phases-of-meiosis
4. https://www.ysi.com/parameters/biochemical-oxygen-demand-bod
5. https://www.merckmillipore.com/IN/en/water-purification/learning-centers/applications/environment-water-analysis/cod/CLqb.qB.BIMAAAFAZwsQWTdi,nav?ReferrerURL=https%3A%2F%2Fwww.google.com%2F&bd=1

SEMESTER IV

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-CC-IV: Human Physiology

Ins. Hrs./Week: 5 **Course Credit**: 4 **Course Code**: 23BC407

UNIT-I: Body fluids **(16 Hours)**

Extra cellular fluid- Plasma. Intracellular fluid: Lymph and Blood-composition and functions. Osmolarity of the body fluids, ionic composition, electrolytes, body buffers. Blood cells-Types, Morphology and functions, haemoglobin, haemopoiesis, blood coagulation and blood groups.

UNIT-II: Circulation and Respiration **(15 Hours)**

Circulation: Structure and functions of Heart and blood vessels. Origin and conduction of heart beat, cardiac cycles, cardiac factors controlling blood pressure, electro cardiogram.

Respiration: Anatomy and physiology of respiration, exchange of gases between lungand blood and between blood and tissues. Role of lungs in acid-base balance.

UNIT-III: Digestive system **(16 Hours)**

Anatomy of the digestive system, Salivary, Gastric, Biliary, pancreatic and intestinal Secretions- composition and functions. Movements in Gastro intestinal tract, Digestion and absorption in the small intestine. Absorption in the large intestine; Digestion andabsorptionofcarbohydrates, lipidsand proteins.

UNIT-IV:Excretory system and Muscle **(14 Hours)**

Excretory system: Structure and functions of kidney and Nephron, Urine- composition and formation. Renal regulation of acid-base balance. **Muscle:** Kinds of muscle, Ultrastructure and chemical composition of skeletal muscle, Sliding filament theory, Physicochemical changes during muscle contraction.

UNIT-V:Central Nervous System **(14 Hours)**

Brief outline of nervous system-Brain, spinal cord, nerve fibre, synapse. Structure and types of neuron. Resting and action potential-conduction of nerve impulse. Synaptic transmission, neurotransmitters. Brain-chemical composition, metabolism, Biochemical aspects of learning and memory.

Total Lecture Hours- 75

COURSE OUTCOME

The students are able to,

1. Explain and describe the composition, function of various body fluids like blood and lymph and their significance.
2. Define and explain the anatomy and physiology, various levels of organizations basic homeostatic mechanism.
3. Explain the morphology, physiology of skeletal system along with the physiology of Muscle contraction in co-ordination with the joints, their articulation and skin.
4. Classify the peripheral nervous system, nerves and morphology of special senses.
5. Understand the functions of important physiological systems of excretory system.

TEXT BOOK(S)

1. Jain AK. 2019. Text book of Physiology with Free QA Physiology (2 Volume Set), 8th edition, Arya Medical (APC) Publishers, New Delhi.
2. Martini FH and Nath JL. 2009. Fundamentals of Anatomy & Physiology. 11th edition, Pearson Benjamin Cummings. USA.
3. Nitin Ashok John, 2019. Chatterjee's Human Physiology Volume–1&II, 13th edition, Kalyani Mukerjee Publications, Kolkata, India.
4. Pal GK. 2019. Comprehensive Textbook of Medical Physiology (2 Volume Set), 2nd edition, Jaypee Medical Publishers, India.
5. Sarda Subramaniam, Madhavan Kutty K and Singh HD. 2006. Text Book of Human Physiology. 6th edition, S.Chand and Company Publishers, New Delhi.

REFERENCE BOOK(S)

1. Guyton AC and Hall JE. 2006. Textbook of Medical Physiology. 11th edition. Saunders, Philadelphia. USA.
2. Shalya Subhash, 2000. Human Physiology: Systemic & Applied, 1st edition, CBS Publishers, New Delhi.
3. Silverthorn DU. 2016**.** Human Physiology: An Integrated Approach, 6th edition, Pearson Publishers, Austin.
4. Stuart H. Ralston, Ian D. Penman, Mark W. J. Strachan and Richard P. Hobson, 2018. Davidson's Principles and Practice of Medicine. 23rd edition, Elsevier Publishers, USA.
5. West ES, Todd WR, Mason HS and JTV. 2011. Textbook of Biochemistry, 4th edition, Bruggen Oxford IBH Publishers, New Delhi.

E-RESOURCES

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3. https://www.pdfdrive.com/essentials-human-physiology-e1543905.html
4. https://www.pdfdrive.com/human-physiology-from-cells-to-systems-168189400.html
5. https://www.pdfdrive.com/human-anatomy-physiology-e51197.html
6. https://www.pdfdrive.com/essentials-of-medical-physiology-6th-edition-e32299678.html

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-CP-IV: Human Physiology Practical

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 23BC408P

PRACTICALS

1. Determination of bleeding time
2. Determination of clotting time
3. Estimation of haemoglobin content
4. Determination of heart rate
5. Determination of Blood group
6. Determination of Rh factor
7. Determination of erythrocyte sedimentation rate (ESR)
8. Recording of basal mass index
9. Enumeration of Red blood cells (RBC and WBC)–Demonstration
10. Demonstration on pulse oxymeter

COURSE OUTCOME

1. Students practically learns and able to determine the rate of haematological process, parameters of blood.

TEXT BOOK(S)

1. Ghai CL. 2013. Textbook of Practical Physiology, 8th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
2. Inderbir Singh. 2011. Textbook of Human Histology, 6th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
3. Kishore J. 2019. National Health Programs of India National Policies and Legislations Related to Health, 13th edition, Peepee Publishers, New Delhi.
4. Pal GK. 2019. Comprehensive Textbook of Medical Physiology (2Volume Set), 2nd edition, Jaypee Medical Publishers, Chennai, Tamil Nadu.
5. Praful B Godkar, Bijal Dave & Laveena Muley. 2017. Textbook of Medical Microbiology and Parasitology, 1st edition, Bhalani Publisher, New Delhi.
6. Srinageswari K and Rajeev Sharma. 2018. Practical work book of Human Physiology, 2nd edition, Jaypee Brothers Medical Publishers(P) Ltd., New Delhi.

REFERENCE BOOK(S)

1. Arthur C. Guyton. 2011. Guyton & Hall Textbook of Medical Physiology, 12th edition, Elsevier Health Science, 3rd edition Saunders, an imprint of Elsevier Inc., USA.
2. Chatterjees CC. 2020. Human Physiology (vol1and 2), 13th edition, CBS Publishing Distribution Pvt. Ltd., India.
3. Nitin Ashok John. 2019. CC Chatterjee's Human Physiology Volume–1 & II, 13th edition, CBS Publishers, New Delhi.
4. Shalya Subhash. 2000. Human Physiology: Systemic & Applied, st edition, CBS Publishers, New Delhi.
5. West ES., WR. Todd, HS. Masonand JTV. 2011. Text book of Biochemistry, 4th edition, Bruggen Oxford IBH Publishers, New Delhi.

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3. https://ia801901.us.archive.org/26/items/KSembulingamEssentialsOfMedicalPhysiology6thEdition/K%20Sembulingam%20%20Essentials%20of%20Medical%20Physiology%2C%206th%20Edition.pdf
4. https://ia802205.us.archive.org/1/items/pdfy5vClyqSbVzIGpuT2/DM%20Vasudevan%20%20Textbook%20of%20Biochemistry%20For%20Medical%20Students,%206th%20Edition.pdf
5. http://yengage.yenepoya.edu.in/idata/YenepoyaUniversity/ilFile/3/86/file_38672/001/CL%20Ghai%20%20A%20Textbook%20of%20Practical%20Physiology,%208th%20Edition.pdf
6. https://www.academia.edu/21912072/IB_Singh_Textbook_of_Human_Histology_6th_Edition
7. https://bujhansi.ac.in/econtent/pages/shortcodes/biomedical/Guyton-and-Hall-Textbook-of-Medical-Physiology-12th-Ed.pdf

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-AC-IV: Biology II

Ins. Hrs./Week: 3 **Course Credit**: 3 **Course Code**: 23ABC403

Unit-I: Biological Classification **(11 Hours)**

Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Lichens, Viruses and Viroids. Biodiversity; Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature.

Unit-II:Plant Kingdom **(13 Hours)**

Classification of plants into major groups; Salient and distinguishing features with few examples of Algae, Bryophyta, Pteridophyta, Gymnospermae (Topics excluded – Angiosperms, Plant Life Cycle and Alternation of Generations).

Unit-III: Animal Kingdom **(13 Hours)**

Salient features and classification of animals- Vertebrates and Non- Vertebrates. Mammals-terrestrial, aquatic or aerial. Organ Level of Organization, Tissue Level of Organization, Organ framework Level of Organization, Cellular Level of Organization. non-chordates up to phyla level and chordates uptoclass level.

Unit-IV: **Morphology of Plants** **(11 Hours)**

Morphology of different parts of flowering plants: root, stem,leaf, inflorescence, flower, fruit and seed. Description of family Solanaceae. Anatomy and functions of tissue systems in dicots and monocots.

Unit-V: **Biology and Human Welfare** **(12 Hours)**

Pathogens; parasites causing human diseases (malaria, dengue, chikungunya, filariasis, ascariasis, typhoid, pneumonia, commoncold, amoebiasis, ringworm) and their control; Basic concepts of immunology -vaccines; cancer, HIV and AIDS; Adolescence-drug and alcohol abuse.

Total Lecture Hours - 60

COURSE OUTCOME

The students are able to,

1. Describe levels of organization and related functions in plants and animals.
2. Demonstrate understanding of core patterns and principles of biology
3. Integrate and apply knowledge across scientific disciplines

4. Incorporate contemporary research into existing conceptual framework
5. Understand the processes and patterns of biological evolution, and the role of evolution as the central unifying concept in biology.

TEXT BOOK(S)

1. Campbell, N.A. and Reece, J. B. 2008. Biology 8th edition, Pearson Benjamin Cummings, San Francisco.
2. Raven, P. Hetal. 2006. Biology 7th edition Tata McGraw Hill Publications, NewDelhi
3. Sheeler, P and Bianchi, D.E. 2006. Cell and Molecular Biology, 3rd edition, John Wiley & sons NY.

REFERENCES BOOK(S)

1. Solisbury and Ross,Plant Physiology,3rd edition,CBS Publishers and Distributors.
2. Hans-Walter Held,Plant Biochemistry, 3rd edition,Elsevier India Pvt.Ltd.
3. Bonner and Varner, Plant Biochemistry, 3rd edition,Academic Press.

E-RESOURCE(S)

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2. https://drive.google.com/file/d/1tghNWPyuqPiqKlrlllZzUrFwcoMiuoMa/
3. https://www.freebookcentre.net/biology-books-download/BASIS-ON MOLECULAR-BIOLOGY-(PDF-52P).html .
4. https://www.freebookcentre.net/biology-books-download/Basis-ofmolecular-cell-biology-(PDF-36P).html .
5. https://agrilif.org/gold/files/2012/09/Lecture-26.pdf

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-AC-IV: Biology Practical II

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: 23ABC404P

1. Prepare a temporary mount to observe pollen germination.
2. Study the plant population density by quadrat method.
3. Study the plant population frequency by quadrat method.
4. Preparation and study of T.S. of dicot and monocot roots and stems (primary).
5. Isolate DNA from available plant material such as spinach, green pea seeds, papaya, etc.
6. Test for the presence of sugar, starch, proteins and fats in plant and animal materials.
7. Separation of plant pigments through paper chromatography.
8. Study and observe (Spotting)
   i. Specimens/slides/models and identification with reasons – Bacteria, Oscillatoria, Spirogyra, Rhizopus, mushroom, yeast, liverwort, moss, fern, pine, one monocotyledonous plant, one dicotyledonous plant and one lichen.
   ii. Human skeleton and different types of joints with the help of virtual images/models only

COURSE OUTCOME

The students are able to,

1. Promote understanding of basic principles and classification of animals and plants.

TEXT BOOK(S)

1. Raven and Hetal, P. 2006, Biology 7th edition, Tata McGraw Hill Publications, New Delhi.
2. Powar, C.B. 2010. Cell Biology, Himalaya publishing House, Hyderabad.
3. Sobti, R.C. and Sharma, V.L. 2009. Essentials of Modern Biology, Ane Books, India
4. Sundara Rajan, S. 2008. Introductory Modern Biology, Anmol publications Pvt Ltd, New Delhi.
5. Verma, V. 2006. Text Book of Plant Physiology, Ane Books Pvt Ltd, New Delhi.

REFERENCE BOOK(S)

1. Griffiths, A.J.F, 2008, Introduction to Genetic Analysis, 9th edition, W.H. Freeman & Co. Narway.
2. Ross, F.C.1986. Introductory Microbiology, Bell and Howell Co, London.
3. Taylor, R.G.W. 2005. Practical Cytology, Academic Press, London.
4. Verma, P.S. and Agarwal,V.K. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Company Ltd, New Delhi.

5. Pandey, S.N. and Sinha, B.K. 2009. Plant physiology- 4th ed, Vikas Publishing House, New Delhi.

E-RESOURCES

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3. https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-genetic-diversity/a/phases-of-meiosis
4. https://www.ysi.com/parameters/biochemical-oxygen-demand-bod
5. https://www.merckmillipore.com/IN/en/water-purification/learning-centers/applications/environment-water-analysis/cod/CLqb.qB.BIMAAAFAZws QWTdi,nav?ReferrerURL=https%3A%2F%2Fwww.google.com%2F&bd=1

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-SBE-I: Phytotherapeutics

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: 23SBEBC1

UNIT –I:Introduction to Phytotherapeutics (6 Hours)

Definition, history ,scope and applications of phytotherapy. Phytotherpeutic agents and their role in treating diseases.

UNIT –II: Herbal Drugs and Allergens (6 Hours)

Classification of medicinal plants based on their effects – Ecological status with special reference to India, common herbal drugs available in market and their composition,Herbal Drug industries in India.

UNIT –III: Herbal Drugs and their mechanism of action (6 Hours)

Herbal drugs acting on brain and nervous system – Rheumatic arthritis – Psychoactive drugs – Depressants, Stimulants, hallucinogens – sources, effects, basic mechanism of action.

UNIT- IV: Herbal drugs in treating cardio vascular diseases & pulmonary disorders (6 Hours)

Herbal drugs and Cardiovascular diseases – blood pressure – cardiac drugs of plant origins – alkaloids, anticoagulants – basic mechanism of action. Pulmonary / respiratory disorders – asthma – bronchitis – common cold – allergy – Remedy from plants.

UNIT- V: Herbal drugs in treating Urogenital disorders (6 Hours)

Drugs for urogenital disorders – roots of *Withania somnifera*– Memory stimulants – *Centella asiatica*– Drugs for dissolving kidney stones – *Musa paradiasica* (pseudostem) – Antiinflammatory drugs – *Cardiospermum* – Anticancer drugs – *Catharanthus roseus*.

Total Lecture Hours- 30

COURSE OUTCOME

The students are able to,

1. Develop the ability to understand the plants as the source of medicines, the ecology of medicinal plants and the plant based drugs available in the market.
2. Acquire knowledge on the application of herbal drugs to cure various ailments
3. Acquire knowledge of herbal drugs and their mechanism of action in treating common diseases.
4. Ability to understand the mechanism of action of herbal drugs treating diseases.

5. Acquire knowledge on the medicinal herbs and their applications in treating cardio vascular diseases, pulmonary and urogenital disorders.

TEXT BOOK(S)

1. Heinrich Michael. 2018. Fundamentals of Pharmacognosy and Phytotherapy, 3rd edition, Elsevier Health Sciences Publishers.
2. Jain Usman and Jadhav Tanvir. 2020. A Textbook of Phytochemistry, 2nd edition, S.Vikas and Compnay Publishers.
3. Kerry Bone and Simon Mills. 2013. Principles and Practice of Phytotherapy. 2nd Edition, Edinburgh New York : Churchill Livingstone Publishers.
4. Kokate CK. 2006. Pharmacognosy, 31st Edition, Nirali Prakashan Publishers.
5. Singh MP and Panda H. 2005. Medicinal Herbs with their formulations, 4th Rev.Edition, Daya Publishers.

REFERENCE BOOKS

1. Khan IA and Khanum A. 2004. Role of Biotechnology in medicinal & aromaticplants, Vol 1 and Vol 10, Ukkaz Publishers.
2. Purohit SS. 2005. Agricultural Biotechnology, 2nd edition. Dr.Updesh Purohit Publishers.
3. Slater A, Scott NW and Fowler MR. 2004. Plant Biotechnology – The genetic manipulation of plants, 2nd edition. Oxford University Press Publishers.
4. Francesco Capasso. 2003. Phytotherapy. A quick reference to herbal medicine. Springer Publishers.
5. Iqbal Ramzan. 2015. Phytotherapies, Efficacy, safety and Regulation, 1st edition. John Wiley Publishers.

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2. https://www.intechopen.com/books/herbal-medicine/introductory-chapter-introduction-to-herbal-medicine
3. https://publications.iarc.fr/_publications/media/download/2627/243766665abcdd12254dfd3ab98a0e47ab582f6c.pdf
4. https://www.slideshare.net/mrmodaq/herbal-medicine-43566287
5. https://www.intechopen.com/books/herbal-medicine/introductory-chapter-introduction-to-herbal-medicine

SEMESTER V

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V- CC-V: Enzymes

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:R23BC509

UNIT–I: History and Terminology (14 Hours)

Definition, history, classification, nomenclature, properties and functions of Enzymes. Coenzymes- Definition, classification, properties and functions. Metalloenzymes and metal activated enzymes. Units of enzyme activity. Turnover number. Non-Protein enzymes-Ribozymes. Abzymes.

UNIT–II:Isolation and Purification of Enzymes (18 Hours)

Isolation-localization and extraction of free and membrane bound enzymes. Purification of enzymes-Methods. Separation procedure based on molecular size, solubility difference and electric charge and selective adsorption. Fractionation of enzymes. Criteria of purity of enzymes.

UNIT –III: Enzyme kinetics (15 Hours)

Factors influencing enzymes activity. Derivation of Michaelis-Menten equation, Lineweaver-Burke plots. Importance of Kcal/Km and Vmax. Enzyme inhibitors- reversible and irreversible inhibitors, Competitive, Non competitive and Uncompetitive. Feedback inhibition. Allosteric Enzymes and inhibition.

UNIT–IV:Mechanism of Enzyme action (14 Hours)

Active site: Definition and characteristics- Lock & Key model and Induced fit model. Enzymes catalysis: acidbase catalysis, covalent catalysis, metal ion catalysis. Specificity of enzyme action Formation of Enzyme – Substrate complex. Bisubstrate reactions-brief introduction to sequential and Ping-Pong mechanisms with example. Mechanism of action of Chymotrypsin and Lysozyme.

UNIT–V:Immobilization of Enzymes (14 Hours)

Immobilization of enzymes. Principles and various methods of immobilization – Ionic bonding, adsorption, covalent bonding, microencapsulation and gel entrapment. Applications of immobilized enzymes. Applications of enzymes in Industry. Clinical importance of an enzyme.

Total Lecture Hours- 75

COURSE OUTCOME

The students are able to,

1. Understand the classification and nomenclature of enzymes, specificity of enzyme Catalysis and regulatory enzymes.
2. Explain the mechanism of enzymes and the role of vitamins as coenzyme precursors.
3. Express the Michaelis-Menten equation and graphical representation of various inhibitors
4. Discuss the factors affecting enzyme activity and enzymeisolation & purification.
5. Describetheprinciples and methodsof enzymeimmobilization.

TEXT BOOK(S)

1. Price and Stevens, 1989, Fundamentals of Enzymology, Oxford Bioscience publications, 2nd Ed, Newyork.
2. Palmer T. and Bonner P. 2007. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry, 2nd edition, Horwood Publishers, United Kingdom.
3. Weisman, Handbook of Enzyme technology, 3rd edition, Printice Hall Publishers, United Kingdom.
4. Satyanarayana, 2019. Fundamentals of Biochemistry, Allied & Books Pvt Ltd, Calcutta.
5. Jain. 2005. Fundamentals of biochemistry, 6th Edition, S.Chand Publishers, New Delhi.

REFERENCEBOOK(S)

1. Nelson, Michael M.Cox, 2004, Lehninger Principles of Biochemistry: International Edition, CBS Publishers, 4th Ed, London.
2. Stryer, 1995. Biochemistry: W.H. Freeman & Co., Scientific Research an Academic Publisher, NewYork. 4th Ed.
3. Voetand JG. Voet. 1990. Biochemistry, 4th edition, John Wiley & Sons Inc., Publishers, New York
4. White, 1959. Principles of Biochemistry, 3rd edition, McGraw HillBook Co., Publishers, New York.
5. Price and Stevens, 1999. Fundamentals of Enzymology, 3rd edition, Oxford University Press, New York.

E-RESOURCES

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4. https://www.chem.purdue.edu/courses/chm333/Spring%202013/Lectures/Spring%202013%20Lecture%2016-%2017.pdf
5. ttps://www.rgpv.ac.in/campus/PY/enzymes_ppt.pdf

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V- CC-VI: Intermediary Metabolism

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**: R23BC510

UNIT -1: Bioenergetics (15 Hours)

Energy transformation, Laws of thermodynamics; Biological oxidations/reductions and energy transducing membranes; Gibbs energy, free energy changes, redox potentials, membrane structure, ion transport across membrane, membrane transport mechanisms.

UNIT-II: Carbohydrate metabolism (16 Hours)

Glycolysis, citric acid cycle and their regulation; Order, organization and function of electron carriers in mitochondrial respiratory chain (electron transport), chemo-osmotic theory, oxidative and photosynthetic phosphorylation, pentose phosphate pathway and its regulation; Gluconeogenesis. Glycogenesis and glycogenolysis- Biosynthesis and regulation.

UNIT- III: Lipid metabolism (15 Hours)

Fatty acid biosynthesis: fatty acid synthase complex; omega oxidation of fatty acids; Biosynthesis of triacylglycerols, phosphoglycerides and sphingolipids; Biosynthetic pathways for Ketone bodies; Metabolism of chylomicrons, LDL, HDL and VLDL; Free fatty acids, Lipid levels in pathological conditions.

UNIT-IV: Amino acid metabolism (15 Hours)

Protein turnover, aminoacids pool. Biosynthesis of essential and non-essential amino acids. Degradation of essential and non-essential amino acids and their regulation. Transamination, oxidative deamination, ammonia intoxication, sources and fate of urea, Urea cycle and its regulation; In-born errors of amino acid metabolism.

UNIT-V: Nucleic acid metabolism (14 Hours)

De novo synthesis of purines and pyrimidines nucleotide and salvage pathway of purines nucleotide synthesis. Degradation of purines and pyrimidines nucleotide. Regulatory Control of biosynthesis and degradation of nucleotide; inhibitors of nucleic acid biosynthesis. Disorder of nucleicacids metabolism.

Total Lecture Hours-75

COURSE OUTCOME

The students are able to,

1. Comprehend Biochemistry of metabolism in living cells in relation to thermodynamic laws and principles.
2. Correlate as to how the living organisms exchange energy and matter with the surroundings for their survival, and store free energy in the form of energy-rich compounds.
3. Recognize as to how the catabolic breakdown of the substances is associated with release of free energy; and the utilization of, free energy during synthesis of biomolecules i.e., anabolie pathways.
4. Assess the crucial role of some hormones with regard to the integration of metabolic pathways.
5. Apply the knowledge of metabolic pathways to biotechnological and biochemical research.

TEXT BOOK(S)

1. Denise R Ferrier. 2013. Biochemistry (Lippincott's Illustrated Reviews), 6th edition, Lippincott Williams and Wilkins Publishers, Philadelphia.
2. Keith N Frayn and Rhys D. Evans. 2019. Human Metabolism A Regulatory Perspective, 4th edition, John Wiley Publishers, New Jersey.
3. Reginald H. Garrett, Charles M. Grisham. 2010. Biochemistry, 4th edition, Mary Finch Publishers, Massachusetts, United States.
4. Robert K. Murray, Darryl K. Granner, Peter A. Mayes, and Victor W. Rodwell. 2012. Harper's Illustrated Biochemistry, 29th edition, McGraw-Hill Medical Publishers, Canada.
5. Voet.D and Voet. J.G. 2010. Biochemistry, 4th edition, John Wiley & Sons Inc Publishers, New Jersy.

REFERENCE BOOK(S)

1. Berg JM, JL. Tymoczko, and L. Stryer W.H. 2012. Biochemistry, 7th edition, Freeman Publishers, New York.
2. David A Bender, Shauna M C Cunningham. 2021. Introduction to Nutrition and Metabolism, 6th edition, CRC Press Publishers, Florida.
3. David Nelson L and Michael Cox. 2021. Lehninger Principles of Biochemistry, 8th edition, W.H.Freeman & Co Ltd Publishers, New York.
4. Sareen S Gropper, Jack L Smith, & Timothy P Carr. 2018. Advanced Nutrition and Human Metabolism, 7th edition, Cenage Learning Publishers.
5. Victor Rodwell and David Bender. 2018. Harper's Illustrated Biochemistry, 31st edition Paperback - Illustrated, McGraw-Hill Education, New York.

E-RESOURCES

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3. https://pubmed.ncbi.nlm.nih.gov/23680095/

4. https://www.ncbi.nlm.nih.gov/books/NBK556047/
5. https://www.khanacademy.org/test-prep/mcat/biomolecules/fat-and-protein-metabolism/v/overview-of-fatty-acid-oxidation

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(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V- CC-VII: Molecular Biology

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**: R23BC511

UNIT-I: Structure and Functions of Nucleic Acids (14 Hours)

The beginning of Molecular Biology; DNA: A carrier of genetic information, Chemical structure of DNA and Base composition, biologically important nuleotides,Watson-Crick model, Supercoiled DNA, structure of different types of nucleic acids, hydrolysis of nucleic acids. Conformation of nucleic acids: A, B, Z DNA, t-RNA, m-RNA.

UNIT-II: Replication of DNA (16 Hours)

Models of DNA Replication, Origin and direction of replication, discontinuous replication, DNA polymerases of prokaryotes and their mechanism of action; Primase, Ligase, Single strand DNA binding protein, Helicase, Topoisomerases Replication strategies for replicating circular DNA: Rolling circle replication and D-loop replication. Eukaryotic DNA polymerases, Strategies for replicating linear DNA, Inhibitors of replication.

UNIT-III: Transcription (16 Hours)

RNA synthesis and processing: Structure and function of RNA polymerases. Transcription in prokaryotes. Transcription factors and machinery, formation of initiation complex, transcription activators and repressors, RNA polymerases, capping, elongation and termination, RNA processing, RNA editing, splicing, polyadenylation, structure and function of different types of RNA.

UNIT-IV: Translation (14 Hours)

Protein synthesis and processing: Ribosome, formation of initiation complex, initiation factors and their regulation, elongation, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, translational proofreading, translational inhibitors, post- translational modification of proteins.

UNIT-V: Genetic Mutations and Gene Regulation (15 Hours)

Introduction and Types of Gene mutations - Base substitution, Frame shift mutation-insertion, deletion, missense, nonsense mutation. Mutagens-Physical and chemical. Reverse mutation in bacteria. DNA repair mechanism-Mismatch repair photoreactivation, excision and SOS repair. Beneficial and harmful effects of mutations. Regulation of Gene expression: Inducible operons - Lactose, Repressible operon - Tryptophan.

Total Lecture Hours- 75

COURSE OUTCOME

The students are able to,

1. Understand and apply the principles and techniques of molecular biology.
2. Learn the most significant discoveries and theories through the historical progress of biological scientific discoveries, and their impacts on the development of molecular biology.
3. Acquire knowledge on the principles and laws of inheritance at the cell, individual and population levels.
4. Understand the concepts such as gene structure and function, gene regulation, microbial genetics, mutation and DNA repair, PCR and sequencing, cancer genetics and evolution.
5. Learn as to how gene expression is regulated at different levels, and as to how tissue- specific expression is achieved and can be manipulated and studied experimentally.

TEXT BOOK(S)

1. Bruce Alberts, Alexander D. Johnson and Julian Lewis. 2014. Molecular Biology of the Cell, 6th edition, WW. Norton & Company Publishers, New York, USA.
2. Cooper GM. And RE. Hausman. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington Publishers, Augusta, Georgia.
3. Geoffrey Cooper and Robert E Harsman. 2004. The Cell-A Molecular Approach, Ist edition. ASM Press Publishers, Washington, United States.
4. James D. Watson, A. Baker Tania, P. Bell Stephen, Gann Alexander, Levine Michael and Losick Richard. 2017. Molecular Biology of the Gene, 7th edition, Pearson Education Publishers, New York, USA.
5. Rastogi SC. 2011. Cell and Molecular Biology, 3rd edition, New age International publisher, New Delhi, India.
6. David Freifelder. 2008. Molecular Biology, 2nd edition, Narosa publishing house Publishers, India.

REFERENCE BOOK(S)

1. Alberts B., Johnson A., Lewis J., Mofgan D., Raff M., Roberts Kand Walter P. 2014. Molecular Biology of the Cell. 6th edition. Garland Science, New York, USA.
2. Allison A. Lizabeth. 2012. Fundamental Molecular Biology, 2nd edition. J Willey and Sons, Hoboken, New Jersey.
3. Berg JM, Tymoczko JL, Gatto GJ and Stryer L. 2015. Biochemistry, 8th edition, WH Freeman & Co., New York, USA.
4. David Nelson L. and Michael Cox. 2021. Lehninger Principles of Biochemistry. 8th edition, WH. Freeman & Co Ltd Publishers, New York, USA.
5. Freifelder D and Malacinski GM. 2010. Essentials of Molecular Biology, 4th edition,

John and Bartlett Publishing, UK.
6. George M Malanciski. 2008. Freifelder's Essentials of Molecular Biology, 4th edition. Narosa Publishing House, India.
7. Gerald Karp. 2008. Cell and Molecular Biology, 5th edition, John Wiley and Sons Publishers, Hoboken, New Jersey.
8. Krebs JE., Kilpatrick ST. and Goldstein ES. 2013. Lewin' GENES XI, Jones & Bartlett Learning. Burlington, Massachusetts.
9. Lodish H., A. Berk, CA. Kaiser, M. Krieger, MP. Scott, A.Bretscher, H. Ploegh and P. Matsudaira. 2007. Molecular Cell Biology. 6th edition, WH. Freeman Publishers, New York, USA.
10. Watson JD, TA. Baker and SP. Bell. 2008. Molecular Biology of the Gene. 5th edition, Darling Kindersley (India) Pvt. Ltd., Publishers, New Delhi.

E-RESOURCES

1. https://agrilife.org/gold/files/2012/09/Lecture-26.pdf
2. https://static1.squarespace.corn/static/6019d0bc7dff866728d961d3/t/601a68429c231608a 9b8f2a0/1612343363359/biochemistry_satyanarayana_ebook_free.pdf
3. https://drive.google.corn/file/d/1tghNWPyuqPiqKlRll1ZzUrFwcoMiuoMa/
4. http://www.freebookcentre.net/biology-books-download/BASICS-ON-MOLECULAR-BIOLOGY-(PDF-52P).html
5. http://www.freebookcentre.net/biology-books-download/Basics-of-molecular-cell-biology-(PDF-36P).html

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2022 – 2023)
DEPARTMENT OF BIOCHEMISTRY
B.Sc., BIOCHEMISTRY

Semester: V- CP-III: Enzymes and Molecular Biology Practical
Ins. Hrs./Week: 3 **Course Credit**: 3 **Course Code**: R23BC512P

1. Effect of pH, temperature, substrate concentration and specific activity of salivary amylase
2. Effect of pH, temperature, substrate concentration and specific activity of urease
3. Effect of pH and temperature of acid phosphatase/ alkaline phosphatase.
4. Extraction and quantification of DNA from animal source
5. Extraction and quantification of RNA from animal source
6. Extraction and quantification of protein from animal source

DEMONSTRATION
1. SDS-PAGE
2. Agarose Gel Electrophoresis

COURSE OUTCOMES
The students are able to,
1. Understand the concepts of metabolism, characteristics of metabolic pathways and strategies used to study these pathways.
2. Gain a detailed knowledge of various catabolic and anabolic pathways.
3. Understand the regulation of various pathways.
4. Gain knowledge about the diseases caused by defects in metabolism with emphasis on the metabolic control.
5. Understand the basics of Molecular techniques.

REFERENCE BOOK(S)
1. Lehringer's Principles of Biochemistry (2019), Nelson, D.L. and Cox, M.M., W.H.Freeman and Company (New York), ISBN:13:978-1-4641-0962-1 / ISBN13: 978-1429234146 ISBN-10: 9781429234146
2. Textbook of Biochemistry with Clinical Correlations, 7 th Edition. Textbook of Biochemistry, 7th Edition. Thomas M. Devlin (Editor). ISBN: 978-0-470-28173-4
3. Biochemistry (2013) 4th ed.,Voet, Donald,Voet, Judith &Pratt, charlotte. Wiley & Sons, Inc. (New Jersey), ISBN:978-1-11809244

TEXT BOOK(S)
1. An Introduction to Molecular Biotechnology: Molecular Fundamentals, Methods and Applications in Modern Biotechnology - M. Wink. Wiley, ed. 2, 2011.

2. Molecular and cellular Biology, Stephen L.Wolfe, Wadsworth Publishing Company, 1993
3. Molecular Biology LabFax, T.A. Brown (Ed.), Bios Scientific Publishers Ltd., Oxford, 1991
4. Electrophoresis in Practice: A Guide to Methods and Applications of DNA and Protein Separations, Fourth Edition; Dr. Reiner Westermeier,2004

E-RESOURCES

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

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V- MBE-I: Genetics

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**: R23MBEBC1

UNIT – I: Introduction to Genetics **(16 Hours)**

Brief history/basic concepts of genetics, Cell division and chromosomes. Mendelian genetics/monohybrid, dihybrid cross. Mendelian genetics/trihybrid cross, probability. Modification of Mendelian ratios/incomplete and codominance. Structure of Gene.

UNIT – II: Chromosome abnormalities **(15 Hours)**

Diploid chromosomes number- Sex differentiation and sex determination.The X chromosomes, Barr bodies, the Lyon hypothesis. Aneuploidy and polyploidy: Gene deletion, duplication, inversions and translocation. Sex Linkage in Drosopohila and Man, Sex Influenced and Sex Limited Genes - Non-Disjunction and Gynandromorphs.

UNIT – III: Nature and Function of Genetic Material **(16 Hours)**

Fine Structure of the Gene - Cistron, Recon, Muton - Mutation - Molecular Basis of Mutation, Types of Mutation, Mutagens, Mutable and Mutator Genes. Chromosomal Aberrations - Numerical and Structural Examples from Human.

UNIT – IV: Applied Genetics **(14 Hours)**

Animal Breeding - Heterosis, Inbreeding, Out Breeding, Out Crossing, Hybrid Vigour. Population Genetics, Evolutionary genetics, Hardy Weinberg Law - Gene Frequency, Factors Affecting Gene Frequency, Eugenics, Euphenics and Euthenics, Bioethics.

UNIT – V: Practice problems **(14 Hours)**

Genetic Principles and their application in medical practice; Syndromes and disorders: definition and their genetic basis - Cystic fibrosis and Tay Sach's Syndrome; Phenylketonuria and Galactosemia; Ethical issues with clinical genetics.

Total Lecture Hours- 75

COURSE OUTCOME

The students are able to,

- Identify and describe the process and purposes of the cell cycle, meiosis, and mitosis, as well as predict the outcomes of these processes.
- Transmission genetics problems, make accurate predictions about inheritance of genetic traits, and map the locations of genes.

- To identify the parts, structure, and dimensions of DNA molecules, RNA molecules, and chromosomes, and be able to categorize DNA as well as describe how DNA is stored.
- To describe what causes and consequences of DNA sequence changes and how cells prevent these changes, as well as make predictions about the causes and effects of changes in DNA.
- To describe applications and techniques of modern genetic technology, as well as select the correct techniques to solve practical genetic problems.

TEXT BOOK(S)

1. The Biology of Cancer, R.A. Weinberg, Garland Science, Taylor and Francis Group, 2007.
2. Cancer Biology,3rd ed., R.J.B. King and M.W. Robbins, Pearson Education Ltd., 2006.
3. Cancer cytogenetics, chromosomal and molecular genetic aberrations of tumor cells,3rd ed., S. Heim and F. Mitelman, Wiley, Blackwell Inc., 2009
4. Human cytogenetics: malignancy and acquired abnormalities, a practical approach,3rd ed., D.E. Rooney, Oxford University Press, 2001.
5. Introduction to the Cellular and Molecular Biology of Cancer,4th ed., M.A. Knowles and P.J. Selby, Oxford University Press, 2005.

REFERENCE BOOK(S)

1. Genetics by Verma, P.S. and V. K.Aggarwal.
2. Genetics by Russell P.J.
3. Genetics analysis and principles by Brooker R.J and McGraw Hill.
4. Basic Genetics my Miglani G.S.
5. Genetics: Analysis of genes and genomes by Hartl D.L and Jones E.W.

E-RESOURCES

1. https://www.slideshare.net/vanessaceline/intorduction-to-genetics
2. www.goldiesroom.org/

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

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(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V- SBE-II: Herbal Cosmetics

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: R23SBEBC2

UNIT –I: Standardization of Herbal Materials (6 Hours)

Quality Control and Standardization of Herbal Medicines, Need for standardization, Assessment of quality – Stability, Safety, toxicity and efficacy. Standardization of Crude plant material, Plant preparations and Finished product. Steps Involved in Standardization - Pharmacognostic evaluation, Physico-chemical parameters, Chemical parameters, Chromatographic and spectroscopic analysis, Microbiological parameters.

UNIT –II: Cosmetic Technology-I (6 Hours)

Raw materials used for formulation of skin care and hair care cosmetics: source and description of raw materials of natural origin like fixed oils, waxes, gums, hydrophilic colloids, colours, perfumes, protective agents, bleaching agents, preservatives, antioxidants and other ancillary agents used in the cosmetic formulations.

UNIT –III: Cosmetic Technology-II (6 Hours)

Stability aspects of cosmetics: Shelf-life, effects of environmental factors like light, temperatures etc., on product stability. Quality control tests of different cosmetic products, Packaging of cosmetics. Herbs used as antioxidants, free-radical scavenger, antiseptic, antibacterial, antiwrinkle, anti-fungal.

UNIT –IV: Hair and Skin Care Products (6 Hours)

Hair Care Products: Hair structure, Shampoos, Conditioners, Setting lotion, Hair creams, Hair dyes. Herbal skin care cosmetics: Cleansing agents - apricot. Emollients - aloe, almond. Astringent – amla, Freshening agent - chandan, khus. Skin Pigmentation - saffron, ambi haldi.

UNIT –V: Types of Cosmetic preparations (6 Hours)

Coloured Cosmetics: Introduction, lip colour, nail polish and face make-up eye make-up-Solutions, Lotions, Suspensions, Ointments, Creams or emulsions, Gels, Sticks, Powders, Tablets and Aerosols. Dental products: Dentifrices, Oral rinses, Tooth powder, Tooth paste. Personal Hygiene Products: Shaving creams, after shave products.

Total Lecture Hours- 30

COURSE OUTCOME

The students are able to,

1. Impart knowledge on the assessment of quality, quality control and standardization of herbal drugs.
2. Acquire knowledge of plant based raw materials their sources, information and various constituents used in cosmetic formulations.
3. Understand the stability, standardization, shelf life and quality control of herbal based cosmetic preparations.
4. Gain knowledge on the formulation of skin and hair care cosmetic products.
5. Acquire knowledge on cosmetics, understand the techniques and develop skills in cosmetic technology to become entrepreneurs.

TEXT BOOK(S)

1. Vimaladevi, M. 2019. Textbook of Herbal Cosmetics, CBS Publishers.
2. Eiri Board. 2015. Herbal Cosmetics & Beauty Products with Formulations, Engineers India Research Ins Publishers.
3. Eiri Board. 2013. Hand Book of Synthetic And Herbal Cosmetics, Engineers India Research Ins Publishers.
4. Chattopadhyay, PK. 2013. Herbal Cosmetics & Ayurvedic Medicines, 3rd Revised Edition, Niir Project Consultancy Services and Publishers.
5. Panda, H. 2005. The Complete Technology Book on Herbal Beauty Products with Formulations and Processes, Asia Pacific Business Press Inc Publishers.

REFERENCE BOOK(S)

1. Nora Robson. 2017. Skin care: For dry skin. Lotions, creams, soap and scrubs. Make your own natural, organic cosmetics: Health & Beauty. (Volume 1), Create Space Independent Publishers.
2. Lorraine McCormick. 2019. Natural Soap Making for Beginners: How to Make Soap from Scratch Using Essential Oils, Herbs, and Other Natural Additives (Natural Health Care), Independently published.
3. Helen Markham. 2013. Dry Skin Care Solutions: 21 Completely Natural Remedies for Achieving Healthy and Radiant Skin (Completely Natural Skin Care Series) (Volume 1), Create Space Independent Publishing Platform.
4. Vesela Tabakova. 2017. How to Grow Long Hair with Herbs, Vitamins and Gentle Care: Natural Hair Care Recipes for Hair Growth and Health (Organic Beauty on a Budget),), Independently published.
5. Mandi Nyambi. 2019. Fresh Face: Simple routines for beautiful glowing skin, every day (Skin Care Book, Healthy Skin Care and Beauty Secrets Book), Illustrated edition, Chronicle Books Publishers.

E-RESOURCES

1. https://www.slideshare.net/rahimbrave/herbal-cosmetics-69811712
2. https://www.slideshare.net/ShresthaPandey1/herbal-cosmetics-for-hair-and-skin-care
3. https://www.slideshare.net/LavanyaSA/drlavanyasa-standardization-of-herbal-drugs

4. https://www.slideshare.net/zhaciil/technology-in-the-field-of-cosmetics
5. https://www.slidemembers.com/en_US/view/PPT-Templates/natural-cosmetic-presentation-ppt-11822
6. http://www.iamj.in/posts/2017/images/upload/269_277.pdf

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: V- SBE-III: Clinical Lab Technology

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: R23SBEBC3

UNIT-I: Hematology (6 Hours)

Blood – Components- Plasma and corpuscles –counting of cells – TC and DC, Platelets, Hematocrit test, ESR, Mean corpuscular Hb, BT & CT. Blood Banking: Rh Typing – Slide test, Blood transfusion – Compatibility testing. Blood culture and sensitivity.

UNIT- II: Biochemical profile (6 Hours)

Blood glucose-Fasting -Post prandial-Oral Glucose Tolerance Test (OGTT), Lipid profile-Total serum cholesterol, High Density Lipoprotein (HDL), Low density lipoprotein (LDL), Renal profile-Blood Urea Nitrogen (BUN), Creatinine, Urea, Uric acid. Liverprofile -Bilirubin-Liver enzyme test-protein test.

UNIT- III: Serology (6 Hours)

Widal test, VDRL, A.S.O. titre, C-Reactive Protein. Thyroid Function Test (TFT)-Total Thyroxine (T4),Tri iodo thyronine (T3), Rapid testing -RT-PCR. Role of Serology in criminal investigation- DNA Fingerprinting technique.

UNIT-IV: Urine Analysis (6 Hours)

Physical properties of Urine – Colour, Volume, Specific gravity, Odour, Turbidity and pH. Chemical examination – urine sugar, albumin, bile salts, Bile pigments, urobilinogen Microscopic Examination of Urine deposits – Cast Crystals – Cells. Principles in Pregnancy Test. Microbial culture and sensitivity.

UNIT-V: Analysis of excretory product and body fluids (6 Hours)

Stool examination: Color-microscopic examination, worms. Cerebrospinal Fluid-appearance-cytology –chemistry, Sputum – Microbial analysis, Culture and sensitivity. Semen analysis-physical properties-Microscopic examination.

Total Lecture Hours- 30

COURSE OUTCOME

The student are able to,

1. Apply principles of OSHA safety regulations for blood-borne pathogens, quality assurance and quality control in Hematology.
2. Evaluate specimen acceptability of hematology specimens and dispose of them in the appropriate biohazard containers

3. Demonstrate an understanding of the components of human blood and characteristics, functions, and abnormalities and disease states of each.
4. Compare and contrast hematology values under normal and abnormal conditions.
5. Demonstrate proficiency in the skills necessary to perform blood cell counts, and evaluation of blood elements within stated limits of accuracy and assess the clinical significance of the results.

TEXT BOOK(S)

1. Sood, R, 1999, Medical Laboratory Technology – methods and interpretations – Fifth edition, Jaypee, New Delhi.
2. Mukherjee, L.K. 1988, Medical Laboratory Technology – Vol.3 – 2nd ed. – Hill Publishing Ltd., New Delhi.
3. Connie R. Mahon. Diane G. Tice. 2006. Clinical Laboratory Immunology. 8th edition. Pearson Prentice Hall. 325 pp.
4. France Talaska Fishbach., Margaret A. Fishbach. 2018. A Manual of laboratory and Diangnostic Tests- 10th Edition.
5. Dany Spencer Adams , 2014 , Lab Math- 2nd Edition.

REFERENCE BOOK(S)

1. Rapael, S.S, 1983, Lynch Medical Laboratory Technology, Fourth edition, W.B. Saunders Co, Singapore.
2. Woohan, I.D.P., Heather Freeman, 1990, Micro Analsis in Medical biochemistry, sixth edition, Churchil Livingstone Publishing Ltd., USA.
3. John Ridley 2010. Essentials of clinical laboratory science. CLIA. Compliance guide.
4. Ochei, J and Kolhattar, A. 2000. Medical Laboratory Science – Theory and Practice. Tata McGraw - Hill Publishing Company Ltd., New Delhi. India.
5. Mary Loou Turgeon , 2018, Clinical Hematology- Theory and Procedures, 6th Edition.

E-RESOURCES

1. https://www.pcc.edu/rograms/medical-lab/resources/
2. https://ashpublications.org/hematology
3. https://www.bloodline.net/

SEMESTER VI

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: VI- CC-VIII: Immunology

Ins. Hrs./Week: 6 **Course Credit**: 6 **Course Code**: R23BC613

UNIT-I: Immune system **(20 Hours)**

Lymphoid organ - Types- Primary Lymphoid organ - Thymus, Borne marrow, Bursa and Secondary Lymphoid organ- Spleen, Lymphnode, Lymphocytes- their origin and differentiation, Types- B Cell, T Cell and NK cells. Antigen presenting cells- macrophages, dendritic cells, langerhans cell. Mechanism of phagocytosis. Complement -characteristic features, activation- Classical pathway and Alternative pathway- biological functions.

UNIT-II: Immunity **(19 Hours)**

Definition, Types - Innate immunity- classification- mechanism of innate immunity and Acquired immunity- classification- active and passive- mechanism of acquired immunity. Humoral and cell mediated immunity. Immunity to infection against bacteria and virus. Cytokines- interleukins, Interferon-their role in immune response.

UNIT-III: Immunoglobulins **(18 Hours)**

Immunoglobulin- Definition, structure, types based on light and heavy chain, biological functions, generation of diversity. Antigen- Types, hapten, immunogen, factors determining antigenicity. Antigen-antibody interactions- agglutination, neutralization, complement fixation, opsonization, bacteriolysis and precipitation.

UNIT-IV: Immunity to infection **(17 Hours)**

Hypersensitivity reactions- Definition, types based on time duration & location and mechanism. Transplantation-Definition, types, graft acceptance, graft rejection- types- rejection mechanism and prevention, immune suppressive drugs. HLA-immune response genes, HLA molecules, Auto immune diseases- pathogenesis - treatment.

UNIT-V: Immunochemical techniques **(16 Hours)**

Production and applications of polyclonal antibodies. Principle, Production, biological significances of monoclonal antibodies. The precipitation reaction- immunodiffusion, immunoelectrophoresis, immunofluorescence, complement fixation test- principle, types, mechanism and biological significances. Principle, technique and applications of RIA and ELISA.

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to,

1. Learn the structure and properties of lymphoid organs and role of lmmune Cells.
2. Understand various types immunity, immune response and the importance of lmmunity.
3. Acquire knowledge about immunoglobulins and antigen - antibody interactions.
4. Understand the hypersensitivity reactions and organ transplantation and immune response.
5. Learn the technique of production of polyclonal and monoclonal antibodies and their applications.

TEXT BOOK(S)

1. Anil K. Sharma. 2019. Immunology: An Introductory Textbook, 1st edition, Jenny Stanford Publishers, California.
2. Gupta SK. 2017. Essentials oflmmunology, 2nd edition, ARYA Publishers, New Delhi.
3. Kenneth Murphy. 2017. Janeway's Immunobiology, 9th edition, W.W. Norton & Company Publishers, New York.
4. Mohanty SK. 2019. Essentials of Microbiology & Immunology, 1st edition, Paras Medical Publishers, New Delhi.
5. Robert R. Rich. 2020. Clinical Immunology- Principles And Practice, 5Th edition, Elsevier Publishers, India.
6. Shyamasree Ghosh. 2020. Computational Immunology Basics, 1st edition, CRC Press Publishers, England.

REFERENCE BOOK(S)

1. Abul K. Abbas, Andrew H. Lichtman, and Shiv Pillai. 2020. Cellular and Molecular Immunology, 10th edition, Elsevier Publishers, India.
2. Ashim **K.** Chakravarty. 2016. Immunology and Immunotechnology, 1st edition, Oxford Publishers, England.
3. Jenni Punt, Sharon A Stranford, Patricia P Jones and Judith A Owen. 2019. Kuby Immunology, 8th edition, Macmillan Education Publishers, London.
4. Peter J. Delves, Seamus J. Martin, Dennis R. Burton and Ivan M. Roitt. 2016. Roitt's Essential Immunology, 13th edition, Wiley-Blackwell Publishers, New Jersey.
5. Richard A. Goldsby, Thomas J**.** Kindt, Barbara A. Osborne, Janis Kuby. 2002. Immunology, 5th edition, W.H.Freeman Publishers, New York.

E-RESOURCES

1. https://www.nature.com/ni/video
2. https://www.cell.com/immunity/home
3. https://www.wpunj.edu/sec/vsec/science courses/bio/BIOimmuANIM .html
4. https://www.youtube.com/watch?v=K09xzIQ8zsg
5. https://nptel.ac.in/content/syllabus_pdf/102105083.pdf

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: VI- CC-IX: Clinical Biochemistry

Ins. Hrs./Week: 6 **Course Credit**: 6 **Course Code**: R23BC614

UNIT- I: Basic concepts of Clinical Biochemistry (19 Hours)

A brief review of units and abbreviations used in expressing concentrations and standard solutions. Specimen collection and processing (Blood, Urine, Faeces). Anticoagulant preservatives for blood and urine. Transport of specimens. Blood coagulation - disturbances in blood clotting - haemophilia A and haemophilia B. Blood groups, haemoglobin in Anaemias, Sickle Cell Anemia, Thallasemia, Porphyrias and porphyrinurias. Blood banking.

UNIT -II: Hepatic Function Test (17 Hours)

Homeostasis, Disorders of fluids, electrolyte balance and gastrointestinal system, disorder involving change in hydrogen ion concentration. Liver function tests, Jaundice, Haemolytic, Hepatic and Obstructive Jaundice. Renal function tests, normal and abnormal constituents of unne.

UNIT- III: Disorders of carbohydrate metabolism (18 Hours)

Sugar level in normal blood, maintenance of blood sugar concentration - endocrine influence on Carbohydrate Metabolism, Hypoglycemia, Glycosuria, Renal Threshold Value, Diabetes Mellitus - classification, complications, glucose tolerance test (GTT), Diabetic Coma, Diabetic Ketoacidosis, Glycogen Storage Diseases, Fructosuria, Galactosemia.

UNIT- IV: Disorders of Protein, Aminoacid and Nucleicacid metabolis (19 Hours)

Plasma proteins, their origin, significance and variation in diseases. Nitrogen Balance, Proteinuria, Multiple Myeloma, Wilsons Disease. Phenylketonuria, Alkaptonuria, Tyrosinosis, Albinism, Hartnupsdisease. Fanconic Syndrome, Cystinuria, Gout.

UNIT -V: Disorders of lipid metabolism (17 Hours)

Lipid metabolism in liver and adipose tissue, plasma lipoproteins, cholesterol triglycerides and phospholipids in health and diseases, Fatty Liver, Atherosclerosis, Lipid Storage Diseases, Hypolipoproteinemia and Hyperlipoproteinemia.

Total Lecture Hours-90

COURSE OUTCOME

The Students are able to,

1. Understand the difference between plasma, serum, normal and abnormal constituents in various body fluids, Blood clotting mechanism and anticoagulants.
2. Acquire knowledge on the nature and function of various enzymes, normal levels and elevated levels in various diseases.
3. Comprehend that blood is a universal fluid for carrying different minerals, nutrients, proteins etc to and from various tissues.
4. Learn that many diseases result from imbalance in certain enzymes and helps in diagnosis of liver, cardiac, gastrointestinal, kidney diseases.
5. Make the students knowledgeable and potential human resource with basic understanding on clinical biochemistry.

TEXT BOOK(S)

1. Bruce Alberts, Alexander D. Johnson and Julian Lewis. 2014. Molecular Biology of the Cell, 6th edition, WW. Norton & Company Publishers, New York, USA.
2. Carl Burtis A. Edward Ashwood R. and David Bruns E. 2012. Textbook of Clinical Chemistry and Molecular Diagnosis, 5th edition, Springer Publishers, New York.
3. Chatterjee MN. and Ranashinde. 2012. Text Book of Medical Biochemistry, 8th edition, Jaypee Brothers Medical Publisher, New York.
4. DevlinTM. 2011. Textbook of Biochemistry with Clinical Correlations. 7th edition, John Wiley & Sons Publishers, New York .
5. Graham Basten. 2011. Introduction to Clinical Biochemistry, Interpreting Blood Results. Book Boon. 2 nd edition, Bookboon.

REFERENCE BOOK(S)

1. Dennis Kasper and Eugene Braunwald. 2005. Principles oflntemal Medicine. Harrison's Vol I & 2, 16th edition, McGraw-Hill Publishers, New York.
2. Harold Varley. 2006. Practical Clinical Biochemistry. 6th edition. CBS Publishers.
3. Lippincott William & Wilikns. 2018. Clinical Chemistry, Principles, Techniques, Correlations with Access. 8th edition. Michael Bishop, Edward Fody, & Larry Schoeff Publishers, Philadelphia.
4. Tata Mc Graw Hill Companies. 2001. The Metabolic & Molecular Basis of inherited Diseases, Vol 1, 8th edition, Vallersty Publishers, Mumbai.
5. Thomas M Devlin. 2006. Textbook of Biochemistry with Clinical Correlation. 2nd edition, Wiley & Sons Publishers, New York.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.ht
2. https://www.enpab.it/images/2018/EbookBiologia%20Clinica%2001 Clinical%20Bioche mistry%20and%20Metabolic%20Medicine%20- %20Martin%20Andrew%20Crook.pdf

3. http://www.student.oulu. fi/-taneliha/Harpers Illustrated Biochemistry_ (29thEdition).pdf
4. https://staticl.squarespace.com/static/6019d0bc7dff866728d961d3/t/60la68429c231608a 9b8f2a0/1612343363359/biochemistry_satyanarayana_ebook_free.pdf
5. https://www.pdfdrive.com/biochemistry-books.html

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(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: VI-CP-VI: **Immunology and Clinical Biochemistry Practical**

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**: R23BC615P

1. Collection of Blood and Urine, Types of preservative and anticoagulants
2. Blood grouping, hemoglobin content, RBC, TC/DC count, PCV, and ESR
3. Qualitative tests of Urine: Abnormal constituents:
   Sugar, Protein (Albumin), Ketone Bodies, Bile Pigments and Bile Salts.
4. Quantitative estimation in Blood
   Glucose, Cholesterol, Calcium, Urea, Iron, Bilirubin, Uric acid, Creatinine
5. Quantitative estimations in Urine
   Glucose, Urea, Uric acid, Creatinine
6. Immunology
   - Haemagglutination reaction- Blood grouping
   - Widal test - rapid slide test for typhoid
   - VDRL test - test for syphilis

COURSE OUTCOME

The students are able to,

1. Explain the clinical significance of the laboratory tests
2. Perform the hematology based analysis
3. Acquire knowledge in collection of blood and urine samples and preservation for laboratory analysis
4. Analyze the biochemical parameters in blood quantitatively
5. Analyze the biochemical parameters in urine quantitatively and quantitatively
6. Apply important techniques used for the study of immunological reaction.

TEXT BOOK(S)

1. Jayaraman J. 2011. Laboratory Manual in Biochemistry, 3rd Edition, New age International Pvt Ltd Publishers, India.
2. Sadasivam S. Manickam A. 2009. Biochemical Methods, 3rd Edition, New age publishers, India.
3. Sawhney SK. Randhir Singh. 2005. Introductory Practical Biochemistry, 2nd Edition, Alpha Science International, Ltd., United Kingdom.
4. Plummer T. 2001. Practical Biochemistry, 3rd Edition, McGraw Hill Publishing Company, New York, USA.
5. Pattabiraman TN. 1998. Laboratory manual in Biochemistry, 4th Edition, All India publishers, New Delhi.

6. Robert R. Rich. 2020. Clinical Immunology- Principles and Practice, 5th Edition, Elsevier Publishers, India.

REFERENCE BOOK(S)

1. Alan H Gowenlock. 1998. Varley's Practical Clinical Biochemistry, 6th Edition, CBS Publishers, India.
2. Godkar B. 2020. Textbook of Medical Laboratory Technology Vol 1 & 2 Paperback, 3rd Edition, Bhalani Publisher, New Delhi.
3. Kanai L Mukerjee. 1996. Medical Lab Technology, Vol I & II, 1st Edition, Tata Mcgraw Hill Publishers, New York, USA.
4. Ranjna Chawla. 2014. Practical Clinical Biochemistry Methods and Interpretations (Paperback). 4th Edition, Jaypee Brothers Medical Publishers, Tamil Nadu.
5. Kanai L Mukerjee. 1996. Medical Lab Technology Vol I & II, 3rd Edition, Tata McGraw Hill Publishers, New Delhi.
6. Ashim K. Chakravarty. 2016. Immunology and Immunotechnology, 1st Edition, Oxford Publishers, England.

E-RESOURCES

1. https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors
2. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&is Allowed=y
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y
4. https://www.pdfdrive.com/medical-biochemistry-4th-edition-medial-biochemistry-e194558015.html
5. https://www.pdfdrive.com/clinical-biochemistry-e33663835.html
6. https://www.cell.com/immunity/home

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: VI- CC-MBE II: Endocrinology

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**: R23MBEBC2

UNIT-I: Hormones and Receptors (14 Hours)

Hormones- Definition, Classification, Biosynthesis, Circulation and Degradation. Hormone receptors: Intracellular receptors - cytoplasmic and nuclear receptors. Cell surface receptors- ion channels, G-protein coupled receptors (GPCR), receptor kinases (tyr, ser/thr). Second messengers – cyclic nucleotides (cAMP, cGMP), lipids (phosphatidyl inositol diphosphate and DAG), calcium ions, Calmodulin and NO.

UNIT-II: Thyroid and Parathyroid hormones (15 Hours)

Hormones of the thyroid: Biosynthesis, regulation, transport and biological actions of thyroid hormones Hyperthyroidism and hypothyroidism. Antithyroid agents. Parathyroid hormone- Biosynthesis and biological actions. Hyperparathyroidism and hypoparathyroidism. Calcitonin and Calcitriol- Biosynthesis and functions. Paget's disease. Ricket's and osteomalacia.

UNIT-III: Hypothalamus and Pituitary hormones (16 Hours)

Hypothalamic releasing factors. Anterior pituitary hormones-actions-Growth promoting and lactogenic hormones. Glycoprotein hormones-TSH and Gonadotrophins, the POMC family- ACTH, Endorphins and MSH. Posterior pituitary hormones-Vasopressin and oxytocin- synthesis and biological effects. Pituitary diseases-Gigantism, Acromegaly, Dwarfism and Diabetes insipidus.

UNIT-IV: G.I. and Pancreatic hormones (14 Hours)

G.I. hormones: Brief account of gastrointestinal hormones. Insulin- Biosynthesis, regulation of secretion and biological actions. Mechanism of action of insulin. Glucagon- Biosynthesis, regulation of secretion and biological actions. Somatostatin, pancreatic polypeptide and Insulin like growth factors.

UNIT V: Adrenal and Gonadal hormones (16 Hours)

Adrenal hormones- Glucocorticoids, Mineralocorticoids- synthesis and biological effects. Catecholamines: biosynthesis and biological effects. Gonadal hormones-Androgens and estrogens. Ovarian cycle. Abnormal secretion of adrenal hormones-Addison's disease. Cushing's syndrome, congenital adrenal hyperplasia, phaeochromocytoma.

Total Lecture Hours- 75

COURSE OUTCOME

The students are able to,

1. Acquire knowledge about classification, synthesis and circulation of hormones and receptors.
2. Illustrate the synthesis and biological actions of hormones from thyroid and parathyroid glands.
3. Acquire knowledge about pituitary and hypothalamic hormones.
4. Understand the role of the G.I and pancreatic endocrine cells in the regulation of blood glucose.
5. Identify the hormones released by the adrenal and gonads origin, their biological actions and disorders.

TEXT BOOK(S)

1. Mac E. Hadley, Jon E. Levine, Jonathan Levine, 2009, Endocrinology, 6th edition. Benjamin Cummings Publishers, USA.
2. Nagini S. 2007. Text Book of Biochemistry, 2nd edition, Scitech publishers, India.
3. Norman Levin, 2019. Manual of Endocrinology and Metabolism, 5th edition, Wolters Kluwer Publishers, New York.
4. 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.
5. Smith EL, Hill RL, Robert LI. Lefkowitz RJ, Philip H, and Abraham W. 1983. Principles of Biochemistry: Mammalian Biochemistry, 7th edition, McGraw-Hill Education Publishers, New York.

REFERENCE BOOK(S)

1. Arthur C. Guyton and Hall, 2006. Text Book of Medical Physiology, 11th edition, Elsevier India pvt. Ltd., New Delhi.
2. Bernhard K and Winfried B. 2016. Hormones and the Endocrine System: A text Book of Endocrinology, 1st edition, Springer Nature Publishers, Switzerland.
3. De Robertis and De Robertis, 2001. Cell and Molecular Biology, 8th edition, Wolters Kluwer Publishers, India.
4. Lary Jameson J. 2017. Harrison's Endocrinology, 20th edition, McGraw Hill Publishers, New York.
5. Melmed S, Polonsky KS, Larsen PR, Kronenberg HM. 2016. Williams Textbook of Endocrinology, 13th edition, Elsevier Publishers, India.
6. Wilson and Foster, 1992. Textbook of Endocrinology, 8th edition. W. B. Saunders publishers, USA.

E-RESOURCES

1. https://www.pdfdrive.com/biochemistry-books.html
2. https://www.pdfdrive.com/textbook-of-biochemistry-with-clinical-correlations-e184776201.html
3. https://www.news-medical.net/health/Pituitary-Gland-Hormones-and-Functions.aspx
4. https://www.pdfdrive.com/williams-textbook-of-endocrinology-expert-consult-e189818749.html
5. https://www.pdfdrive.com/harrison-endocrinology-e34584578.html

NON MAJOR ELECTIVE

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: III-NME-I: Health and Diseases

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: 23NMEBC31

UNIT-I: Specimen collection and processing (5 Hours)

Specimen collection and processing of blood, urine and faeces. Anticoagulants and preservatives for blood and urine. Electrolytes and acid base balance. Maintenance of acid base balance by respiratory and renal mechanism. Acidosis and alkalosis.

UNIT- II: Disorders of Carbohydrate Metabolism (6 Hours)

Overview of regulation of blood glucose, Glucose Tolerance Test (GTT)-normal values and interpretations, causes of abnormal GTT curve, sugar levels in blood, renal glucosuria, hyperglycaemic hormones, Diabetes mellitus- pathological alterations in diabetes mellitus, oral hypoglycaemic agents, hypoglycaemia.

UNIT-III: Disorders of Lipids and Proteins (6 Hours)

Plasma lipoproteins, lipoprotein disorders, cholesterol, triglycerides and phospholipids in health and diseases. Hyperlipidemia, hyperlipoproteinemia, abetalipoproteinemia. Abnormalities in nitrogen metabolism-phenylketonuria, cystinosis and homocystinuria.

UNIT-IV: Disorders of Liver, Kidney and Heart (6 Hours)

Functions of liver, kidney and heart. Jaundice, fatty liver. Diagnostic enzymes in different diseases-myocardial infarction, liver diseases, muscle diseases, bone diseases, and GI tract diseases. Renal calculi, Cardiac arrest and management, causes, symptoms, pathophysiology and diagnosis of atherosclerosis.

UNIT-V: Oncology (7 Hours)

Cancer – definition, terminology-neoplasia, hyperplasia, hyperthropy, dysplasia, metaplasia, adenoma, sarcoma, epidemiology, etiologic factors, biochemistry of metastasis, prevention-primary, secondary and tertiary prevention, principles of cancer therapy, diagnosis and treatment- chemotherapeutic agents.

Total Lecture Hours- 30

COURSE OUTCOME

The students are able to,

1. Know about basic procedures during biological sample collections.
2. Learn various types of diseases associated with impaired carbohydrate metabolism
3. Understand the disorders of protein and lipid metabolism. And the associated diseases

4. Gain knowledge on disorders of liver, kidney and heart
5. Acquire knowledge on oncology, and epidemiology, prevention and treatment of cancer

TEXT BOOK(S)

1. Birn AE., Pillay Y & Holtz T. 2009. Textbook of international health: Global health in a dynamic world, 3rd edition, Oxford University Press Publishers, England.
2. Chakrabarty, Kaveri and Chakrabarty AS. 2019. Textbook of Nutrition in Health and Disease, 1st edition, Springer Publishers, New York, USA.
3. Chatterjea MN and Rana Shinde. 2007. Textbook of Medical Biochemistry, 7th edition, Jaypee Brothers Publishers, Chennai, Tamil Nadu.
4. Krishna Das KV. 2013. Clinical Medicine (A Textbook of Clinical Methods and Laboratory Investigations), 4th edition, Jaypee Brothers Medical publishers, Chennai, Tamil Nadu.
5. Seyed Mohammad Nabavi, Grazia D'Onofrio and Seyed Fazel Nabavi. 2020. Nutrients and Nutraceuticals for Active & Healthy Ageing, 1st edition, Springer Publishers, New York, USA.

REFERENCE BOOK(S)

1. Carl A. Burtis, Edward. Ashwood and David E. Bruns. 2011. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th edition, Saunders Publishers, United States.
2. Kaplan A, Jack KE, Opheim B, Toivola B and Lyon AW. 1995. Clinical Chemistry Interpretation and techniques, 4th edition, Williams and Wilkins Publishers, United States.
3. Simon Langley-Evans. 2015. Nutrition, health and disease: A lifespan approach, 2nd edition, John Wiley & Sons Publishers, New Jersey, United States.
4. Vibha Rani, Umesh and Yadav. 2018. Functional Food and Human Health, 1st edition, Springer Publishers, New York, USA.
5. William S. Hoffman. 1964. The Biochemistry of Clinical Medicine, 3rd edition, Year Book Medical Publishers, Chennai, Tamil Nadu.

ERESOURCES

1. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_stude
2. https://www.researchgate.net/publication/327247966_Chapter-06_Carbohydrates-III_Regulation_of_Blood_Glucose_Diabetes_Mellitus
3. https://www.slideshare.net/amitverma1612147/lipoprotein-disorders
4. http://www.student.oulu.fi/~taneliha/Harpers_Illustrated_Biochemistry(29th_Edition).pdf
5. https://www.slideshare.net/ImranIqbal7/metabolic-disorders-2019
6. https://www.slideshare.net/veerundh/veerendhar-nadh-38767743
7. http://103.4.234.46/books/Lippincotts%20Illustrated%20Reviews%20Biochemistry%205th%20edition.p
8. https://ia801901.us.archive.org/26/items/KSembulingamEssentialsOfMedicalPhysiology6thEdition/K%20Sembulingam%20-20Essentials%20of%20Medical%20Physiology%2C%206th%_20Edition.pdf

9. https://www.pdfdrive.com/biochemistry-books.html
10. https://drive.google.com/file/d/10C4EYN0Sv2LPI9ZzhoV-
11. https://drive.google.com/file/d/1UyLEp6iXyKrqXuVwh-
12. https://drive.google.com/file/d/1tghNWPyuqPiqK1Rl11ZzUrFwcoMiuoMa/
13. https://pharmacologyonline.silae.it/files/newsletter/2009/vol3/44.Jagdish.pdf
https://www.slideshare.net/MiamiDadePA/1-introduction-to-oncology

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614 016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-NME-II: Health Education and Community Pharmacy

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: 23NMEBC42

Unit –I:Concept of health **(6 Hours)**

Definition of physical health, mental health, social health, spiritual health determinants of health, indicatory of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.

Unit-II:Nutrition and health **(6 Hours)**

Nutrition and health: Classification of foods, requirements, diseases induced due to deficiency of Proteins – Kwarshiorkar, Marasmus, Vitamins – Rickets, Anemia. Minerals – Osteophoris, Renal calculi - treatment and prevention.

Unit-III:First aid **(6 Hours)**

Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures and resuscitation methods, Elements of minor surgery and dressings. Environment and health: Source of water supply, water pollution, purification of water, health and air, noise, light-solid waste disposal.

Unit –IV: Communicable diseases **(6 Hours)**

Causative agents, mode of transmission and prevention. Respiratory infections chicken pox and tuberculosis. Intestinal infection – Hepatitis, Typhoid and food poisoning. Surface infection – Rabies and Leprosy. Sexually transmitted diseases - Syphilis and AIDS. Non-communicable diseases: causative agents, prevention, care and control.

Unit –V: Epidemiology **(6 Hours)**

Epidemiology: Its scope, methods, uses, dynamics of disease transmission. Immunity and immunization: Immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and control. Disinfection, types of disinfection procedures for-feces, urine, sputum.

COURSE OUTCOME

The students are able to,

1. Discuss about basic procedures during biological sample collections.
2. Explain various types of diseases associated with impaired carbohydrate metabolism.
3. Understand the disorders of protein and lipid metabolism and the associated diseases.
4. Gain knowledge on disorders of liver, kidney and heart.

5. Acquire knowledge on oncology, and epidemiology, prevention and treatment of cancer.

TEXT BOOK(S)

1. Birn AE. Pillay Y & Holtz T. 2009. Textbook of international health: Global health in a dynamic world, 3rd edition, Oxford University Press Publishers, England.
2. Chakrabarty, Kaveri and Chakrabarty AS. 2019. Textbook of Nutrition in Health and Disease, 1st edition, Springer Publishers, New York, USA.
3. ChatterjeaMN andRanaShinde. 2007. Textbook of Medical Biochemistry, 7th edition, Jaypee Brothers Publishers, Chennai, Tamil Nadu.
4. Krishna Das KV. 2013. Clinical Medicine (A Textbook of Clinical Methods and Laboratory Investigations), 4th edition, Jaypee Brothers Medical publishers, Chennai, Tamil Nadu.
5. Seyed Mohammad Nabavi, GraziaD'Onofrio and SeyedFazelNabavi. 2020. Nutrients and Nutraceuticals for Active & Healthy Ageing, 1st edition, Springer Publishers, New York, USA.

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2. Kaplan A, Jack KE, Opheim B, Toivola B and Lyon AW. 1995. Clinical Chemistry Interpretation and techniques, 4th edition, Williams and Wilkins Publishers, United States.
3. Simon Langley-Evans. 2015. Nutrition, health and disease: A lifespan approach, 2nd edition, John Wiley & Sons Publishers, New Jersey, United States.
4. Vibha Rani, Umesh and Yadav. 2018. Functional Food and Human Health, 1st edition, Springer Publishers, New York, USA.
5. William S. Hoffman. 1964. The Biochemistry of Clinical Medicine, 3rd edition, Year Book Medical Publishers, Chennai, Tamil Nadu.

E-RESOURCES

1. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_stude
2. https://www.researchgate.net/publication/327247966_Chapter-06_Carbohydrates-III_Regulation_of_Blood_Glucose_Diabetes_Mellitus
3. https://www.slideshare.net/amitverma1612147/lipoprotein-disorders
4. http://www.student.oulu.fi/~taneliha/Harpers_Illustrated_Biochemistry(29th_Edition).pdf
5. https://www.slideshare.net/ImranIqbal7/metabolic-disorders-2019
6. https://www.slideshare.net/veerundh/veerendhar-nadh-38767743

VALUE ADDED COURSE

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2022 – 2023)

DEPARTMENT OF BIOCHEMISTRY

Semester: I-VAC-I: Biochemical Changes in Lifestyle disorders

Course Credit: **2*** **Course Code**: **22BCVA1**

Unit-I: Human Physiology

Body fluids and their composition. Definition and differentiation of disease and disorder, types and causes. Analysis of various biochemical parameters in body fluids and specific tissues during disorders, diseases and forensics

Unit-II: Diseases and Disorders

Aetiology; classification; causative factors; incidence, symptoms and biochemical aspects and markers for- identification, monitoring, prevention and interventions. Renal disease**:** Nephrotic syndrome, Acute and Chronic renal failure- diagnostic procedures and dietary management. Dialysis, medical and nutrition therapy.

Unit-III: Gastrointestinal diseases/disorders

Gastro-oesophageal reflux and esophagitis, Gastritis and Peptic ulcer. Characteristics of and comparison of the stomach and duodenal ulcers. Diagnostic tests for malabsorption, sprue and tropical sprue, Crohn's disease, diarrhoea, constipation, ulcerative colitis, diverticular disease and colon cancer.

Unit-IV: Cancer and HIV/AIDS

Biochemistry of carcinogenesis, types, stages of cancer, diagnosis and existing medicines. Biochemistry of HIV infection, ART and social issues.

Unit-V: Diagnostic Techniques

Collection and storage of biological samples for clinical use. Commonly used tests for diagnosis of various diseases and their interpretation. Blood analysis: Total blood count including ESR, Total serum proteins. Blood glucose (GTT), serum lipid fraction– cholesterol, triglyceride, LDL and HDL, blood urea, and serum calcium. Urine: Creatinine, Glucose and protein. Enzymes: SGPT, SGOT and isoenzymes as markers in various disorders and diseases.

COURSE OUTCOME

The students should be able to,

1. Understand the common concepts of Biochemistry like bodyfluids and its components
2. Assess the hypo/hyper immunological reaction
3. Acquire knowledge on the basic concepts of health anddisease/disorder
4. Demonstrate the connection between knowledge of anatomy and physiology and real-world situations
5. Critically evaluate on healthy lifestyle decisions and homeostatic imbalances

TEXT BOOK(S)

1. Chatterjee M N and Rana shinde, 2011. Textbook of Medical Biochemistry, 8th edition,Jaypee Publishers
2. David E. Metzler, 2001. Biochemistry- The Chemical Reactions of Living Cells, 2nd edition, Academic Press
3. Mohanty and Basu,2002. Fundamentals of Practical Biochemistry, BI Publications
4. Eric E. Conn, Paul K. Stumpf, George Breuning, Roy H. Doi , 2009. Outlines of Biochemistry, 5th edition, John-Wiley and sons

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1. Carl A. Burtis, Edward. Ashwood and David E. Bruns. 2011. Tietz Textbook of ClinicalChemistry and Molecular Diagnostics, 5th edition, Saunders Publishers, United States.
2. Kaplan A, Jack KE, Opheim B, Toivola B and Lyon AW. 1995. Clinical Chemistry Interpretation and techniques, 4 th edition, Williams and Wilkins Publishers, United States.
3. Simon Langley-Evans. 2015. Nutrition, health and disease: A lifespan approach, 2ndedition,John Wiley & Sons Publishers, New Jersey, United States.
4. Vibha Rani, Umesh and Yadav. 2018. Functional Food and Human Health, 1st edition,
   Springer Publishers, New York, USA.
5. William S. Hoffman. 1964. The Biochemistry of Clinical Medicine, 3rdedition, YearBookMedical Publishers, Chennai, Tamil Nadu.

E RESOURCES

1. https://www.slideshare.net/ImranIqbal7/metabolic-disorders-2019
2. https://www.slideshare.net/veerundh/veerendhar-nadh-38767743
3. https://drive.google.com/file/d/10C4EYN0Sv2LPI9ZzhoV-
4. https://drive.google.com/file/d/1UyLEp6iXyKrqXuVwh-
5. https://drive.google.om/file/d/1tghNWPyuqPiqK1Rl11ZzUrFwcoMiuoMa/

Semester: II-VAC-II: Know Your Medicine

Course Credit: **2*** **Course Code**: **22BCVA2**

Unit-I: Know your Medicine

Brief description of some common Dosage forms of Medicines: Tablets, Capsules, Liquids, Suspensions, Injectable, Non-oral dosage forms etc. Components of a Medicine (Dosage form). Generic and Branded medicines. Dosage strength and How to read the label of Medicines. Idea of Batch, Manufacturing and Expiry Dates.

Unit-II: Using Medicines

Buying and storing medicines at home. Concept of Dosage frequencies and its variation. Reasons for before or after food dose. Do's and Don'ts with special dosage forms (enteric or extended release etc). Do's and Don'ts on Medicines for chronic conditions such as Diabetes, Hypertension etc

Unit-III: Drugs or Medicine Discovery

Some historical perspectives of drug discovery examples such as Aspirin, Penicillin, Quinine, etc. Natural drugs to Modern drugs. Safety evaluation and Efficacy Evaluation etc. Some modern advances such as Gene Therapy, Stem cell therapy etc.

Unit-IV Herbal, Ayurvedic and Siddha Medicines

Basic concepts. Common Traditional Remedies and Illustrative examples of popular plant drugs used in the above systems of medicines, their therapeutic constituents and uses.

Unit-V: Standards, Quality and Regulation of Medicines

Basic concepts of quality with respect to medicinal products and how it is ensured. Outline of structure and functions of Drug Control and other relevant Bodies such as NPPA, Scope and purpose of Drugs and Cosmetic Act etc.

COURSE OUTCOMES

The students should be able to,

1. Explain the various dosage forms, components, categories and labelling of Medicines.
2. Gain awareness about buying, using, storing and side effects of Medicines.
3. Understand about various stages of drug development and about current therapies.
4. Appreciate the concepts of traditional medicines, standards for medicines and regulation of medicines.
5. Extract, evaluate and label the medicines.

TEXT BOOK(S)

1. Allen, 2018, Ansel's Pharmaceutical Dosage Forms And Drug Delivery System, Wolters Kluwer India Pvt. Ltd.
2. Mohantha G P, 2017, Textbook of Clinical Research, PharmaMed Press/BSP Books
3. Wallis T E, 2005, Textbook Of Pharmacognosy, CBS
4. Indian Pharmacoepia

REFERENCE BOOK(S)

1. Faroogi AA and Sreeramu B S, 2004. Cultivation of medicinal and aromatic crops. Revised edition, Universities Press (India) Private Limited, Hyderabad
2. Harbone JB, 1998. Phytochemical Methods: A guide to modern techniques of plant analysis. 3rd Edn, Springer (India) Private Limited, New Delhi.
3. WHO, 2002. Quality control methods for medicinal plant materials, World Health Organization, Geneva, A.I.T.B.S., Publishers and Distributors, New Delhi.
4. Halliwall B and Gutteridge J M. 1985. Free radicals in Biology and medicine. Oxford university press.

E RESOURCES

1. Central Drugs Standard Control Organization (CDSCO): https://cdsco.gov.in/opencms/opencms/en/Home/
2. https://pharmacologyonline.silae.it/files/newsletter/2009/vol3/44.Jagdish.pdf