MARUDHAR KESARI JAIN COLLEGE FOR WOMEN (AUTONOMOUS)

Vaniyambadi – 635 751

PG Department of Biochemistry

for

Undergraduate Programme

Bachelor of Science in Biochemistry

From the Academic Year 2024 - 2025

CONTENT

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE

1. Preamble

Biochemistry, as a scientific field, delves into the chemical processes within living organisms, focusing on cellular and molecular levels. The Department of Biochemistry at MKJC aims to produce biochemists who can innovate, invent, and share knowledge for the betterment of humanity. It also seeks to provide students with comprehensive training in applying biochemical skills.

The Department of Biochemistry was established in 2004, the department initiated its Post Graduate course in 2007, followed by the M.Phil course in 2012 and the Research Course (Ph.D) in 2021. Biochemistry covers a wide array of scientific disciplines, including Genetics, Microbiology, Forensics, Plant Sciences, Medicine, and Nutrition. It's an ideal choice for students interested in healthcare delivery services and those who want to contribute innovative information to technological advancements in understanding life processes.

Equipped with advanced tools and instruments, the Biochemistry Department's laboratory conducts a variety of biochemical tests on blood and urine to understand health and disease.

The department organizes National and International Conferences, Health Awareness Programs, and Blood Grouping Programs for first-year students every academic year. These events provide valuable information and problem-solving skills to students in biology.

To foster academic and professional advancement, the department has signed Memorandums of Understanding (MoUs) with Microlab, Sacred Heart College, Vanni Tech, Saveetha Institute of Medical & Technical Science, and Xcellogen Biotech. Currently, the department comprises 11 faculty members and has a student strength of 142.

PROGRAMME OUTCOMES (PO)

Programme	**B.Sc Biochemistry**
Programme Code	**US06**
Duration	**UG (3 Years)**
Programme Outcomes	**PO1**: Acquire knowledge in the field of Biological Sciences and to apply the knowledge in their day-to-day life for the betterment of self and society. **PO2:** Develop critical, analytical thinking and problem-solving skills. **PO3:** Develop research related skills in defining the problem, formulate and test the hypothesis, analyse, interpret, and draw conclusion from data. **PO4:** Address and develop solutions for societal and environmental needs of local, regional and national development. **PO5:** Work independently and engage in lifelong learning and enduring proficient progress. **PO6:** Provokes employability and entrepreneurship among students along with ethics and communication skills. **PO7:** Understand the importance of ethical behavior in business contexts and be able to recognize and address ethical dilemmas they may encounter in their professional careers. **PO8:** Prepared for lifelong learning and professional development, including the ability to adapt to changes in technology, business practices, and economic conditions throughout their careers.

Programme Specific Outcomes:	**PSO1:** Students will be able to Understand the principles and methods of various techniques in Biochemistry, Immunology, Microbiology, Enzyme kinetics and Molecular Cell Biology. Based on their understanding, the students may would be able to design and execute experiments during their final semester project, and further research programs. **PSO2:** Insight on the structure-function relationship of biomolecules, their synthesis and breakdown, the regulation of these pathways, and their importance in terms of clinical correlation. Students will also acquire knowledge of the principles of nutritional biochemistry and also understand diseases and their prevention through Pharmaceutical Biochemistry. **PSO3:** To understand the concepts of Recombinant DNA Technology, Molecular Endocrinology and Developmental Biology in association with various research methods. Acquire insight into the immune system and its responses, and use this knowledge in the processes of immunization, vaccine development, transplantation and organ rejection.

Eligibility for Admission:

Candidates for admission to the first year of (B.Sc Biochemistry) shall be required to have passed the Higher Secondary Examination within the science stream in the Physics, Chemistry and Biology subjects with a score of 50%

Methods of Evaluation and Assessment

Methods of Evaluation		
Internal Evaluation		25 Marks
External Evaluation	End Semester Examination	75 Marks
	Total	**100 Marks**
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Semester - I						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24UFTA11	Tamil – 1	4	1	0	0	3
24UFEN11	English – 1	4	1	0	0	3
24UBCC11	CC – 1 Biomolecules	3	1	2	0	5
24UBCC12P	CC - 2 (Practical) Titrimetric and Qualitative Analysis - I	0	0	4	0	3
24UBCA11	EC - 1 Allied Biochemistry	3	1	0	0	3
24UBCS11	SEC – 1 NM Health and Nutrition	1	0	1	0	2
24UBCS12P	SEC – 2 Practical Biochemistry-I	0	0	2	0	2
24UBCF11	FC- Medicinal Diet	1	1	0	0	2
TOTAL					**30**	**23**

Semester - II						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24UFTA21	Tamil – 2	4	1	0	0	3
24UFEN21	English – 2	4	1	0	0	3
24UBCC21	CC – 3 Cell Biology	3	1	2	0	5
24UBCC22P	CC - 4 (Practical) Titrimetric, Qualitative Analysis, and Microscopic Analysis	0	0	4	0	2
24UBCA21	EC - 2 Allied Biochemistry-II	3	1	0	0	4
24UBCA22P	EC - 3 Allied Practical Biochemistry-II	0	0	2	0	2
24UBCS21	SEC – 3 First Aid	1	0	1	0	2
24UAEC21	AEC – 1 Life Skills Through Yoga	1	1	0	0	2
TOTAL					**30**	**23**

L-Lecture T-Tutorial P-Practical S-Seminar C-Credit

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nanmudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCC11	Core Course -1 Biomolecules	Core	3	1	2	0	5	6	25	75	100

Learning Objectives

LO1	Students will comprehend the diverse types of saccharides, including monosaccharides disaccharides, polysaccharides, and their roles in biological systems.
LO2	Students will investigate the various types of proteins and amino acids, understanding their structures, functions, and characteristics.
LO3	Students will be able to understand the structure, function, and different forms of DNA, RNA, and nucleic acids, and their significance in genetic processes.
LO4	Students will explore the characteristics and classifications of lipids, including fatty acids, and understand their roles in cellular structure and energy storage.
LO5	Students will gain knowledge about the categorization of vitamins and minerals, understanding their importance in metabolism, growth, and overall health.

Unit	Content	Hours
1	**UNIT I: Chemistry of Carbohydrates:** Introduction of carbohydrates, 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).	18 Hours
2	**UNIT II: Chemistry of Amino Acids and Proteins:** Amino acids- structure and classification based on structure. Standard and non- standard amino acids, Essential and non-essential amino acid. Physical properties: isoelectric points and zwitter ion. Introduction, classification of proteins based on solubility, size and shape. Structure of proteins - primary, secondary, tertiary and quaternary.	18 Hours
3	**UNIT III: Chemistry of Lipids** Introduction, definition and classification of lipids- simple, compound (phospholipids) and derived lipids (cholesterol). Classification of fatty acids – saturated fatty acids, unsaturated atty acids. Physical property-emulsification. Chemical properties- saponification number, Rancidity, acid number, Iodine number and Reichert – Meissl number.	18 Hours
4	**UNIT IV: Chemistry of Nucleic Acids:**Nucleic acids – Definition, bases, Nucleotides and Nucleosides, phosphodiester linkage; Nucleic acid types –DNA and RNA; structure- double helical structure of DNA; Properties of DNA – Denaturation, Renaturation, Tm and hyperchromicity, structure of RNA and its major types -tRNA, mRNA and rRNA.	18 Hours

5	**UNIT V: Vitamins and Minerals** Dietary Sources, deficiency manifestation and biological functions of fat soluble and water-soluble vitamins. Dietary Sources, deficiency manifestation and biological functions of Calcium, Phosphorus, Magnesium. Iron, Zinc, Iodine, Fluoride, Sodium and Potassium.	15 Hours

CO	Course Outcomes
CO1	To Understand the structures and functions of carbohydrates
CO2	To Illustrate the classification, structure, properties of amino acids and acquire knowledge about the classification of proteins, levels of structural organization of proteins
CO3	To Gain knowledge on the structure and properties of nucleic acids.
CO4	To study the importance of various lipids
CO5	To Gain knowledge on vitamins and minerals
Textbooks:	
1	Dr.A.C.Deb, "Fundamentals of Biochemistry" (8th edition), Kolkata, New Central Book Agency
2	Ambikashunmugam, "Fundamendals of Biochemistry (8th Edition)2016, Wolters Kluwer India Pt Ltd
3	U.Sathayanarayana,(2006). Biochemistry. 3rd Edition by Books and Allied (P) Ltd.,India.
4	Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
5	Biomolecules-C.Kannan , MJP Publishers,Chennai-5.
Reference Books:	
1	Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
2	Harper's Illustrated Biochemistry.30th edition -McGraw Hill
3	Donald Voet and Judith Voet," Biochemistry",2nd edition,John Wiley &Sons,Inc,NY
4	Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5	Biochemistry" by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer, 8th edi, published in 2015
Web resources:	
1	https://drive.google.com/drive/folders/17teC8hUgF7fkOVFn8bvGTRN28ayoEmXL?usp=drive_link – eBooks google drive
2	https://tvuni.academia.edu/mvinayagam - Educational networks to share research, knowledge, teaching documents, chapters, e-notes, e-books, thesis, materials.
3	https://ncert.nic.in/textbook.php
4	National Digital Library - https://ndl.iitkgp.ac.in/
5	https://cec.nic.in/cec/ - e-Content courseware in UG subjects

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	3	3	3	3
CO2	3	2	1	3	2	2	2	3	3	3	3
CO3	3	2	2	3	2	2	2	3	3	3	3
CO4	3	2	2	3	2	2	2	3	3	3	3
CO5	3	2	1	3	2	2	2	3	3	3	3
Total	15	10	8	15	10	10	10	15	15	15	15
Average	3	2	1.6	3	2	2	2	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCC12P	**CC - 2 (Practical) Titrimetric and Qualitative Analysis - I**	Core	**0**	**0**	4	0	3	4	25	75	100

Learning Objectives	
LO1	Students will be able to identify the presence of various carbohydrates and starch in each sample through qualitative analysis.
LO2	Students will gain the ability to determine the concentration of biological molecules quantitatively.
LO3	Students will develop the skills to measure the saponification value of edible oil, providing insights into their quality and composition.
LO4	Students will develop the skills to measure the acid number of edible oil, providing insights into their quality and composition
LO5	Student able to qualitatively analyse Carbohydrates

Unit	Content	Hours
1	**EXPERIMENT INVOLVING TITRIMETRIC PROCEDURES** 1. Estimation of Glycine by Sorenson formal titration. 2. Estimation of ascorbic acid using 2, 6 – dichlorophenol indophenol as link solution, present in an unknown solution 3. Determination of glucose by Benedict's method. 4. Determination of Acid number of edible oil. 5. Determination of saponification value of edible oil. **QUALITATIVE ANALYSIS** A) Qualitative analysis of Carbohydrates • Qualitative analysis of Glucose, • Qualitative analysis of Fructose, • Qualitative analysis of Arabinose/Xylose, • Qualitative analysis of Maltose, • Qualitative analysis of Sucrose • Qualitative analysis of Starch Qualitative analysis of unknown sugar	60 Hours

CO	Course Outcomes
CO1	Quantify glycine by Sorenson's formol titration method
CO2	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO3	Quantify glucose by Benedicts method
CO4	Qualitatively analyze the carbohydrates report the type of carbohydrate based on specific tests
CO5	Determine lipid properties of unsaturation and fatty acid content by SAP number and acid number

Textbooks:	
1	J. Jayaraman, Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011.
2	S. K. SawhneyRandhir Singh, Introductory Practical Biochemistry, Alpha Science International, Ltd 2 edition, 2005.
3	Irwin H.Saegal, Biochemical calculations, Liss, Newyork, 1991
4	Quantitative Chemical Analysis" by Daniel C. Harris Publication: W. H. Freeman Edition: 9th Edition (2015)
5	Analytical Chemistry: Principles and Techniques" by Robert A. Day and Michael S. Selvin Publication: CBS Publishers & Distributors Edition: 2nd Edition (2014)
Reference Books:	
1	Fundamentals of Analytical Chemistry" by Douglas A. Skoog, Donald M. West, F. James Holler, and Stanley R. Crouch Publication: Cengage Learning Edition: 9th Edition (2013)
2	Principles of Instrumental Analysis" by Douglas A. Skoog, F. James Holler, and Stanley R. Crouch Publication: Cengage Learning Edition: 7th Edition (2016)
3	Quantitative Analysis for Management" by Barry Render, Ralph M. Stair Jr., and Michael E. Hanna Publication: Pearson, Edition: 13th Edition (2018)
4	Analytical Chemistry" by Gary D. Christian Publication: Wiley Edition: 7th Edition (2013)
5	Practical Analytical Chemistry" by S. M. Khopkar Publication: New Age International Edition: 1st Edition (2003)
Web resources:	
1	https://courseware.cutm.ac.in/wp-content/uploads/2020/06/Practice-6.pdf
2	https://www.iitg.ac.in/biotech/BTechProtocols/Ascorbic.pdf
3	https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/3%20ESTIMATION%20OF%20SUGAR.pdf
4	https://fssai.gov.in/upload/uploadfiles/files/Revised-method-acid-value_Oils_Fats_20_02_2018.pdf
5	https://egyankosh.ac.in/bitstream/123456789/43428/1/Experiment-24.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15	15
Average	3	3	3	3	3	3	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCA11	**Allied Biochemistry**	SEC-2	**3**	**1**	0	0	3	4	25	75	100

Learning Objectives	
LO1	To Students will acquire knowledge on the structure and functions of carbohydrates.
LO2	To Students will understand the structure and classification of amino acids, essential building blocks of proteins.
LO3	To Students will acquire knowledge on the classification of proteins and their functions in the body.
LO4	To understanding their roles in energy storage, membrane structure, and cell signaling..
LO5	To Students will understand the basics of DNA and RNA with reference to their functions.

Unit	Content	Hours
1	**UNIT-I** Definition and Classification of carbohydrate. Monosaccharides – Glucose, Fructose. Anomer, epimer and enantiomers-Definition with examples. Disaccharides – Definition-Sucrose, maltose and Lactose occurrence, structure and functions. Polysaccharides – Homopolysaccharides -Starch -Structure and functions.	12
2	**UNIT-II** Amino acids- structure and classification based on structure. Standard and non- standard amino acids, Essential and non-essential amino acid. Physical properties: isoelectric points and zwitter ion. Introduction, classification of proteins based on solubility, size and shape. Structure of proteins - primary, secondary, tertiary and quaternary	12
3	**UNIT-III** Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol).	12
4	**UNIT-IV** Nucleic acid- Composition of nucleic acid., Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure ofRNA- types: tRNA, mRNA and rRNA and functions of RNA.	12
5	**UNIT – V** Classification, Dietary Sources, deficiency manifestation and biological functions of fat soluble and water-soluble vitamins. Classification, Dietary Sources, deficiency manifestation and biological functions of Calcium, Magnesium. Iron, Sodium and Potassium.	12

CO	Course Outcomes
CO1	Students will be able to explain the structure, biological importance of carbohydrates, from monosaccharides to polysaccharides
CO2	Students will be able to identify the structure and classification of amino acids,
CO3	Students will be able to classify proteins and explain their properties
CO4	After studying unit 4, the stud Students ents will be able to classify lipids and describe the structure and biological functions of phospholipids, glycolipids and sterols
CO5	Students will be able to illustrate the structure of nucleotides, distinguish DNA and RNA and describe the structure of DNA, types of RNA and their biological functions Matching

Text books:	
1	Ambikashunmugam, "Fundamentals of Biochemistry (8th Edition) 2016, Wolters Kluwer India Pvt Ltd
2	Dr.A.C.Deb, "Fundamentals of Biochemistry" (8th edition), Kolkata, New Central Book Agency
3	Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company
4	Harper's Illustrated Biochemistry.30th edition -McGraw Hill
5	U.Sathayanarayana,(2006). Biochemistry. 3rd Edition by Books and Allied (P) Ltd., India.
Reference Books:	
1	Biochemistry: Molecular Basis of Cell Structure and 2015by Albert L. Lehninger (Author)
2	Nelson, D. L. & Cox, M. M. Lehninger Principles of Biochemistry. Freeman, 5th edn, 2008.
3	Biochemistry - Voet and Voet
4	Principles and Techniques of Practical Biochemistry- Keith Wilson and John Walker, Cambridge Press.
5	Biochemistry" by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer, 8th edition, published in 2015

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	2	3	3	3
CO2	2	3	3	3	2	3	3	2	3	3	3
CO3	3	3	3	2	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3
CO5	3	2	3	3	3	3	3	2	3	3	3
Total	14	14	15	14	14	15	15	10	15	15	15
Average	2.8	2.8	3.0	2.8	2.8	3.0	3.0	2.0	3.0	3.0	3.0

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCS11	**SEC (NME) – 1 Health and Nutrition**	**SEC – 1 (NME)**	1	0	1	0	2	2	25	75	100

Learning Objectives	
LO1	To able to interpret and apply nutrition concepts to evaluate and improve the nutritional health of communities
LO2	Describe the structure of major human organs and explain their role in the maintenance of healthy individuals
LO3	To enables the students to learn the importance of Balanced diet, Meal planning at different phases of life.
LO4	To minimize the growth of microorganisms during the storage period, thus promoting longer shelf life and reduced hazard from eating the food.
LO5	Guiding healthy individuals to achieve adequate nutrient intake

Unit	Content	Hours
1	Introduction and definition of food and Nutrition. Basic Food groups-Energy yielding, Body Building, Protective Foods. Basic concepts of Energy Expenditure, Unit of Energy, Calorific values of Proteins, Carbohydrates and Fats. BMR.	6
2	Physiolgical role and Nutritional significance of Carbohydrates, Proteins, Lipids, Vitamins and Minerals. Biological value of Proteins (Animal and Plant), Single cell Proteins	6
3	Composition of Balanced Diet, RDA for Infants, Children, Adolescent, Adult male, female, Pregnant, Lactating women and Old age.	6
4	Food processing, Food Preservation. Principles of Diet therapy, therapeutic diets for Anaemia, heart diseases, obesity and Diabetes Mellitus.	6
5	Protein Malnutrition (Kwashiorkar), Undernutrition (Marasmus) their preventive and curative measures. Deficiency diseases of Vitamins.	6

CO	Course Outcomes
CO1	To Understand the fundamental concepts of food and nutrition
CO2	To know physiological roles and nutritional significance of carbohydrates, proteins, lipids, vitamins, and minerals in the human body
CO3	To understand nutritional needs during different life stages such as infancy, childhood, adolescence, adulthood, pregnancy, lactation, and old age.
CO4	To know the principles and methods of food processing and preservation, including their effects on nutrient content and food safety.
CO5	To know the causes, symptoms, and risk factors associated with protein-energy malnutrition, including kwashiorkor and marasmus.

Textbooks:	
1	Text Book of Physiology and Nutrition-M.Swaminathan.
2	Human Nutrition &Dietetics-Davidson and Passemore.
3	Nutrition and Dietetics-Shubangini Joshi.
4	Biochemistry-Dr. Ambika Shanmugam, Published by Author.
5	Lippincott's Biochemistry - P.C. Champe
Reference Books:	
1	Food Science" by Norman N. Potter and Joseph H. Hotchkiss (7th Edi, Springer, 2018)
2	Advanced Nutrition and Human Metabolism" by Sareen S. Gropper, Jack L. Smith, and James L. Groff (7th Edition, Cengage Learning, 2018)
3	Biochemistry - Garrett Grishmam. 3rd edition. International student's edition
4	Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
5	Nutrition for Health, Fitness & Sport" by Melvin H. Williams, Eric A. Rawson, and David Branch (11th Edition, McGraw-Hill Education, 2019)
Web resources:	
1	https://www.jvwu.ac.in/documents/83-%20final-Text%20Book%20of%20 Food% 20and % 20 Nutrition.pdf
2	https://www.msdmanuals.com/en-in/home/disorders-of-nutrition/overview-of-nutrition/carbohydrates,-proteins,-and-fats
3	https://www.nin.res.in/downloads/DietaryGuidelinesforNINwebsite.pdf
4	http://www.jnkvv.org/PDF/02042020124642Modified_diet%20(9%20files%20merged).pdf
5	https://www.msdmanuals.com/en-in/professional/nutritional-disorders/undernutrition/protein-energy-undernutrition-peu

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	1	3	2	1	3	1	2	3
CO2	2	3	1	2	3	2	3	2	3	2	2
CO3	2	2	2	1	1	3	3	1	2	3	2
CO4	2	3	1	2	3	2	3	2	3	2	2
CO5	2	3	2	1	1	1	3	1	2	3	2
Total	11	13	09	7	11	10	13	08	11	12	11
Average	2.2	2.6	1.8	1.4	2.2	2.0	2.6	1.6	2.2	2.4	2.2

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCS12P	**SEC – 2 Allied Biochemistry Practical**	SEC-2	**0**	**0**	2	0	2	2	25	75	100

Learning Objectives	
LO1	1. To estimate the number of compounds using volumetric analysis
LO2	2. To acquire skills to qualitatively analyse carbohydrate
LO3	3. To obtain skills to qualitatively analyse amino acids

Unit	Content	Hours
1	1. Estimation of Glucose by Benedict's method.	2
2	2. Estimation of Ascorbic acid by 2, 6 dichlorophenol indophenols dye method.	2
3	3. Estimation of Glycine by Sorenson's formal titration.	2
4	**A) Qualitative analysis of Carbohydrates** • Qualitative analysis of Glucose • Qualitative analysis of Fructose • Qualitative analysis of Maltose • Qualitative analysis of Starch	2
5	**B) Qualitative analysis of Amino acids** • Qualitative analysis of Arginine, • Qualitative analysis of Cysteine • Qualitative analysis of Tryptophan • Qualitative analysis of Tyrosine	2

CO	Course Outcomes
CO1	Quantify glycine by Sorenson's formol titration method
CO2	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO3	Quantify glucose by benedicts method
CO4	Qualitatively analyze the carbohydrates report the type of carbohydrate based on specific tests
CO5	Determine lipid properties of unsaturation and fatty acid content by SAP number and acid number

Textbooks:	
1	J. Jayaraman, Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011.
2	S. K. SawhneyRandhir Singh, Introductory Practical Biochemistry, Alpha Science International, Ltd 2 edition, 2005.
3	Irwin H.Saegal, Biochemical calculations, Liss, Newyork, 1991
4	Quantitative Chemical Analysis" by Daniel C. Harris Publication: W. H. Freeman Edition: 9th Edition (2015)
5	Analytical Chemistry: Principles and Techniques" by Robert A. Day and Michael S. Selvin Publication: CBS Publishers & Distributors Edition: 2nd Edition (2014)
Reference Books:	
1	Fundamentals of Analytical Chemistry" by Douglas A. Skoog, Donald M. West, F. James Holler, and Stanley R. Crouch Publication: Cengage Learning Edition: 9th Edition (2013)
2	Principles of Instrumental Analysis" by Douglas A. Skoog, F. James Holler, and Stanley R. Crouch Publication: Cengage Learning Edition: 7th Edition (2016)
3	Quantitative Analysis for Management" by Barry Render, Ralph M. Stair Jr., and Michael E. Hanna Publication: Pearson, Edition: 13th Edition (2018)
4	Analytical Chemistry" by Gary D. Christian Publication: Wiley Edition: 7th Edition (2013)
5	Practical Analytical Chemistry" by S. M. Khopkar Publication: New Age International Edition: 1st Edition (2003)
Web resources:	
1	https://www.youtube.com/watch?v=PAKCgrnKeBA
2	https://www.youtube.com/watch?v=o-ugcmSgtGc
3	https://www.youtube.com/watch?v=KJFt0-q2s9k
4	https://www.youtube.com/watch?v=ojhdTFmkY1c
5	https://www.youtube.com/watch?v=wmhmAESv72E

Mapping with Programme Outcomes and Programme-Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	3	3	2	2
CO2	3	3	3	3	3	3	1	3	3	2	2
CO3	3	3	3	3	3	3	1	3	3	2	3
CO4	3	3	3	3	3	3	1	3	3	2	3
CO5	3	3	3	3	3	3	1	3	3	2	3
Total	15	15	15	15	15	15	5	15	15	10	13
Average	3	3	3	3	3	3	1	3	3	2	2.6

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCF11	FC – 1 Medicinal Diet	FC	1	0	1	0	2	2	25	75	100

Learning Objectives	
LO1	Possess basic knowledge about diet
LO2	Sketch diet plan for GI diseases
LO3	Sketch diet plan for liver diseases
LO4	Sketch a diet plan for Infectious diseases
LO5	Prepare diet chart for Diabetes Renal and Cardiovascular Diseases

Unit	Content	Hours
1	Principles of Therapeutic Diet: Definitions of Normal diet, Therapeutic diet, Soft Diet and Liquid diet. Objectives of Diet Therapy. Advantages of using normal diet as the basis for Therapeutic diet.	6
2	Diet modification in Gastrointestinal diseases: Peptic ulcer, Diarrhoea, Lactose intolerance, Constipation and Malabsorption syndrome	6
3	Diet Modification in liver and gall bladder in diseases: Etiology, symptoms and dietary treatment in jaundice, hepatitis, Cirrhosis of liver and hepatic coma.	6
4	Diet Modification in Infectious Diseases: Fevers, Typhoid, COVID19 and Viral Hepatitis. Dietary modifications in Tuberculosis.	6
5	Diet Modification in Diabetes, Cardio-vascular diseases, Acute& Chronic glomerulonephritis, nephrosis, renal failure, kidney stone and Hypertension.	6

CO	Course Outcomes
CO1	Possess basic knowledge about diet
CO2	Sketch diet plan for GI diseases
CO3	Sketch diet plan for liver diseases
CO4	Sketch a diet plan for Infectious diseases
CO5	Prepare diet chart for Diabetes Renal and Cardio-vascular diseases

Textbooks:

1	MA Text Book of Foods, Nutrition and Dietetics, .Raheena Begum, Sterling Publishers Pvt.Ltd.
2	Fundamentals of foods and Nutrition, M.V.Raja Gopal, Sumati. R., Mudambi, Wiley EasternLimited, Year-1990.
3	Nutrition and Diet Therapy, William S.R 1985, 5thedition, Mosly Co. St. Louis.
4	Nutrition and Dietetics, Author: M. Swaminathan., Publisher: Ramesh Publishers., Edition: 2nd Edition

5	Dietetics: Practice and Future TrendsAuthor: Esther A. Winterfeldt, Jane W. Winterfeldt, Publisher: Jones & Bartlett Learning, Edition: 5th Edition
Reference Books:	
1	Rodwell Williams Nutrition and Diet Therapy, 1985, the C.V MoslySt.Louis
2	M.V.Krause & M.A.Mohan, Food Nutrition and Diet Therapy, 1992 by W.B SaundersCompany, Philadelphia, London.
3	Davidson and Pass more, Human Methods and Diabetics, 1976 the English Language BookSociety and Churchill.
4	Diet and Nutrition in Critical Care, Author: Rajeev Chawla, Namrata Joshi Publisher: Jaypee Brothers Medical Publishers, Edition: 2nd Edition
5	Modern Nutrition in Health and Disease, A. Catharine Ross, Benjamin Caballero, Robert J. Cousins, et al. Publisher: Lippincott Williams & Wilkins Edition: 11th Edition
Web resources:	
1	https://homescience10.ac.in/storage/pages/ecurriculum/Bsc-Hsc-Sem-4/THERAPEUTIC%20MODIFICATIONS%20OF%20A%20NORMAL%20DIET.pdf
2	https://my.clevelandclinic.org/health/articles/7040-gastrointestinal-diseases
3	https://www.webmd.com/digestive-disorders/understanding-cirrhosis-basic-nformation
4	https://www.cdc.gov/hepatitis/hav/havfaq.htm
5	https://ugcmoocs.inflibnet.ac.in/assets/uploads/1/264/8373/et/Dietary%20management%20in%20Nephrotic%20syndrome%20and%20renal%20failure20041510100404282 8.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	3	2	3	1
CO2	1	3	2	2	3	2	3	2	3	2	3
CO3	2	1	3	2	3	1	2	1	2	2	3
CO4	3	3	1	2	1	3	2	3	1	3	2
CO5	2	3	2	1	3	2	1	3	2	1	2
Total	10	13	09	10	12	09	10	12	10	11	11
Average	2.0	2.6	1.8	2.0	2.4	1.8	2.0	2.4	2.0	2.2	2.2

3-Strong 2 – Medium 1- low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCC21	Core Course -1 Cell Biology	Core	3	1	2	0	5	6	25	75	100

Learning Objectives

LO1	Cell structure and function: Understanding the structure and function of cells, organelles, and membranes in both prokaryotic and eukaryotic cells
LO2	The plasma membrane, or the cell membrane, protects a cell. One is to transport nutrients into the cell and also to transport toxic substances out of the cell.
LO3	The observations suggest that microtubules are partly responsible for the maintenance and functioning of the Golgi complex,
LO4	Explain the role of ribosomal RNA and proteins in forming ribosomes. Identify the structure and components of mitochondria
LO5	Understand the Relationship Between the Nucleus and Nucleolus. Identify the components of a chromosome.

Unit	Content	Hours
1	**UNIT I HISTORY OF CELL BIOLOGY** An overall view of cells- History of cell Biology - Cell theory. Definition of cell, Classifications of cell - Prokaryotic and Eukaryotic cells. Differences between prokaryotic and eukaryotic cells. Scope of cell biology	15 Hours
2	**UNIT II: PLASMA MEMBRANE AND TRANSPORT MECHANISM** Plasma membrane- Fluid Mosaic Model- Importance of fluid mosaic model, Structure and function of Plasma membrane. Chemical and Physical properties of the Plasma membrane, Membrane proteins, and their properties. Membrane carbohydrates and their role. Transport mechanism –Different types of membrane transport -Osmosis, facilitated diffusion, active and passive transport, Uniport, Symport, and Antiport. Simple,	15 Hours
3	**UNIT III: ENDOPLASMIC RETICULUM, GOLGI COMPLEX, AND MICROTUBULES** Endoplasmic reticulum -Endoplasm and Ectoplasm. Types of Rough Endoplasmic reticulum, Smooth Endoplasmic reticulum, Chemical composition of endoplasmic reticulum, Origin of Endoplasmic reticulum, structure and functions. Golgi Complex – structures, chemical composition of Golgi complex and functions of Acrosome, microtubules- structure and function microtubules.	15 Hours
4	**UNIT IV: MITOCHONDRIA, RIBOSOMES, LYSOSOMES** Mitochondria: the origin of mitochondria, Structure, and function. Ribosomes – Structure of Ribosomes, Chemical composition of ribosomes, types of Ribosomes, and tasks of Ribosomes. Lysosomes- structure and functions. Polymorphic structure of lysosomes and their types. and lysosomal enzymes,	15 Hours

5	**UNIT V: CELL DIVISION AND CELL CYCLE** Nucleus structure and functions, structure of the interphase nucleus, nuclear pore complex. Nucleolus structure and functions. Chromosome-Chromosome structure and function. Cell divisions are the cell cycles- phases of the cell cycle. Meiotic and mitotic cell division, Difference between Meiotic and mitotic cell division, cell-cell communications, cell recognition, cell adhesion, and cell functions.	15 Hours

CO	**Course Outcomes**
CO1	To Explain the structures and functions of basic components of prokaryotic and eukaryotic cells
CO2	To describe the structure, function, and composition of cell membranes and communicate the types and mechanisms of membrane transport
CO3	To discuss the structure and functions of cellular organelles
CO4	To understand the types of microfilaments and mitochondria
CO5	To describe nucleus and nucleolus, Illustrate the phases of cell cycle; in particular mitosis and describe the significance of meiosis in genetic diversity Relate the structure and biological role.
Textbooks:	
1	Cell Biology and Molecular Biology Paperback – 1 January 2019 by N. Arumugam
2	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology Dr. P S Verma & Dr. V K Agarwal
3	Cell Biology 4th Edition 2023 By Thomas D Pollard
4	Cell and Molecular Biology PB Paperback – 1 January 2017 by Gupta P.K
5	Principles Of Cell Biology By George Plopper Bygeorge Plopper
Reference Books:	
1	Rastogi . S.C. Cell Biology. Newage Publishers, (2008).
2	Devasena.T, Cell Biology, Oxford University Press India First edition (2012).
3	Cooper, G.M. and Hausman, R.E. The Cell: A Molecular Approach Sinauer Associates, Inc 6th edition (February 1, 2013)
4	Verma.P.S and Agarwal.V.K. Cell biology, Genetics, Molecular biology, Evolution and Ecology, S.Chand & Co Ltd, 2004
5	Cell biology structure and functions-David and Sadava, Jones Bartlett publishers.
Web resources:	
1	https://www.youtube.com/watch?v=URUJD5NEXC8
2	https://www.youtube.com/watch?v=t5DvF5OVr1Y
3	https://www.khanacademy.org/science/ap-biology/cell-structure-and-function/cell-structures-and-their-functions/v/introduction-to-the-cell
4	https://www.youtube.com/watch?v=qMOOw0OZZQ8
5	https://www.khanacademy.org/science/ap-biology/cell-structure-and-function/cell-structures-and-their-functions/v/introduction-to-the-cell

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	3	3	3	3
CO2	3	2	1	3	2	2	2	3	3	3	3
CO3	3	2	2	3	2	2	2	3	3	3	3
CO4	3	2	2	3	2	2	2	3	3	3	3
CO5	3	2	1	3	2	2	2	3	3	3	3
Total	15	10	8	15	10	10	10	15	15	15	15
Average	3	2	1.6	3	2	2	2	3	3	3	3

3-Strong 2 – Medium 1- low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCC22P	**Practical -Titrimetric, Qualitative Analysis, and Microscopic Analysis**	Core	**0**	**0**	4	0	2	4	25	75	100

Learning Objectives	
LO1	To obtain skills to analyze amino acids qualitatively
LO2	To learn the parts of a microscope, investigate the cells under a microscope
LO3	Image the cells using different stains
LO4	Identify the cells, organelles, and stages of cell division. Identify the spotters

Unit	Content	Hours
1	**A) Qualitative analysis of Amino acids** 1. Qualitative analysis of Arginine, 2. Qualitative analysis of Cysteine 3. Qualitative analysis of Tryptophan 4. Qualitative analysis of Proline 5. Qualitative analysis of Methionine 6. Qualitative analysis of Histidine 7. Qualitative analysis of Tyrosine	60
2	**B) MICROSCOPY AND STAINING TECHNIQUES** 1. Study the parts of Light and Compound microscope 2. Preparation of Slides and Micrometry 3. Examination of prokaryotic and eukaryotic cell	
3	**C) GROUP EXPERIMENT** 1. Identification of different stages of Mitosis in onion root tip 2. Identification of different stages of Meiosis in onion bulb	
4	**D) SPOTTERS** 1. Cells: Nerve, Plant and Animal cell 2. Organelles: Mitochondria, Chloroplast, Endoplasmic reticulum, 3. Mitosis stages–Prophase, Anaphase, Metaphase, Telophase	

CO	Course Outcomes
CO1	Identify the parts of microscope.
CO2	Preparation of Slides
CO3	Identify the stages of mitosis & meiosis
CO4	Visualize nucleus and mitochondria by staining methods
CO5	Identify the spotters of cells, organelles and stages of cell division
Textbooks:	
1	Rickwood, D and J.R.Harris Cell Biology: Essential Techniques, John wikey1996.
2	Davis, J.M. Basic Cell culture: A practical approach, IRL 1994.

3	Ganesh M.K. and Shivashankara A.R. 2012. Laboratory Manual for Practical Biochemistry Jaypee publications, 2ndEdn
4	Cell and Molecular Biology: A Lab Manual By K. V. Chaitanya
5	Cell Biology Genetics & Molecular Biology V K Aggarwal & Ps Verma
Reference Books:	
1	Essential practical handbook of Cell biology, Genetics and Microbiology -A Practical manual Debarati das Academic publishers, ISBN, 9789383420599, 2 nd Edition 2017
2	Cell biology Practical, Dr. Venu Gupta ISBN8193651219, Prestige publisher, 2 nd Jan 2018.
3	Cell and Molecular biology, De Robertis, 8th edition, 2 nd June, 1987
4	Cell And Molecular Biology : A Lab Manual Kindle Edition By K. V. Chaitanya (Author) Format: Kindle Edition
5	Cell Biology International Edition Author: Thomas D. Pollard, William C. Earnshaw, Jennifer Lippincott-Schwartz Publisher: Elsevier ISBN : 9780323417402
Web resources:	
1	http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
2	https://www.microscopemaster.com/organelles.html
3	https://www.microscopemaster.com/organelles.html
4	https://www.microscopemaster.com/organelles.html
5	https://www.khanacademy.org/science/ap-biology/heredity/meiosis-andgenetic diversity/a/phases-of-meiosis

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	3	1	3	3	3	3
CO2	3	2	3	3	3	3	1	3	3	3	3
CO3	3	3	3	3	2	3	1	3	3	3	3
CO4	3	3	2	2	3	3	1	3	3	3	3
CO5	3	3	3	3	2	3	1	3	3	3	3
Total	15	15	15	15	12	15	5	15	15	10	13
Average	3	3	3	3	3	3	1	3	3	2	2.6

3-Strong 2 – Medium 1- low

1 ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCA21	Allied-Biochemistry-II	Allied	3	1	0	0	4	4	25	75	100

Learning Objectives	
LO1	To understand the basics of metabolic pathways
LO2	To understand the basics of metabolic pathways of amino acids
LO3	To acquire knowledge on the various metabolic disorders
LO4	To understand the importance of enzymes in the body
LO5	To illustrate the biological significance of Hormones in the body

Unit	Content	Hours
1	**CARBOHYDRATE METABOLISM** -Metabolism-Catabolism and anabolism-Definition. Reactions of glucose oxidation Glycolysis, TCA cycle and its energetics, HMP shunt and its significance.	12
2	**AMINO ACID METABOLISM** Amino acid transamination and Deamination, reaction, Urea cycle- Formation of urea, Biosynthesis of creatinine	12
3	**METABOLIC DISORDERS** Diabetes mellitus- definition. Types and symptoms., Glycogen storage diseases. Inborn errors of amino acid metabolism- Phenylketonuria, Alkaptonuria (Black urine syndrome), and albinism	12
4	**ENZYMES** Enzymes-Definition, IUB system of classification with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Co enzymes- Vitamins as coenzymes (Tabulation of Coenzymes with functions in metabolism)	12
5	**HORMONES-** Definition and classification, mechanism of action, and biological functions of Insulin and glucagon, Sex hormones – testosterone and estrogen, menstrual cycle.	12

CO	Course Outcomes
CO1	Students will be able to illustrate the reactions of various metabolic pathways in carbohydrates.
CO2	Students will be able to illustrate the reactions of various metabolic pathways in Amino acids
CO3	Student will be able to acquire knowledge on the various metabolic disorders
CO4	Student will be able to classify enzymes and explain their functions
CO5	Gain expertise in giving first aid for insect bites and chemical poisoning

Textbooks:	
1	Lehninger Principles of Biochemistry" by David L. Nelson and Michael M. Cox
2	Harper's Illustrated Biochemistry" by Peter J. Kennelly, Kathleen M. Botham, Owen McGuinness, and Victor W. Rodwell
3	Biochemistry" by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer
4	Textbook of Biochemistry with Clinical Correlations" by Thomas M. Devlin
5	Bioorganic Chemistry: Deoxynucleic Acid (DNA) Directed Synthesis of Polypeptides and Proteins" by Heinz G. Floss, Marvin J. Tsai, and J. Herbert Taylor
Reference Books:	
1	Biochemistry" by Matthew R. Hemming and Michael J. Berridge (Oxford University Press)
2	Clinical Biochemistry: An Illustrated Colour Text" by Michael A. Crook (Elsevier)
3	Textbook of Biochemistry with Clinical Correlations" by Thomas M. Devlin
4	Harper's Illustrated Biochemistry" by Peter J. Kennelly, Kathleen M. Botham, Owen McGuinness, and Victor W. Rodwell
5	Lehninger Principles of Biochemistry" by David L. Nelson and Michael M. Cox
Web resources:	
1	https://youtu.be/5p1inSjJtJQ
2	https://youtu.be/6xQ7uMzWjQw
3	https://youtu.be/G4fN1xL7W0Q
4	https://youtu.be/KlMoM6qNq8o
5	https://youtu.be/H4il5rZL5Xw

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	2	3	3
CO2	3	3	3	3	2	3	2	3	2	3	2
CO3	3	3	3	2	3	3	2	3	3	2	2
CO4	3	2	2	3	2	2	3	3	3	3	3
CO5	3	3	3	2	3	3	3	3	2	3	2
Total	15	14	14	13	13	14	13	15	12	14	13
Average	3.0	2.8	2.8	2.6	2.6	2.8	2.6	3.0	2.4	2.8	2.6

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCA22P	(Practical II) Allied Biochemistry	SEC-2	**0**	**0**	4	0	2	2	25	75	100

Learning Objectives	
LO1	Estimate protein quantitatively
LO2	Prepare biomolecules from its sources
LO3	Learn the chemical principles behind iodine value in reactions
LO4	Learn the chemical principles behind saponification numbers in edible oil analysis.
LO5	Learn the Interpret results in relation to oil quality and stability.

Unit	Content	Hours
1	**. I Colorimetry** a) Estimation of protein by Biuret method (a) b) Estimation of amino acid by Ninhydrin method.	6
2	**II. Biochemical preparations** a) Preparation of casein from milk. b) Preparation of starch from potato. c)Preparation of albumin from egg	6
3	**IIIGroupExperiment** a) Determination of Iodine of an edible oil b) Determination Saponification number of an edible oil c)Determination of Acid value of an edible oil	6

CO	Course Outcomes
CO1	Estimate protein by colorimetric method
CO2	Understand the principles of biochemical separation and purification techniques.
CO3	Check the quality of edible oil
CO4	Learn the methods for preparing and isolating biomolecules from natural sources.
CO5	Understand the significance of iodine and saponification numbers in edible oil analysis.

Textbooks:

1	Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, New Age International Publishers, 2011,
2	An Introduction to Practical Biochemistry, David T. Plummer, 3 rd edition, Tata McGrawHill Publishing Company Limited, 2001.
3	Biochemical Methods, Sadasivam S and Manickam A, 4h edition, New Age

	International Publishers, 2016
4	Indrani TK. 2003. Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
5	S. Sadasivam A. Manickam Biochemical Methods New Age International Pvt Ltd publisher's third edition 2018
Reference Books:	
1	Biochemical Methods, Sadasivam S and Manickam A, 4h edition, NewAge International Publishers, 2016
2	Essentials of Food and Nutrition, Vol. I & II, M.S. Swaminathan.
3	Analytical Chemistry of Foods" by D. C. Nielsen Edition: 2nd
4	Harold Varley, Practical Clinical Biochemistry, CBS. 6 editions, 2006
5	Biochemical Tests – Principles and Protocols. Anil Kumar, SarikaGarg and NehaGarg.VinodVasishtha Viva Books Pvt Ltd, 2012.
Web resources:	
1	https://www.pdfdrive.com/instant-notes-analytical-chemistry-e912659.html 14
2	https://www.pdfdrive.com/analytical-biochemistry-e46164604.html
3	https://www.pdfdrive.com/biochemistry-books.html
4	https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf
5	https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	3	1	3	3	3	3
CO2	3	2	3	3	3	3	1	3	3	3	3
CO3	3	3	3	3	2	3	1	3	3	3	3
CO4	3	3	2	2	3	3	1	3	3	3	3
CO5	3	3	3	3	2	3	1	3	3	3	3
Total	15	15	15	15	12	15	5	15	15	10	13
Average	3	3	3	3	3	3	1	3	3	2	2.6

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UBCS21	**SEC – 3 First Aid**	**SEC**	**1**	**0**	**1**	**0**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	Provide knowledge on the basics of first aid.
LO2	Perform first aid during various respiratory issues.
LO3	Demonstrate the first aid to treat injuries.
LO4	Learn the first aid techniques to be given during emergency.
LO5	Familiarize the first aid during poisoning.

Unit	Content	Hours
1	Aims and important rules of first aid, dealing with emergency, types and content of a first aid kit. First aid technique – Dressing and Bandages, fast evacuation technique, transport techniques.	**6 Hours**
2	Basics of Respiration – CPR, first aid during difficult breathing, drowning, choking, strangulation and hanging, swelling within the throat.	**6 Hours**
3	Common medical aid- first aid for wounds, cuts, head, chest, Abdominal injuries, shocks and burns.	**6 Hours**
4	First aid related to unconsciousness, stroke, fits, convulsions-seizures, epilepsy.	**6 Hours**
5	First aid in poisonous bites (Insects and snakes), honey bee stings, animal bites, disinfectant, acid and alkali poisoning.	**6 Hours**

CO	Course Outcomes
CO1	Discuss the rules of first aid, dealing during emergency and first aid techniques
CO2	Understand the first aid techniques to be given during different types of respiratory problems
CO3	Provide first aid for injuries, shocks and bone injury
CO4	Detail on the first aid to be given for unconsciousness, stroke, fits and convulsions
CO5	Gain expertise in giving first aid for insect bites and chemical poisoning

Textbooks:	
1	First Aid and Emergency Care, Dr. R. L. Bijlani, Dr. S. Manjunath: Jaypee Brothers Medical Publishers, 2015
2	First Aid and Emergency Nursing Poonam Malhotra CBS Publishers & Distributors Pvt. Ltd., 2018
3	Handbook of First Aid Dr. R. S. Gokhale, Vora Medical Publications, 2019
4	First Aid Manual for Nurses, P. Jeevanandham, Jaypee Brothers Medical Publishers, 2020
5	The First Aid Handbook, Your one-stop reference guide by Adejobi Adeloye

Reference Books:	
1	First Aid for Medical Emergencies, Dr. P. R. Goyal, CBS Publishers & Distributors Pvt. Ltd. 2021
2	Practical First Aid Dr. K. Srinivas, Paras Medical Publisher, 2016
3	Essentials of First Aid and Emergency Care, Dr. Anil Kumar, Dr. N. Sharma Jaypee Brothers Medical Publishers, 2018
4	Emergency First Aid: A Quick Reference Guide, Dr. R. Gupta, Lotus Publishers 2019
5	Emergency Care and First Aid, Dr. K. S. Venkatesh, AITBS Publishers 2020
Web resources:	
1	https://www.firstaidforfree.com/the-aims-of-first-aid-three-ps/
2	https://www.youtube.com/watch?v=qt94qmBcv-o
3	https://www.youtube.com/watch?v=4e7evinsfm0
4	https://www.youtube.com/watch?v=vSnRdmR6xcE
5	https://www.youtube.com/watch?v=01Po5RTNfhs

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	2	3	2	3
CO3	3	2	3	3	3	2	3	3	3	2	3
CO4	3	3	3	2	2	3	2	3	3	3	2
CO5	3	2	3	2	3	3	3	3	3	2	3
Total	14	13	15	12	13	14	14	14	15	12	13
Average	2.8	2.6	3	2.4	2.6	2.8	2.8	2.8	3	2.4	2.6

3 – Strong, 2- Medium, 1- Low

SCHEME OF VALUATION

CHEMISTRY PRACTICAL FOR PHYSICAL AND BIOLOGICAL SCIENCES - II

(For Biochemistry and ND (FSM) – I year/II Semester)

Internal assessment	: 25 Marks
External assessment	: 75 Marks
Total	: 100 Marks
Max. Marks	: 75 Marks
Record	: 15 Marks
Organic Analysis	: 60 Marks

Organic Analysis	**:** 60 Marks
Preliminary Test	: 8 Marks
Aliphatic or Aromatic	: 7 Marks
Saturated or unsaturated	: 7 Marks
Tests for elements	: 9 Marks
Confirmation Tests	: 12 Marks
Functional groups	: 10 Marks
Derivative/Coloured reaction	: 7 Marks