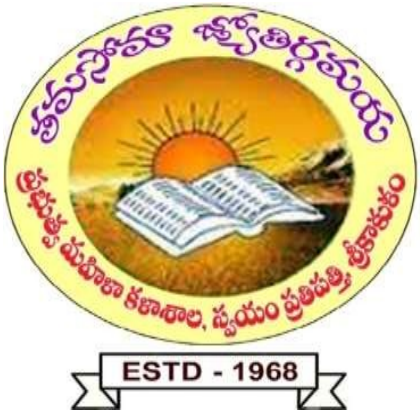
GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)
SRIKAKULAM

DEPARTMENT OF BIO-CHEMISTRY



BOARD OF STUDIES

BIO-CHEMISTRY SYLLABUS

2024-25

* * * *

Government College for Women (Autonomous)
Srikakulam

Reaccredited by NAAC with 'A' Grade during 3rd Cycle (CGPA 3.09)
E-Mail : gdcw.sklmjkc@gmail.com

VI BOARD OF STUDIES MEETING – 03.10.2024
Agenda for Academic Year 2024-25

(For 2024-2025, 2023-2024, 2022-2023, Admitted Batches for Academic Year 2024-25)

1. Approval of CBCS Pattern for all semesters.
2. Approval of Major and Minor subject's syllabi, blue print and model question papers for 2022-2023, 2023-24 and 2024-2025 Admitted Batches.
3. Approval of Programme, Outcomes (POs), Programmes Specific Outcomes (PSOs) and Course Outcomes (COs) for Single Major and Minor Programme and its mapping for Academic Year 2024-25.
4. Ratification of semester mode of pattern for all students for Academic Year 2024-2025.
5. Approval and ratification of Continuous Assessment System (CAS) for all students with 60-40 pattern for 2022-23, 2023-24 and 2024-25 Admitted Batches.
6. Approval and ratification of syllabi, blue print and model question papers for Skill Enhancement and Multidisciplinary courses of 2023-24 and 2024-25 Admitted Batches for all semesters of the Academic Year 2024-25.
7. Approval and ratification of SEC and MDC for 50 marks external pattern (No Internals).
8. Approval of List of Examiners and Paper Setters.
9. Approval of Innovative learning and evaluation techniques.
10. Approval of student seminars, workshops, field trips and student centric activities.
11. Approval of Peer Group Learning and Student Research Projects .
12. Approval of ICT Mode of learning.

13. Approval for encouragement of students to join extension activities i.e., JKC, NSS etc.,
14. Approval for encouragement of students to participate in Sports and cultural Activities.
15. Approval of Certificate courses, Add-on Course (offline & online), MoUs, Outreach and Learning Improvement Programmes etc.,
16. Approval and ratification of Community Service Project after the second semester, Short Term Internship after the fourth semester and Long Term Internship in the sixth semester for all admitted students.

Principal

GOVT. COLLEGE FOR WOMEN (A), SRIKAKULAM
DEPARTMENT OF BIOCHEMISTRY

RESOLUTIONS/MINUTES OF THE 2nd BOARD OF STUDIES 2024 – 2025

In pursuance of conferment of Autonomous status to Govt. College For Women (A), Srikakulam by the UGC vide Letter No.F22-1/2017(AC), dated 28 -11 - 2018 Joint Secretary, UGC New Delhi; Proceedings of Vice – Chancellor Lr. No. BRAU/F1: Autonomous status/2019-20 Dt. 15-03-2019, Dr. BRAU, Srikakulam; Proceedings of Registrar Nomi-GB/AC/GCW(A)/2019-20, Letter Dt: 26-06-2019, Dr. BRAU, Srikakulam; the2nd Board of Studies in Biochemistry subject is constituted on 27 - 09- 2023 at 10 AM with the following members. The Board of Studies in Biochemistry has approved the syllabus under Choice Based Credit System, changes in the syllabus, question paper, blue print and the evaluation system. The changes will be implemented from 2023 - 2024 academic year onwards.

DESIGNATION	NAME	SIGNATURE
Chairperson	Dr. K. Suryachandra rao Principal GDCW (A), Srikakulam	
Subject Expert (Univ. Nominee)	Prof.P.Sujatha Dr.B.R.Ambedkar University Srikakulam	
Subject Expert (from the Affiliated(A) College – nominated by Academic Council)	K.Krishnamnohar HOD of Dept of Biochemistry Maris Stella College,Vijayawada	
Subject Expert (from the Affiliated(A) College – nominated by Academic Council)	Dr.Ch.Mina Kumari Asst.Prof.Department of Bio-Chemistry, Prism Degree& P.G.College ,Vizag	
Member from Alumni	K.Geetanjali, MR PG College,vizianzgaram	
Head of the Department	Smt G.Neeraja	
Faculty Member	Smt G.Neeraja	

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Imeplemented from 2024-25 Academic Year)

APSCHE/ REVISION OF C.B.C.S – BIOCHEMISTRY
COURSE W.E.F.2024-25

S. No.	Semester	Title of the Course (Paper)	Hours /week	Max. Marks (SEE)	Marks in CIA	Credits
1.	Sem-V Course-6B	Laboratory Technics and Diagnostics	04	Max. Marks-50 External assessment at Semester end		03
	Course-6B Practical	Laboratory Technics and Diagnostics	02	60+40		02
2.	Sem.- V Course- 7B	Blood banking and Clinical science	04	Max. Marks-50 External assessment at Semester end	40	
	Course-7B Practical	Blood banking and Clinical science	02	60+40		02
	VI	Long term internship		100		
Year	**Semester**	**Title**	**No. Hrs./ Week**			**No. of Credits**
	II	Biomolecules - (T)	3	60+40		3
		Biomolecules - (P)	2	Max. Marks-50 External assessment at Semester end		1
	II	Community Service Project	60	100		
II	III	Analytical techniques- (T)	3	60+40		3

		Analytical techniques- (P)	2	Max. Marks-50 External assessment at Semester end	1	03
	IV	Bioenergetics and Metabolism of Carbohydrates and Lipids- (T)	3	60+40	3	
		Bioenergetics and Metabolism of Carbohydrates and Lipids- (P)	2	Max. Marks-50 External assessment at Semester end	1	
	IV	Clinical Biochemistry- (T)	3	60+40	3	
		Clinical Biochemistry- (P)	2	Max. Marks-50 External assessment at Semester end	1	
	IV	Short term Internship	60	100		
III	V	Nutritional Biochemistry - (T)	3	60+40	3	
		Nutritional Biochemistry - (P)	2	Max. Marks-50 External assessment at Semester end	1	
		Enzymology- (T)	3	60+40	3	
		Enzymology- (P)	2	Max. Marks-50 External assessment at Semester end	1	
	VI	Long term Internship		100		

B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6B	Laboratory Techniques and Diagnostics	Hrs/Wk:4

Learning outcomes:

Students after successful completion of the course will be able to

1. Understand different types of diagnostic Laboratory Techniques
2. Identify various facilities required to set up a diagnostic labs.
3. Understand expertise related to various practices in diagnostic labs.
4. Acquire skills to get an employment or to become an entrepreneur.

Syllabus: (Total 90 hrs. (Including Teaching, Lab, Field Training and unit tests etc.)

UNIT – I: Basic Medical Laboratory Principles and Procedures: (10h)

Code of conduct for laboratory personnel – safety measures in the laboratory, chemical/reagents labeling, storage and usage.

First Aid in laboratory accidents – Precautions and first aid equipment's.

Sterilization, preparation of reagents.

General approach to quality control, quality control of quantitative data.

Reporting laboratory tests and keeping records.

UNIT-II: Laboratory equipment's: (10h)

Principle, Procedure & Applications of microscope – light microscope, Phase contrast, Fluorescence, Electron microscope.

Centrifuge-principle, types and applications

Colorimeter - Usage and care.

serological water bath and incubator, hot-air oven

UNIT-III: Urine Analysis: (10h)

Composition- abnormal and normal constituents of urine

Collection and preservation of urine

Physical examination

Chemical examination [abnormal and normal constituents of urine]

Microscopic examination of the urinary sediment.

Microbial culture of urine

UNIT- IV: Stool Examination: (10h)

Specimen collection- inspection of faeces- odour, pH

Interfering substance.

Test for occult blood, fecal fat

Microscopic examination of stool specimen.

UNIT-V: Clinical Hematology: (10h)

Collection of blood - Anticoagulants, preservation

Hemoglobin estimation by Sahli's method

RBC count, Packed cell volume [PCV]

Erythrocyte sedimentation rate [ESR]

Total and differential count of WBC, Platelet count

Blood grouping, ABO system, Rh System,

SUGGESTED REFERENCES:

- Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
- Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
- Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
- Robbins and Cortan, Pathologic Basis of Disease, VIII Edition.
- Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
- Medical laboratory technology by Mukaraje

B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course: 6B	Laboratory Techniques and DiagnosticsLab	Hrs/Wk:2

Skill outcomes:

On successful completion of the practical course, student shall be able to

1. List out different types of Blood Cells.
2. Identify the Laboratory tools
3. Develop skill on Collection and analysis of urine
4. Develop skill on Collection and analysis of fecal sample

Practical syllabus:

1. Hemoglobin estimation by Shale's method
2. RBC count
3. ESR
4. Total and differential WBC count
5. Blood grouping [ABO system & Rh System]
6. Collection of urine and fecal samples
7. Fecal analysis to detect fats, undigested food and blood
8. Qualitative analysis of urine for normal and pathological conditions.

SUGGESTED REFERENCES FOR PRACTICALS:

1. Practical clinical Biochemistry - Harold Varley, CBS, New Delhi
2. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill Publication and co. ltd., Vol, I, II, III
3. Clinical chemistry – Ranjana Chawla
4. laboratory Manual in Biochemistry – Jayaraman
5. Biochemical methods – S.Sadasivan And Manickam
6. Introduction to practical biochemistry – David T. Plummer.

Co-curricular activities:

a) Mandatory: (Training of students by teacher on field related skills: 15hrs)

1) For teachers: Training of students by teacher in laboratory and field for a total of 15hrs on divisions in diagnostic center and infrastructure of diagnostic center.

2) For students; Visit to local diagnostic centers, observing the various analysis doing in lab. Submission of field work report of 10 pages in the prescribed format.

3) Maximum marks for field work report: 05

4) Suggested format for field work report: Title page, student details, content page, introduction, work done, findings, conclusion and acknowledgements.

5) Unit test (IE)

b) Suggested co-curricular activities:

1. Visit to diagnostic centers
2. Learning techniques of basic tools and instruments handling related to field work
3. Observe the Sample collection , processing and preservation
4. Training of students by related subject experts
5. Attending special lectures, group discussions and seminars on related topics

MODEL QUESTION PAPER

Semester V

(Skill Enhancement Course- Elective)

PAPER-6B: Laboratory Techniques and Diagnostics

(w.e.f. 2024-25)

Time : 3 Hours Max. Marks : 60

SECTION-A

[5X8=40M]

(Answer all the questions. Each question carries 8 marks)

1. (a) Write an essay on Laboratory safety and hygiene.

(or)

(b) Write in detailed note on sterilization and preparation of reagents.

2. (a) Write an essay on working principle of Electron microscope.

(or)

(b) Write the working principle and instrumentation of Laboratory centrifuge.

3. (a)Write a detailed note on collection and preservation of urine.

(or)

(b)Write an essay on microbial culture of urine.

4. (a) Write an essay on specimen collection and inspection of faeces.

(or)

(b) Write an essay on microscopic examination of stool specimen.

5. (a) How do you estimate Haemoglobin percentage by Sahli's method.

(or)

(b)Write an essay on total and differential count of WBC.

SECTION -B [5X4=20M]

(Answer any five questions. Each question carries 4 marks)

6. First aid and precautions.
7. Quality control.
8. Incubator.
9. Normal and abnormal constituents of urine.
10. Physical examination of urine.
11. Test for fecal fat.
12. ESR.
13. ABO system.

Question Paper Model For Practical Examination

Semester – V/ Biochemistry Course – 6 A (Skill Enhancement Course)

BCP-6B: LABORATORY TECHNIQUES AND DIAGNOSTICS

Max. Time: 3 Hrs. Max. Marks: 50

1. Estimate the amount of Hemoglobin by Shale's method 20 M
2. Write the principle ,procedure for Blood grouping 10M
3. Write the principle /procedure for following Practicals 5 M
   a) ESR b) Total count of RBC
4. Scientific Identification of spotters 5 x 1 = 5 M

A. Centrifuge
B. Colorimeter
C. light microscope
D. Neubauer chamber
E. RBC Pipette

5. Record + Viva-voce 5+5 = 10 M

B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7B	Blood Banking & Clinical Science	Hrs/Wk:4

Learning outcomes:

Students after successful completion of the course will be able to

1. Understand different types of procedures in Blood Bank.
2. Identify various facilities required to set up a Blood Bank. And clinical lab.
3. Understood expertise related to various practices in a Blood Bank. And clinical lab.
4. Acquire skills to get an employment or to become an entrepreneur.

Syllabus: (Total 90 hrs. (Including Teaching, Lab, Field Training and unit tests etc.)

UNIT - I: Blood Banking

Blood grouping- ABO system, Rh typing.
Coomb's test.
Blood transfusion - Blood donors, donor screening, drawing of blood
Compatibility testing, cross matching,
Blood transfusion complications.

UNIT - II: CSF and Other Body Fluids

Composition of Cerebrospinal fluid &CSF analysis
Composition of semen
Semen analysis
sputum examination
pregnancy tests - Interpretation.

UNIT - III: Endocrine Function Tests and diabetes tests

thyroid hormones and its function, and Clinical disorders
Thyroid function test - T3 and T4, TSH, 131 I Uptake.
cortisol and prolactin test
testosterone and estrogen test
types of diabetes
Glucose tolerance test , Glycated hemoglobin

UNIT - IV: Medical Parasitology

Amoebiasis- life cycle of causative organism , pathogenesis and diagnosis
Malaria – life cycle, pathogenesis and diagnosis
Acute and chronic filariasis – diagnosis.
Helminthiasis- life cycle, pathogenesis and diagnosis

UNIT - V Medical Microbiology

Safety procedure in microbiological techniques.
Culture of organisms from various specimens.
Culture media
Antibiotic sensitivity tests (pus, urine, stool, sputum, throat swab]
Gram staining, Ziehl –Neilson staining (TB, Lepra bacilli).

B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course: 7B	Blood Banking & Clinical Science Lab	Hrs/Wk:2

Skill outcomes:

On successful completion of the practical course, student shall be able to

1. List out different types of Blood Cells.
2. Identify the Laboratory tools
3. Develop skill on Collection And Analysis Of Urine
4. Develop skill on Collection And Analysis Of fecal sample

Practical syllabus:

1. Blood grouping
2. RH Typing
3. Coomb's test.
4. Cerebrospinal fluid analysis
5. Semen analysis
6. pregnancy test
7. Thyroid function test - T3 and T4, TSH
8. Glucose tolerance test
9. Estimation Of Glycated hemoglobin
10. Observe the permanent Slides; malarial parasites,Amoebiasis
11. Gram staining, Ziehl –Neilson staining [demonstration]

SUGGESTED REFERENCES:

1. Practical clinical Biochemistry - Harold Varley, CBS, New Delhi
2. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill Publication and co. ltd., Vol, I, II, III
3. Clinical Chemistry – Ranjana Chawla
4. Laboratory Manual in Biochemistry – Jayaraman
5. Biochemical methods – S.Sadasivan And Manickam
6. Introduction to Practical biochemistry – David T. Plummer.

Co-curricular activities:

a) Mandatory: (Training of students by teacher on field related skills: 15hrs)

1. For teachers: Training of students by teacher in laboratory and field for a total of 15hrs on divisions in diagnostic center and infrastructure of diagnostic center.
2. For students; Visit to local diagnostic centers ,observing the various analysis doing in lab . Submission of field work report of 10 pages in the prescribed format.
3. Maximum marks for field work report: 05
4. Suggested format for field work report: Title page, student details, content page, introduction, work done, findings, conclusion and acknowledgements.
5. Unit test (IE)

b) Suggested co-curricular activities:

1. Visit to diagnostic centers
2. Learning techniques of basic tools and instruments handling related to field work
3. Observe the Sample collection, processing and preservation
4. Training of students by related subject experts
5. Attending special lectures, group discussions and seminars on related topics

MODEL QUESTION PAPER

Semester V

(Skill Enhancement Course- Elective)

PAPER-7B: Blood Banking & Clinical Science

(w.e.f. 2024-25)

Time: 3 hours **Max. Marks: 60**

SECTION-A [5X8=40M]

Answer All the questions. Each question carries 8 marks.

1. (a)Write an essay on ABO blood grouping. (or)
(b)Write in detailed note on blood transfusion.
2. (a)Write an essay on composition of CSF and analysis.
(or)
(b) Write a detailed note on pregnancy test and interpretation.
3. (a)Write an essay on thyroid hormones and its clinical disorders.
(or)
(b)Write a detailed note on testosterone and estrogen test
4. (a)Write an essay on malarial parasites.
(or)
(b) Write an essay on Helminthiasis
5. (a) Write an essay on various culturemedia.
(or)
(b) Write a detailed note on antibiotic sensitivity tests.

SECTION- B

Answer any five questions. Each question carries 4 marks. [5X4=20M]

6. Coomb's test.
7. Cross matching.
8. Composition of semen.
9. Semen analysis.
10. Types of diabetes.
11. GTT.
12. Amoebiasis.
13. Gram's staining.

Suggested Question Paper Model For Practical Examination

Semester – V/ Biochemistry Course – 6 A (Skill Enhancement Course)

BCP-7B: BLOOD BANKING& CLINICAL SCIENCE

Max. Time: 3 Hrs. Max. Marks: 50

1. Estimate the amount of Glycated hemoglobin present in given blood sample 20 M
2. Write the principle, procedure for Blood grouping 10M
3. Write the principle /procedure for following Practicals 5 M

a) Coomb's test. b) GTT

4. Scientific Identification of spotters 5 x 1 = 5 M

A. Centrifuge
B. Coomb's test.
C. GTT
D. Neubauer chamber
E. RBC Pipette

5. Record + Viva-voce 5+5 = 10 M

QUESTION BANK
DEPT. OF BIOCHEMISTRY

UNIT – I

I. Biophysical concept

1. Write the Biological Buffer
2. Oxygen Electrodes
3. PKA Valuey
4. To Write the Soil Analysis
5. Biological Solvent of Water

UNIT – II Carbohydrates

1. D and L Designation
2. Amino Sugars
3. Epimary&Anomary&Mutarotarions
4. BaltirialCell wall of Polysacharides .
5. Classification of Carbohydrates
6. Disaccharides
7. Storage Polysaccharides
8. Glycosamine glycols

UNIT –III LIPIDS

1. Properties of fats & Oils
2. General Properties ofPhaspholipids
3. Prostaglandins structure& Properties
4. Fluid Musaic Models
5. Types & functions of Lipoproteins
6. Bio membranes.

UNIT- IV Amino acids and Proteins

1. Classifications of Amino acids
2. Titration curve of Glycine
3. Peptide bond formation
4. Naturally accuring peptides.
5. Classification of Properties
6. Essential and non essential amino
7. Chemical reactions of Amionoacids
8. Structural organization of property.

UNIT –V Nucleicacids and Properties

1. Structure of RNA
2. Structure ofPurins and Pyrimidins
3. Formation of Phyphodi ester linkage
4. Wason crick double hellial
5. Tim values & Significance
6. Structure of Heme
7. Structure of Chlorophyle
8. Structure of Cytochrom

MINOR

II -SEMESTER

BIO MOLECULES - (Course No-1)

COURSE OUTCOMES

After successful completion of the practical course student should be able to

1. prepare buffers and apply the knowedge to calculate the pH values of charged biomolecules.
2. Identify various carbohydrates, aminoacids and lipids present in the nature by performing qualitative analysis.

II - SEMESTER ANALYTICAL TECHNIQUES –

(Course No2)

COURSE OUTCOMES

1. After completing this course, the student will
2. Understand the basic concepts and principles of biochemical techniques namely Spectrophotometry, Fluorimetry, Chromatography and Centrifugation.
3. Analyse biochemical compounds such as Carotenoids, Vitamins, Alkaloids and Flavonoids.
4. Identify the compounds by various biochemical techniques and interpret the results
5. Apply the laboratory skills and concepts in carrying out experiments using sophisticated instruments.

IV - SEMESTER

BIOENERGETICS AND METABOLISM OF CARBOHYDRATES AND LIPIDS- (Course No-3)

COURSE OUTCOMES

After the completion of this course, the student will be able to

1. Explain the broad outlines of intermediary metabolism and importance of carbohydrate metabolism in life.
2. Describe the importance of Electron transport and ATP production mechanism.
3. Gain in knowledge in Carbohydrate metabolism and their associated with disorders.
4. Describe the details of lipid metabolism.

IV - SEMESTER
Clinical Biochemistry-(Course No-4)

COURSE OUTCOMES

1. After completing this course, the student will:
2. Obtain basic knowledge about specimen collections, pathological variations of water, electrolytes
3. Interpret the results to diagnose the abnormal functions of organs.
4. Understand the antinutrient factors and its implication on other nutrients in food.Understand the, patterns of inherited disorders and disorders of hemoglobin metabolism
5. Correlate the tests used for renal and gastric functions and their interpretations
6. Impart the diagnostic tests for liver function and lipoprotein metabolic disorders
7. Evaluate the alterations in blood glucose regulation and enzymes of clinical importance

IV SEMESTER NUTRITIONAL BIOCHEMISTRY-
(Course No-5)

COURSE OUTCOME

1. Analyse the role of various nutrients, their dietary allowances and relate in day-to-day life.
2. Revise the Knowledge about the water- and fat-soluble vitamins and its significance and its functions
3. Outline the Knowledge about Obesity and obtaining better results

V - SEMESTER ENZYMOLOGY - (Course No6)

COURSE OUTCOMES

1. To enlighten the students about enzyme kinetics.
2. To help the students to understand the mechanism of action of enzymes.
3. To help the students to learn the applications of enzymes.

PROGRAM OUTCOMES

(For Single Major / Minor Programme)

PO1: Comprehensive Knowledge

The students will be expected to demonstrate comprehensive knowledge and understanding of chosen disciplines as a part of undergraduate programme.

PO2: Complex Problem Solving

The Students will be able to demonstrate and solve the different kinds of problems in real life situations rather than replicate curriculum content knowledge.

PO3: Critical and Analytical Thinking

The Students will be expected to demonstrate the Cognitive Skills through analyzing, evaluating and synthesizing the knowledge drawn from various sources.

PO4: Creativity

The Students will be expected to develop the ability to invent new techniques and solutions to solve problems effectively in unusual situations at micro and macro level.

PO5: Communication Skills

The students will be able to exhibit effectively in writing and oral skills, using appropriate media in various situations by adopting acquired knowledge.

PO6: Research Ability

The students will be able to exhibit research temperament through observation, identification of problems and emerge with diversified solutions.

PO7: Team work & Leadership Skills

The Students will be acquired the ability to work effectively in teams with Co-ordination and manifest leadership skills in all aspects.

PO8: Environment Consciousness and Sustainable Development

The Students will be expected to develop awareness towards environmental issues and contribute for the Sustainable Development, through various platforms by practicing eco friendly approaches in all activities.

PO9: Responsible Citizenship

The Students will be expected to exhibit moral & ethical behavior and have a sense of social responsibility to build a strong nation and to preserve culture & heritage of the nation.

PO10: Technological Aptitude

The Students will be expected to acquire technical knowledge and skills to compete with emerging trends and to meet the global needs.

PO11: Financial Management and Entrepreneurship skills

The students will be expected to demonstrate the ability in effective implementation of Planning, Mobilization and Utilization of the financial resources and become good entrepreneurs.

PO12: Physical and Mental Wellbeing

The Students will be able to practice healthy living habits for the holistic and harmonious development.

Program Specific Outcomes (PSO)

- To provide students with scholarly experiences, both theoretical and hands-on, that help instil deep interests in learning the chemistry underlying the working of biological systems while developing broad and balanced knowledge and understanding of key biological concepts, principles and theories. The idea is to equip students with appropriate tools of analysis so that they can independently tackle issues and problems in the field of biology and chemistry.

- To encourage students to study the structure and function of specific molecules and pathways and their interactions and networking in biological systems with particular emphasis on regulation of chemical reactions in living cells.

- To develop in students an inquisitive learning approach to seek answers regarding the complex workings of various physiological systems, cellular multiplication and differentiation and communication within and between cells and organs, and the chemical bases of inheritance and disease.

- To empower students to apply the knowledge and skills they have acquired to the solution of specific theoretical and applied problems in Biochemistry.

- To build concepts in biochemistry that would enable them to undertake further studies in Biochemistry and related areas or in multidisciplinary areas and help I develop a range of generic skills that are relevant to wage employment, self- employment and entrepreneurship.

II -SEMESTER

BIO MOLECULES - (Course No-1)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1													3		
CO2	2														
CO3				2											
CO4			3												
CO5														3	
OVERALL	2	-	3	2	-	-	-	-	-	-	-	-	3	3	-
AVERAGE	2.6														

II - SEMESTER ANALYTICAL TECHNIQUES –

(Course No2)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3														
CO2													3		
CO3								2							
CO4		2													
CO5						3									
OVERALL	3	2	-	-	-	3	-	2	-	-	-	-	3	-	-
AVERAGE	2.6														

IV - SEMESTER

BIOENERGETICS AND METABOLISM OF CARBOHYDRATES AND LIPIDS-
(Course No-3)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO18
CO1			3												
CO2	3														
CO3		2													
CO4								2						3	
CO5						3									
OVERALL	3	2	3			3		2						3	
AVERAGE	2.7														

IV - SEMESTER
Clinical Biochemistry-(Course No-4)
CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3														
CO2			3												
CO3				3											
CO4						3									
CO5														3	
OVERALL	3	-	3	3	-	3	-	-	-	-	-	-	-	3	-
AVERAGE	3														

IV SEMESTER NUTRITIONAL BIOCHEMISTRY-
(Course No-5)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1			2												
CO2				3											
CO3						2									
CO4															3
CO5														3	
OVERALL	-	-	2	3	-	2	-	-	-	-	-	-	-	3	3
AVERAGE	2.6														

V - SEMESTER ENZYMOLOGY - (Course No6)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1										3					
CO2														2	
CO3		3													
CO4						3									
CO5				3											
OVERALL	-	3	-	3	-	3	-	-	-	3	-	-	-	2	-
AVERAGE	2.8														

MINOR

II -SEMESTER

BIO MOLECULES - (Course No-1)

COURSE OBJECTIVES

1. Provides information about classification, physico-chemical properties of amino acids and structural organization of proteins.
2. To understand the structure, properties and biological importance of carbohydrates and lipids.
3. Explore the composition and structure of nucleic acids.

UNIT-I

Fundamentals of Biochemistry: History, scope and avenues of Biochemistry. Water as a biological solvent. Measurement of PH, Buffers, Biological relevance of Buffers. Outlines of surface tension, adsorption and osmosis and their biological relevance.

UNIT-II

Carbohydrates: Classification, monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation. Reactions of carbohydrates (due to functional groups - hydroxyl, aldehyde and ketone. Amino sugars, Glycosides. Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose). Structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen). Glycosaminoglycans.

UNIT – III

Lipids Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids. Prostaglandins- structure, types and biological role. Lipoproteins- types and functions.

UNIT-IV

Amino Acids and Proteins Classification, structure, stereochemistry, chemical reactions of amino acids due to carbonyl and amino groups. 2. Titration curve of glycine and pK values. Essential and nonessential amino acids, non-protein amino acids. 3. Peptide bond - nature and conformation. Naturally occurring peptides - glutathione, enkephalin. 4. Proteins: Classification based on solubility, shape, and function. Determination of amino acid composition of proteins. 5. General properties of proteins, denaturation, and renaturation of proteins. 6. Structural organization of proteins- primary, secondary, tertiary, and quaternary structures (Eg. Hemoglobin and Myoglobin).

UNIT-V

Nucleic acids and porphyrins, Types of RNA and DNA. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. 2. Effect of acids, alkali and nucleases on DNA and RNA. 3. Structure of Nucleic acids- Watson-Crick DNA double helix structure, denaturation and renaturation of nucleic acids, Tm-values and their significance, cot curves and their significance. 4. Structure and properties of porphyrins: Heme, cytochromes and chlorophylls.

COURSE OUTCOMES

After successful completion of the practical course student should be able to

1. prepare buffers and apply the knowedge to calculate the pH values of charged biomolecules.
2. Identify various carbohydrates, aminoacids and lipids present in the nature by performing qualitative analysis.

SEMESTER - I

BIO MOLECULES - (Course No-1)

Credits -1

1. Preparation of buffers (acidic, neutral, and alkaline) and determination of pH.
2. Qualitative identification of carbohydrates- glucose, fructose, ribose/xylose, maltose, sucrose, lactose, starch/glycogen.
3. Qualitative identification of amino acids- histidine, tyrosine, tryptophan, cysteine, arginine.
4. Qualitative identification of lipids- solubility, saponification, acrolein test, Salkowski test, Lieberman-Burchardtest.
5. Preparation of Osazones and their identification
6. Estimation of proteins in biological samples:
   a. Biuret method.
   b. Folin-Lowry method.
   c. UV method.
   d. Bradford's dye binding method
7. Estimation of amino acid by Ninhydrin method.
8. Estimation of tyrosine by Million's –reaction

Recommended Books

1. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.

2. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Lt

3.Nelson.D.L. and Cox.M..M -Lehninger's Principles of Biochemistry- Freeman & Co.- 7 th Edition

II - SEMESTER

ANALYTICAL TECHNIQUES – (Course No2)

COURSE OBJETIVES

1. To understand the basic concepts of analytical techniques.
2. To gain knowledge about the latest advances in analytical techniques.
3. To apply these techniques in research.

UNIT-I

Methods of tissue homogenization. Salt and organic solvent extraction and fractionation. Dialysis, Reverse dialysis, ultra filtration, lyophilization.

Chromatography: principle, procedure and application of partition chromatography, adsorption chromatography, ion exchange chromatography, gel chromatography, affinity chromatography, GLC and HPLC.

UNIT-II

Electrophoresis: Principle, procedure and application of free flow, zone electrophoresis (Paper electrophoresis, Gel electrophoresis, PAGE, SDS-PAGE and Disc PAGE). Isoelectric focusing, High voltage electrophoresis, Pulse field electrophoresis, Immunoelectrophoretic.

UNIT-III

Centrifugation: Principle of sedimentation technique. Different types of centrifuge and rotors. Principle, procedure and application of differential centrifugation, density gradient centrifugation, ultra centrifugation, rate zonal centrifugation, isopycnic centrifugation.

UNIT-IV

Colorimetry and spectrophotometry: Laws of light absorption -Beer - Lambert's law. UV and visible absorption spectra, molar extinction coefficient and quantitation. Principle and instrumentation of colorimetry and spectrophotometry. Principle of nephelometry, fluoromentry, Atomic absoption and emission spectrophotometer

UNIT-V

Important stable radioisotopes used in biochemical research. P 32, I 125,I131, Co 60. C 14 etc. Radiation hazards and precautions taken while handling radioisotopes. Principle and application of RIA. Measurement of radioactivity by GM counter and Scintillation counter.

III - SEMESTER

ANALYTICAL TECHNIQUES – (Course No-2)

Credits -1

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1. Estimation of ascorbic acid
2. Separation and estimation of total carotenoids and β-carotene
3. Extraction and estimation of vitamin A, vitamin E, niacin and free amino
4. Estimation of phosphorus by Fiske and Subbarow method Characterization of fats – estimation of saponification number, iodine number, acid number and R.M.Number
5. Extraction of Phytoconstitutents by Soxhlet and quantification

COURSE OUTCOMES

1. After completing this course, the student will
2. Understand the basic concepts and principles of biochemical techniques namely Spectrophotometry, Fluorimetry, Chromatography and Centrifugation.
3. Analyse biochemical compounds such as Carotenoids, Vitamins, Alkaloids and Flavonoids.
4. Identify the compounds by various biochemical techniques and interpret the results
5. Apply the laboratory skills and concepts in carrying out experiments using sophisticated instruments.

Reference Books

1. Physical Biochemistry- Application to Biochemistry and Molecular Biology: Friefelder D. WH Freeman and Company 1. Principles and Techniques of Biochemistry and Molecular Biology: - Ed. K. Wilson and J. Walker, Cambridge Univerity Press.
2. The Tools of Biochemistry: Cooper T.G., John Wiley and Sons Publication.
3. Biophysical chemistry. Principles and Techniques: Upadhayay A, Upadhayay K and Nath N., Himalaya publishing house.
4. Experimental Biochemistry. Cark Jr J. M. and Switzer R.L, W.H. Freeman and Company.
5. Research Methodology for Biological Sciences: Gurumani.N. M.J.P. Publishers., Chennai, India.
6. Instrumental Methods of Chemical Analysis: Chatwal. G and Anand.S., Himalaya Publishing House, Mumbai, India.
7. A Biologist's Guide to Principles and Techniques of Practical Biochemistry: Williams. B.L. and Wilson. K. (ed.) Edward Arnold Ltd. London
8. Jayaraman, J. (2011). Laboratory Manual in Biochemistry, New Age International (P) Ltd.
9. Sadasivam, S. and Manickam, A. (2005). Biochemical Methods, Second edition, New Age International (P) Ltd.

IV - SEMESTER

BIOENERGETICS AND METABOLISM OF CARBOHYDRATES AND LIPIDS- (Course No-3)

COURSE OBJECTIVES

1. To acquire knowledge related to the intermediary metabolism and the role of TCA cycle in central carbon metabolism.
2. To learn basic concepts of Bioenergetics, the importance of high energy compounds, electron transport chain, synthesis of ATP, mechanisms of oxidative phosphorylation and photophosphorylation.
3. To understand the fundamentals of cellular metabolism of carbohydrates their association with various metabolic diseases.
4. To learn biosynthesis and degradation of Lipids, fatty acids and cholesterol, Metabolism of lipoproteins and Ketone bodies.

UNIT-I

Principles of thermodynamics, free energy, enthalpy and entropy, Free energy changes in biological transformations in living systems. Redox potential, phosphate group transfer potential and ATP, High-energy compounds, oxidation and reduction reactions.

UNIT-II

Oxidative phosphorylation, Mitochondria ultrastructure, Energy harnessing cascade from nutrients, Reducing equivalents, Electron transport and its carriers-Complex I, II, III, IV; Mitchell's Hypothesis—experimental verification, Determination of P:O ratio, ATP synthesis by F1-FO ATP synthase, E. Racker's experiment. Relation of proton movement and ATP synthesis. Experimental demonstration of the movement of ATP synthase.

Oxidation and reduction enzymes, utilization of oxygen aby oxygenase's, superoxide dismutase and catalase. respiratory control, Mechanism, and theories of oxidative phosphorylation. Respiratory chain inhibitors and unvouplers of oxidative phosphorylation. Microsomal electron transport system. Bioluminescence.

UNIT-III

Approaches for studying intermediary metabolism. Glucose as fuel, glucose transporters, Glycolysis, and its regulation. Substrate cycling, TCA cycle – function and regulation, Glyoxylate cycle, Gluconeogenesis, and its regulation, HMP shunt and its significance, Uronic acid pathway, Glycogen metabolism and its regulation with special reference to phosphorylase and glycogen synthase, Metabolism of fructose, galactose and lactose, Biogenesis of amino sugars, peptidoglycans, glycosyl aminoglycans and glycoproteins. In born errors of carbohydrate metabolism.

UNIT-IV

Lipid metabolism – Oxidation of fatty acids, Biosynthesis of fatty acids and regulation; Metabolism of arachidonic acid; formation of prostaglandins, thromboxanes, leukotrienes, Biosynthesis of triglycerides.

UNIT-V

Metabolism of phospholipids, sphingolipids. Biosynthesis of cholesterol and its regulation, Formation of bile acids. Role of liver and adipose tissue in lipid metabolism. In born errors of lipid metabolism

IV - SEMESTER

BIOENERGETICS AND METABOLISM OF CARBOHYDRATES AND LIPIDS- (Course No-3)

PRACTICAL SYLLABUS

1. Isolation of casein from milk
2. Preparation of lactalbumin from milk
3. Estimation of reducing sugar by DNSA (dinitrosalicylic acid) method
4. Titration of glucose by Benedict's method
5. Estimation of urea by Diacetylmonoxime method
6. Estimation of creatinine in serum
7. Estimation of cholesterol by ZAK's method

COURSE OUTCOMES

After the completion of this course, the student will be able to

1. Explain the broad outlines of intermediary metabolism and importance of carbohydrate metabolism in life.
2. Describe the importance of Electron transport and ATP production mechanism.
3. Gain in knowledge in Carbohydrate metabolism and their associated with disorders.
4. Describe the details of lipid metabolism.

RECOMMENDED BOOKS

1. Principles of Biochemistry, White. A, Handler, P and Smith.
2. Biochemistry, Lehninger A.L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, LubertStryer.
5. Text of Biochemistry, West and Todd.

IV - SEMESTER

Clinical Biochemistry-(Course No-4)

COURSE OBJECTIVES

1. To understand the basic concepts of laboratory techniques.
2. To understand the basic concepts of organ functions.
3. To gain knowledge about various investigations and their interpretations.

UNIT-I

Clinical Biochemistry Laboratory and Investigation of Homeostasis. The use of biochemical tests- Specimen collection and types, Automation and Computerization Water and electrolyte homeostasis - renin angiotensin – aldosterone system Pathological variations of water and electrolytes- diagnosis and Interpretations Self Study: Acid base balance and imbalance - Mechanism of regulations, Anion gap, Acidosis and Alkalosis.

UNIT-II

Abnormal Hemoglobin and Inherited Disorders 9hrs Inborn errors of Metabolism: Patterns of inheritance - alkaptonuria, phenyl ketonuria, albinism, glycogen storage diseases and inherited disorders associated with urea cycle. Abnormal hemoglobin and' hemoglobinopathies- Sickle cell anemia and thalassemias, porphyrias and porphyrinurias. Self-study: Plasma proteins in health and diseases

UNIT-III

Investigation of Renal and Gastric Functions. Renal functions tests: Preliminary investigations, tests based on GFR, RPF and tubular function. Diseases related to kidney - nephritis, nephrosis, uremia, renal failure, renal calculi, renal hypertension, renal tubular acidosis, diabetes insipidus.. Dialysis - hemodialyis and peritoneal dialysis. Gastric function tests: Examination of resting content, Fractional gastric analysis, stimulation tests, Tubeless gastric analysis. Malabsorption syndrome, acidity, ulcers - gastric, duodenal and peptic, colon cancer, pancreatitis, gastric and pancreatic 'function tests. Self study: Gout, Leschnyhan syndrome and oroticaciduria.

UNIT-IV

Liver Function Tests and Lipid Disorder Liver function tests: Tests based on abnormalities of bile pigment metabolism, detoxification and excretory functions. Diagnosis of different types of jaundice. Pancreatic function tests. Diseases relating to liver - jaundice, cirrhosis, hepatitis, cholestasis, cholelithiasis, hepatic coma, hepatic carcinoma, inherited diseases of bilirubin metabolism Lipid: Lipoprotinemias and atherosclerosis coronary heart diseases and hypertension. Self study: Biochemical changes in cancer - detection of tumor markers

UNIT- V

Blood Glucose Regulation and Enzymes of Diagnostic Importance 9 hrs Carbohydrates: Blood glucose level - regulation and its clinical significance, Diabetes mellitus, Glycosuria and GTT. Enzymes and Isoenzymes of clinical importance - general principles of assay - Clinical significance of enzymes and isoenzymes (LDH, CK, phosphatase, 5' nucleosidase, amylase, lipase, acetyl cholinesterase, transaminase and gamma glutamyl transferase) Self study: meningitis, encephalities, epilepsy, Parkinson's, Alzheimer's, cerebral palsy.

IV- SEMESTER

Clinical Biochemistry-(Course No-4)

PRACTICAL SYLLABUS

1. Blood analysis:
   Iron and Hemoglobin, Glucose, GTT. 10hrs
2. Serum and Urine analysis:
   Creatine, chloride, phosphorus, calcium. 10 hrs
3. Lipid profiles (Serum) –
   Total cholesterol, triglycerides, HDL, LDL 5 hrs
4. Liver function tests –
   Total Bilirubin, total protein, albumin, globulin, albumin/globulin ratio, AST, ALT, ALP 10 hrs
5. Kidney function tests
   Urea, creatinine, uric acid.

COURSE OUTCOMES

1. After completing this course, the student will:
2. Obtain basic knowledge about specimen collections, pathological variations of water, electrolytes
3. Interpret the results to diagnose the abnormal functions of organs.
4. Understand the antinutrient factors and its implication on other nutrients in food.Understand the, patterns of inherited disorders and disorders of hemoglobin metabolism
5. Correlate the tests used for renal and gastric functions and their interpretations
6. Impart the diagnostic tests for liver function and lipoprotein metabolic disorders
7. Evaluate the alterations in blood glucose regulation and enzymes of clinical importance

REFERENCE BOOKS

1. Gowenlock, A.H. and Donald, J(2002). Varley's practical clinical Biochemistry, sixth edition, CBS publications and Distributors, New Delhi.
2. Sembulingam, K and Sembulingam, P(2010). Essentials of Medical Physiology, fifth edition. Jaypae Brothers (p) ltd, New Delhi.
3. Burtis and Ashwood (2007) Tietz Fundamentals of Clinical chemistry, 6th edition, WB Saunders Company, Oxford Science Publications USA.
4. Chatterjee and Shindae(2012). Text book of medical biochemistry, 8th edition.

5.Devlin, T.M(2010). Text Book of Biochemistry with clinical correlations, 7th edition. NewYork.

6.Gans, G and Murphy, J.M. (2008). Clinical Biochemistry, fourth edition, Churchill Livingstone, Elsevier

V - SEMESTER
NUTRITIONAL BIOCHEMISTRY-(Course No-5)

Credits -3

Course Objectives:

1. To compile various Nutrition and balanced diet,various dietary requirements of nutrients.
2. To acquire knowledge about protein calorie malnutrition
3. To revise the facts about Fat- and Water-soluble vitamins and their importance. 5. To extract facts about Obesity and various lifestyle associated diseases

UNIT- I

Animal and vegetative foods – chemical composition. Nutrients – Essential Nutrients and their classification. Digestibility, absorption and biochemical functions of macro nutrients, Carbohydrates – dietary requirements. Proteins – Nitrogen balance studies, Determination of Biological values of proteins, Specific Dynamic Action, improvement of protein quality by supplementation and fortification. Lipids – Dietary needs of lipids, essential fatty acids. Calorific values of foods, Basal metabolic rate and its determination, factors influencing BMR.

UNIT-II

Clinical nutrition – role of diet and nutrition in prevention of atherosclerosis and obesity, role of leptin in regulation of body mass. Starvation – Protein sparing treatment during fasting, Protein calorie malnutrition – Kwashiorkar and Marasmus, Nutritional requirements for pregnant and lactating women and aged people.

UNIT-III

Biological effects of non-nutrients, dietary fibre, physiological actions. Antinutrients – Protease inhibitors, hemagglutinins, hepatotoxin, goitrogens, cyanogenic glucosides, methyl xanthines, oxalates. Toxins from mushrooms. Biological effects of food contaminants – Hexachlorobenzene, arsenic, DDT, cadmium, mercury, lead, aflatoxins, food additives - saccharin and sodium nitrite. Animal foods and seafoods. Food allergy – role of allergens, diagnosis and management of food allergy. Food processing and loss of nutrients during processing and cooking.

UNIT-IV

Vitamins – Fat soluble vitamins (A,D,E,K) and Water soluble vitamins (B complex and C) (Sources, biological functions and RDA), Disorders of vitamins A, D, E, K , Vitamin C and B-complex vitamins : Thiamin, Riboflavin, Niacin, Pantothenic acid, Lipoic acid, Pyridoxine, Biotin, folic acid and vitamin B12.Minerals- iron, calcium, iodine, selenium (Sources, biological functions and RDA). Deficiency disorders of minerals Nutritional requirements in infancy, childhood, pregnancy and lactation and old age.

UNIT- V

Obesity – Causes, Anthropometric measurements and Diet management. Dietary management in – Infection, Fever, Constipation, Diabetes mellitus, Peptic Ulcer, PCOS, Hypertension, Cardiovascular diseases, Pancreatitis, Cirrhosis and Cancer

V - SEMESTER
NUTRITIONAL BIOCHEMISTRY-(Course No-5)

Credits -1

PRACTICALS

1. Determination of reduced Ascorbic acid by DCPIP method
2. Determination of total Ascorbic acid by DNPH method
3. Determination of calcium in the food
4. Isolation of casein from milk and determination of its protein by any method
5. Determination of cholesterol of edible oil
6. Determination of ash content
7. Determination of moisture content of foods/food grains/ powders
8. Determination of fructose from honey/fruit pulp
9. Determination of pyridoxine of fruits/leaves
10. Isolation of lactose from skimmed milk and the estimation of lactose
11. Determination of iodine value of edible oil by titrimetry
12. Determination of acid value by titrimetry

COURSE OUTCOME

1. Analyse the role of various nutrients, their dietary allowances and relate in day-to-day life.
2. Revise the Knowledge about the water- and fat-soluble vitamins and its significance and its functions
3. Outline the Knowledge about Obesity and obtaining better results

REFERENCE BOOKS:

1. Smith EL (1983) Principles of biochemistry: mammalian biochemistry: McGraw-Hill Companies.
2. Chatterjee CC (1951) Human physiology: Medical Allied Agency.
3. Murray R, Granner D, Mayes P, Rodwell V (2003) Harper's illustrated biochemistry (LANGE basic science): McGraw-Hill Medical.
4. Guyton Aurcher C, Hall John E (2006) Text book of Medical Physiology. Elsevier India Pvt. Ltd. New Delhi.
5. Dixon M, Webb E (1979) Enzyme inhibition and activation. Enzymes 3: 126-136.
6. Rao C (1973) University General Chemistry: An Introduction to Chemical Science: MacMillan India.
7. Price NC, Frey PA (2001) Fundamentals of enzymology. Biochemistry andMolecular Biology Education 29: 34-35.
8. Palmer T, Bonner PL (2007) Enzymes: biochemistry, biotechnology, clinical chemistry:

V - SEMESTER ENZYMOLOGY - (Course No6)

COURSE OUTCOMES

4. To enlighten the students about enzyme kinetics.
5. To help the students to understand the mechanism of action of enzymes.
6. To help the students to learn the applications of enzymes.

UNIT-I

Introduction to enzymes: Holoenzyme, apoenzyme, prosthetic group. Interaction between enzyme and substrate- lock and key model, induced fit model., enzyme specificity and types. IUB system of classification and nomenclature of enzymes (Class and subclass with one example) Ribozymes, Abzymes.

UNIT-II

Enzyme kinetics: Importance, order of reaction, study of the factors affecting the velocity of enzyme catalyzed reaction- enzyme concentration, temperature, pH, substrate concentration, inhibitors and Derivation of Michaelis -Menten equation and Km value determination and its significance. Definition of Vmax value of enzyme and its significance. Lineweaver- Burk plot (Only for single substrate enzyme catalyzed reaction).

UNIT-III

Methods of measurements and expression of enzyme activity. Unit of enzyme activity - definition and importance. Enzyme inhibition: Reversible and irreversible – examples. Reversible- competitive, noncompetitive and uncompetitive inhibition- explanation of double reciprocal plot with examples.

UNIT-IV

Enzyme regulation – covalently modulated enzymes with examples of adenylation and phosphorylation and allosteric regulation- example Aspartate tras carbamoylase. Isoenzymes- Lactate dehydrogenase and creatine phosphokinase. Zymogens

UNIT-V

Immobilization of enzymes, methods of immobilization. Industrial uses of enzymes: Detergent enzymes, thermo stable alpha amylase, papain, chymotrypsin

V - SEMESTER ENZYMOLOGY- (Course No-6)

Credits -1

PRACTICAL SYLLABUS

1. Assay of α- amylase activity in saliva

2. Determination of optimum pH of a plant/animal or microbial enzyme.
3. Studying the effect of different temperatures during enzyme activity measurements.
4. Studying the effect of different pH during enzyme activity measurements.
5. Substrate saturation and determination of Km value from Michaelis Menten curve.

After completing this course, the student will:

1. Acquire the knowledge of structure and organization of protein
2. Identify the different classes of enzymes, the methods used for purification of enzymes and describe enzyme kinetics for bisubstrate and multisubstrate reactions.
3. Do research in a contemporary action of enzyme and enzyme inhibition.
4. Explain the enzyme regulation and multienzyme complex.
5. Explore the applications of enzymes in clinical and various industrial sectors.

REFERENCE BOOKS

1. Enzymes: M. Dixon and E. C. Webb. Longman Publication.
2. Enzymology: Nicholas and Price
3. Biochemistry: D.Voet and J. G. Voet, John Wiley & sons Inc. New York ChischesterBrisbane,Toronto, singapore ISBN 0-471-58651-X
4. Biochemistry: L. Stryer. and Hall, J.E., Library of congress cataloguing-in publication Data, Bery, Jeremy mark ISBN -0-7167-4684-0.
5. Enzymes: Trevor Palmer Affiliated East- West Press Pvt. Ltd, New Delhi ISBN 81-7671-04

GOVT. COLLEGE FOR WOMEN (A) SRIKAKULAM

DEPT. OF BIOCHEMISTRY

B.Sc SEMESTER –II,PAPER-II

BIOCHEMISTRY(MINOR)

MODEL QUESTION PAPER

Bio-Molecules

CODE: BCH-I

TIME:3hrs. MARKS:60

-- SECTION-I

write essay Question Answer any Five of the following 5x8=40

1) a) write about the Biological Buffers?

(OR)

b) Write about the PH and Pka values of water ?

2) a) Write the Classification of Carbohydrates?

(OR)

b) Write the Homo poly Saccarides?

3) a) Write the general properties of fats& Oils?

(OR)

b) Membrane composition and organization (fluid mosaic model)

4) a) Write the Titration curve of glycogen? PH &pka Valey?

(OR)

b) Structural Organization of Proteins?

5) a)Write about the structure of Nucleic acid watsoncric double bellive model.

(OR)

b) Write the Structure of cytochrome?

Section-II

Short Questions Answer any five of the following **5x4=20**

1. Electrical Conductivity?
2. Analysis of Drinking water & pond water?
3. Write about the disaccharides?
4. Bacterial cell wall of Poly saccharine?
5. Write the Phospholipids?
6. Write about the Lipo Proteins?
7. Naturally accruing Peptides?
8. Denaturations of Proteins?
9. Structure of t.RNA?
10. Structure of Chloro phil?

B.Sc. Choice Based Credit System (CBCS)

Subject:B I O C H E M I S T R Y

Model Question Paper (Theory)

Paper: III/IV

Time: 3 Hrs **Max. Marks: 60**

SECTION - A

Answer ANY FIVE questions

Each question carries 10 marks 5 x 8M = 40 Marks

(Select two questions in each unit)

1. a) UNIT-I
   OR
   b) UNIT-I

2. a) UNIT-II
   OR
   b) UNIT-II

3. a) UNIT-III
   OR
   b) UNIT-III

4. a) UNIT-IV
   OR
   b) UNIT-IV

5. a) UNIT-V
   OR
   b) UNIT-V

SECTION - B

Answer ANY FIVE questions

Each question carries 5 marks 5 x 4 = 20 M

6. UNIT-I
7. UNIT-I
8. UNIT-II
9. UNIT-II
10. UNIT-III
11. UNIT-III
12. UNIT-IV
13. UNIT-IV
14. UNIT-V
15. UNIT-V

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GOVT. DEGREE COLLEGE(W) (A), SRIKAKULAM 9th BOARD OF
Department of Bio Bio Chemistry
STUDIES-MINUTES OF THE MEETING 2024-2025

The Department of BIO CHEMISTRY conducted Pre-Board of Studies meeting on 27.09.2013 at 11 00AM under the Chairmanship & Head of the department, Dept. of BIO CHEMISTRY and it resolved the following:

1) To adopt Single major system as per the Staff Councils proceedings commencing from the academic year 2024-2025 for Semester, it III, IV, V, VI, VII of B.Sc. (Minor) in BIO CHEMISTRY students
2) To approve and introduce the newly framed syllabus for Semester II, III, IV, V, VI, VII course in B.Sc (Minor) BIO CHEMISTRY. The newly framed syllabus is oriented in such a fashion that it caters to the needs of the students and to meet the present day job employ ability and to develop professionalism in the field of BIO CHEMISTRY
3) To approve and introduce the semester mode pattern of examinations for Semester III, IV, V, VI, VII and
4) Will of B.Sc (Hons) in BIO CHEMISTRY students Further it is approvest syllabus, blue print and the model question papers submitted by the concerned faculty members for Semester II, II, IV, V, VI, VII
5) To approve new emplovable and skal based programs from 2022-23. To adopt NAAC norms by introducing quality circles among student community
6) To adopt multiple entry and multiple exit system for the benefit of the students as per the NEP 2020 recommendations
7) To approve for 40 internal marks as a part of Continuous internal Assessment for core courses and allocation of marks as per Table-t
8) To approve question paper blue print as per BLOOMS TAXUNOMY, model question papers for 60 external marks and allocation of marks and the pettem of the paperas por Table-
9) To approve minimum pass percentage of semester end theory examinations as 40% of 40 Internal +60 externals =100
10) To approve practical examinations for each core courses for semester I, I, III, IV, V, VI, Vitand Vill, and allocation of marks Table-IIA
11) To approve internship-I as community services project for 1st veer students at the end of Sem-tw.ef 2023-24 as per NEP-2020 and allocation of marks as per Table-l
12) To approve Internship-ll, two months training program for 2nd year students at the end of IV semester w.ef 2023-24 as per NEP-2020 and allocation of marks as per Table-IV

Government College for Women(Autonomous) Srikakulam

Resccredited by NAAC with 'A' Grade during Fil Cycle (CGPA 3.00%

Dept. of Bio Chemistry

Board of studies meeting Resolutions for 2024 2025

1) Board of studies meeting is held in depart of Bio Chemistry under the chairperson and Head of the department on 22.10.2034 Aling are the resolutions taken by the committee. 10.30 AM
2) It is revend by the cimmasite to adopt CBCS System for all sis sermesters.
3) It is resolved by the the conmintee to frume and implent newly formed syllabi for II,III, IV,V,VI Course or subjects and it is adopted by newly formed APSCHE Syllabi
4) It is resolved to introduce semester mode patters of Examination, for all sementors
5) It is resolved and ratified by the committee for the newly introducing Skill based Programs
6) It is resolved to introduce communay service projects and arships to 2020-2021 admitted banchonmards
7) It is resolved by the committee to ramify model question papers and the prints prepared by department faculty. Among 100 marks 23 marks is for continues internal assessment and 75 marks are for external assesment systemand 60 Marks (4020)
8) It is resolved by the committee to allor 50 marks (estemal assessment system) for LSC and
9) SDC Courses. The committee resolved and finalized list of esaminers for paper setting and resolved to appoint practical examiners from our college only, if available 9
10) It is resolved by the committe to adopt inovative maching, learning and evaluation techniques.
11) It is resolved by the committee to conduct student seminars, workshops, field trips student centric activities
12) It is resolved by the committee to encourage students towards research activities
13) It is resolved by the committee to approve ICT mode of Teaching.
14) It is resolved by the committee to ancourage students to join in JKC, NSS etc.
15) It is resolved by the committee to introduce skill enhanced courses in ch semester which is prescribed by APSCHE intend of other papers in the previous system. Also, it is resolved to send students fir & months internship in several industries

Signed and approved by:

Dr. B.R Ambedkar University
(Univ.Nominee)

Principal	**DR.BRAU SKLM**	**Subject Expert**
GDC Women, Srikakulam	(Univ. nominee)	(nominated by Academic Council)

Subject Expert	**Representative Member**	**Head of Department Biochemistry**
(nominated by Academic Council)	From Industry / Corporate / Allied Area relating to placement	

Member from Alumni	**Faculty Member**