B.Sc. Biochemistry Sem. 5

Course Code	US05MABIC01	Title of the Course	Molecular Biology
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	Student should be able to: 1. Understand the concepts of Molecular Biology and Genetics 2. Understand the concepts of Gene, Chromosome, Chromatin and Genome 3. Understand Salient features of viral genome, Prokaryotic genome, Eukaryotic genome. 4. Understand the information of replication, transcription, Translation 5. Understand the Importance of Reverse transcription. 6. Understand the Importance of Inhibition of protein synthesis

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**Basic Concept of Molecular Biology** 1. Introduction of Molecular Biology and Genetics 2. Definition of Gene, Chromosome, Chromatin and Genome 3. Concept of Gene 4. Concept of Chromosome and Chromatin 5. Numerical Changes in chromosome • Aneuploidy (monosomy , nullisomy, trisomy, tetrasomy) • Euploidy (monoploidy, DIploidy, Polyploidy) 6. Salient features of Viral genome, 7. Salient features of Prokaryotic genome 8. Salient features of Eukaryotic genome.	**25%**

2.	**DNA Replication** 1) Introduction of Replication 2) Definition of Replication ,Replisome and Primosome 3) Set of fundamental rules for DNA replication A. DNA replication is semi conservative B. Replication begins at an origin and usually proceeds bidirectionally C. DNA synthesis proceeds in 5' to 3' direction and is semi discontinuous 4) Prokaryotic DNA polymerases: Activities of DNA polymerase I, II and III. 5) Mechanism of replication: A. Initiation, B. Elongation C. Termination. 6) Differences in Prokaryotic and Eukaryotic Replications	**25%**

3.	**Transcription** 1) RNA polymerases in Prokaryotic and Eukaryotic organisms 2) Promoters in Prokaryotic and Eukaryotic organism 3) Mechanism of transcription: A. Initiation B. Elongation C. Termination. 4) Post transcriptional modification A. Splicing mechanism of group 1,2,3,4 B. Generation of 5' cap in m RNA C. 3' poly a tail formation in mRNA 5) Reverse transcriptase and Reverse transcription	**25%**
4.	**Translation / protein synthesis** 1) Genetic code: Definition and properties of genetic code 2) Role of ribosomes, m RNA and t RNA in Translation 3) Mechanism of Translation A. formation of fmet tRNA fmet B. Activation of amino acid C. Initiation D. Elongation E. Termination 4) Post translational modification 5) Inhibition of protein synthesis by antibiotics and toxins.	**25%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
1.	Understand the concepts of Molecular Biology and Genetics
2.	Recognize vocabulary used in biochemistry especially in relation to proteins, DNA, enzymes, etc.
3.	Applying vocabulary and basic concepts to solving more advance problems in biochemistry.
4.	Understand that the correct concepts of gene and genome are essential for normal functioning of the body.

Suggested References:	
Sr. No.	**References**
1.	Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., 2008 Molecular Biology of the Gene
2.	Freifelder's Essentials of Molecular Biology by George M. Malacinski
3.	Nelson and Cox, Lehninger's Principles of Biochemistry (2000), Worth Publish., Inc. NewYork.
4.	Genetics P.K.GUPTA

On-line resources to be used if available as reference material
On-line Resources:
https://onlinecourses.nptel.ac.in/noc22_cy06/preview
https://onlinecourses.nptel.ac.in/noc21_bt19/preview
https://vlab.amrita.edu/?sub=3&brch=63
https://vlab.amrita.edu/?sub=3&brch=64
https://biotech01.vlabs.ac.in/
https://www.nature.com/subjects/biochemistry
https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/
https://www.chem.fsu.edu/chemlab/bch4053l/resources.html
https://onlinecourses.nptel.ac.in/noc22_cy06/preview
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https://vlab.amrita.edu/?sub=3&brch=63
https://vlab.amrita.edu/?sub=3&brch=64

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B.Sc. Biochemistry Sem. 5

Course Code	US05MABIC02	Title of the Course	Human Metabolism-I
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To understand major catabolic and anabolic pathways in metabolism of carbohydrates and lipids 2. To recall the key regulatory points in metabolic pathways 3. To explain how diet and hormonal signalling regulate metabolic pathways 4. To learn molecular mechanisms underlying major inherited diseases of metabolism 5. To connect specific symptoms in clinical case presentations to metabolic disorders

Course Content

Unit	Description	Weightage* (%)
1.	**CARBOHYDRATE METABOLISM** • Basic concept: Anabolism, Catabolism • Digestion and absorption of carbohydrate (In brief) • Glycolysis: Energetics of glycolysis, Regulation of glycolysis, Conversion of pyruvate to lactate, feeder pathways for glycolysis • Gluconeogenesis and its regulation • Hexose monophosphate shunt and significance • Krebs cycle: Energetics of Krebs cycle, Regulation of Krebs cycle • Synthesis of carbohydrates (In Brief): C3, C4 and CAM	25%
2.	**CARBOHYDRATE METABOLISM AND ASSOCIATED DISORDERS** • Hormonal regulation of Carbohydrate metabolism (role of Insulin & Glucagon) • Glycogen metabolism : Role of glycogen, Glycogenesis & Glycogenolysis along with regulation • Glycogen storage diseases (Type 0, Type I – VII) • Glycosuria, Pentosuria, Fructosuria • Diabetes mellitus (Classification, Clinical and Biochemical Symptoms)	25%
3.	**LIPID METABOLISM** **Fatty acid oxidation** • Digestion, absorption and transport of lipid in blood, • Alpha, beta and omega Oxidation of Saturated Fatty acid • Oxidation Unsaturated, and Odd carbon chain of fatty acids • Degradation of phospholipids and glycolipids • Oxidation of Ketone Bodies	25%

	• Metabolism of lipoproteins; Structure, Types, Chemistry and importance	
4.	**LIPID METABOLISM AND ASSOCIATED DISORDERS** **Fatty acid biosynthesis** • Biosynthesis of Fatty acids, TG, Cholesterol(Brief) • Synthesis of Ketone bodies • Synthesis of glycolipids and phospholipids • Hormonal regulation of lipid metabolism • Diseases associated with lipid metabolism(In Brief); Hypercholesterolemia, Atherosclerosis and Fatty Liver	25%
...		

Teaching-Learning Methodology	This course will be taught by a mixture of discussion, lecture, readings, smart -board technology, on-line quizzes and student presentation modalities.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	The focus is on the regulation of sugar and fat metabolism in eukaryotes, with an emphasis on mammals. The course will begin with a review of carbohydrate and lipid metabolic pathways, particularly pathway integration and regulation.
2.	The physiology of the carbohydrate Digestion in mammals
3.	Illustrate the metabolism of carbohydrates through various anabolic and catabolic pathways like glycolysis, Kreb's cycle, Glycogen metabolism, glucuronic acid cycle and others.
4.	Development of understanding about the disorders due to enzyme which works in metabolism process.

Suggested References:	
Sr. No.	References
1.	Lehninger Principles of Biochemistry by David L. Nelson, Michael Cox Publisher:WH Freeman
2.	Biochemistryby Donald Voet, Judith G. Voet Publisher: Wiley
3.	Textbook of biochemistry by Rafi MD Publisher: Universities Press (India) Pvt. Ltd.
4.	Biochemistry – By U Satyanarayanaand U Chakrapani Publishers: Elsevier
5.	Biochemistry by Jeremy M. Berg (Editor), John L. Tymoczko (Editor), LubertStryer (Editor)

On-line resources to be used if available as reference material
On-line Resources
NPTEL
SWAYAM

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B.Sc. Biochemistry Sem. 5

Course Code	US05MABIC03	Title of the Course	Biochemistry Practical
Total Credits Of the Course	4	Hours per Week	8

Course Objectives:	Student should be able to: 1. To learn basic operations and applications of common lab instruments 2. To understand the fundamentals of instrumentation techniques such as Colorimeter/UV- visible Spectrophotometer, electrophoresis and chromatography. 3. To develop understanding of DNA isolation from different sources 4. To estimate compounds like proteins and carbohydrate 5. To learn the chromatographic technique for isolation of various compounds. 6. To learn different techniques for precipitation of proteins.

Unit	Description
	Section-I
1.	To study the principle, working and applications of lab instruments • Weighing Balance • pH meter • BOD incubator • Centrifuge • Homogenizer
2.	Isolation of chromosomal DNA from bacterial cells.
3.	Agarose gel electrophoresis of genomic DNA
4.	Analysis of Normal urine using strip and biochemical tests
5.	Analysis of abnormal urine
6.	Estimation of reducing sugar by DNS method
7.	Estimation of creatine
8.	Estimation of total carbohydrates by anthrone method

	Section-II
1.	To study principle, instrumentation, working and applications of chromatography.
2.	Separation of plant pigments using chromatography
3.	Separation of amino acids by TLC
4.	Immobilization of enzymes
5.	Intracellular total protein precipitation by TCA/ Acetone method
6.	To study principle, instrumentation, working and applications of electrophoresis.
7.	Determination of A/G ratio
8.	Effect of enzyme concentration on arginase enzyme.

Teaching-Learning Methodology	Topics will be taught and discussed in interactive sessions using conventional black board and chalk as well as ICT tools such as power point presentations and videos. Practical sessions will be conducted in a suitablyequippedlaboratoryeitherindividuallyoringroupsdependingon the nature of exercise as well as availability of infrastructure. Practical materials will be provided from primary and secondary sources of information.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written/Practical Examination (AsperCBCSR.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical,Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

B.Sc. Biochemistry Sem. 5

Course Outcomes: Having completed this course, the learner will be able to	
1.	Students will be able to demonstrate an understanding of fundamental biochemical principles.
2.	They will gain the hands on knowledge of various techniques useful in biochemistry which can help them to stand with a skilful job at various industries and research labs

Suggested References:	
Sr. No.	References
1.	Standard methods of biochemical analysis–S.R.Thimmaiah
2.	Practical clinical biochemistry methods & interpretations–RanjanaChawla
3.	Practical biochemistry by Harold Varley.

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B.Sc. Biochemistry Sem. 5

Course Code	**US05MIBIC01**	**Title of the Course**	**Enzymology**
Total Credits of the Course	**2**	**Hours per Week**	**2**

Course Objectives:	1. The students will gain the knowledge of various theories of enzyme kinetics, the mechanisms of enzyme catalysis, and the mechanisms of enzyme regulation in the cell. 2. To get the knowledge of different techniques used for isolation and purification of enzyme.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**Enzyme kinetics & Inhibition** 1. Introduction of Kinetics 2. Michaelis -Menten Equation & plot 3. Lineweaver – Burk(L-B)Equation & plot 4. Significance of Km and Vmax 5 Factors affecting enzyme activity: • Effect of enzyme concentration • Effect of Substrate concentration • Effect of pH • Effect of temperature • Effect of product concentration • Effect of light & radiation 6 Allosteric enzymes 7 Enzyme Inhibitions A)Reversible Inhibitions a) competitive inhibition b) non-competitive inhibition c) uncompetitive inhibition B) Irreversible inhibition a) Suicide Inhibition 7. Bisubstrate reaction a) Sequential mechanism b) Non-sequential mechanism	**25%**

2.	**Isolation and purification of enzymes** 1) Introduction, objectives & Strategy of enzyme Purification. 2) In brief methods that based on size / mass (Principle/Application) a) Centrifugation b) Gel filtration c) Ultra filtration & dialysis 3) Methods based on polarity a) Electrophoresis b) Ion exchange chromatography 4) Methods that based on change in solubility a) Change in pH b) Change in ionic strength c) Decrease in dielectric constant 5) Methods based on the possession of specific binding sites or structural features a) Affinity Chromatography	**25%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern

Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
	The students will gain the knowledge of various theories of enzyme kinetics, the mechanisms of enzyme catalysis, and the mechanisms of enzyme regulation in the cell.
	They get knowledge of different techniques used for isolation and purification of enzyme.

Suggested References:

Sr. No.	References
1.	Biochemistry – By U Satyanarayana and U Chakrapani Publishers: Elsevier
2.	Principles of Anatomy and Physiology- By Gerard J. Tortora, Bryan H. Derrickson Publishers: John Wiley & Sons, Inc.
3.	C. C. Chatterjee's Human Physiology

On-line resources to be used if available as reference material
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https://vlab.amrita.edu/?sub=3&brch=63
https://vlab.amrita.edu/?sub=3&brch=64
https://biotech01.vlabs.ac.in/
https://www.nature.com/subjects/biochemistry

https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/
https://www.chem.fsu.edu/chemlab/bch4053l/resources.html
https://onlinecourses.nptel.ac.in/noc22_cy06/preview
https://onlinecourses.nptel.ac.in/noc21_bt19/preview
https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/
https://vlab.amrita.edu/?sub=3&brch=63
https://vlab.amrita.edu/?sub=3&brch=64

B.Sc. Biochemistry Sem. 5

Course Code	**US05MIBIC02**	**Title of the Course**	**Biochemistry Practical**
Total Credits of the Course	**02**	**Hours per Week**	**04**

Course Objectives:	1. To learn the effect of different parameters on enzyme activity. 2. To understand the principle and use of equipment such as centrifugation and colorimeter/UV Visible spectroscopy. 3. To get aware of Western Blotting 4. To have understanding of basic chromatography technique.

Sr No	**Name of the Practical**
1.	To study principle, instrumentation, working, types and applications of centrifugation.
2.	Effect of the Enzyme (Invertase) Concentration on enzyme activity
3.	Effect of Substrate Concentration on enzyme activity
4.	Effect of time on enzyme activity
5.	Effect of pH on enzyme activity
6.	Isolation of lipids from egg yolk and separation by TLC
7.	Demonstration of Western Blotting
8.	To study principle, instrumentation, working and applications of Colorimeter/UV-visible Spectrophotometer.

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review

	Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Course Outcomes: On the successful completion of the course, the students will be able to understand
Students will gain a good understanding of sophisticated instruments like centrifuge and TLC.
Students will develop the understanding of effect of different parameters on enzyme activity.

Suggested References:	
Sr. No.	**References**
1.	Standard Methods of Biochemical Analysis S.K. Thimmaiah Publishers: Kalyani
2.	Principles & Techniques of Practical Biochemistry – Wilson, Walker- Cambridge Univ. Press.
3.	An Introduction to Practical Biochemistry by David T. Plummer
4.	Textbook of Medical Laboratory Technology by Praful B. Godkar; Darshan P. Godkar

On-line resources to be used if available as reference material
On-line Resources:

https://vlab.amrita.edu/?sub=3&brch=63
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https://biotech01.vlabs.ac.in/
https://www.nature.com/subjects/biochemistry
https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/

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Course Code	**US05MIBIC03**	**Title of the Course**	**Fundamentals of clinical Biochemistry**
Total Credits of the Course	**02**	**Hours per Week**	**02**

Course Objectives:	1. To get knowledge related to nervous system including structure of neuron and its classification based on its structure and function and signal transmission at synapse etc. 2. To get familiar with basic structure of haemoglobin and various types of anaemia.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**NERVOUS SYSTEMS:** • Organization of the Nervous System (central & peripheral nervous system) • Functions of the Nervous System. • Basic Structure of neuron • Structural and functional classification of neuron • Neuroglia • Myelination • Ion Channels • Signal transmission at synapse (electrical and chemical) • Excitatory and Inhibitory Postsynaptic Potentials • Structure of Neurotransmitter Receptors: *Ionotropic Receptors and Metabotropic Receptors*	**50%**
2.	**HEMOGLOBIN AND ANAEMIA** • Hb: - Chemistry, Structure, Normal types of Hb. 1) Haemoglobinopathies • Sickle – cell anemia- Molecular Bais of Hbs, Biochemical Basis of the diagnosis & management of Sickle cell Disease • Thalassemia (brief) 2) Nutritional anaemia (Iron deficiency anaemia and folate deficiency anaemia) • Blood coagulation factors and pathways	**50%**

Teaching-Learning	Direct Teaching through Chalk-Walk and Talk

Methodology	ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern

Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand

	By learning this course students will acquire knowledge of nervous system and its working.
	Students will expand their knowledge regarding hemoglobin structure as well as hemoglobinopathies.

Suggested References:	
Sr. No.	**References**
4.	Biochemistry – By U Satyanarayana and U Chakrapani Publishers: Elsevier
5.	Principles of Anatomy and Physiology- By Gerard J. Tortora, Bryan H. Derrickson Publishers: John Wiley & Sons, Inc.
6.	C. C. Chatterjee's Human Physiology

On-line resources to be used if available as reference material
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https://biotech01.vlabs.ac.in/
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https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/
https://www.chem.fsu.edu/chemlab/bch4053l/resources.html
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https://onlinecourses.nptel.ac.in/noc21_bt19/preview
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https://vlab.amrita.edu/?sub=3&brch=63
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Minor Biochemistry Practical

Course Code	**US05MIBIC04**	**Title of the Course**	**Biochemistry Practical**
Total Credits of the Course	**02**	**Hours per Week**	**04**

Course Objectives:	1. To learn how to extract and estimate proteins. 2. To understand the quantitative estimation of various parameters such as TG, Urea, creatinine and cholesterol. 3. To understand the mechanism of adulteration.

Sr No	**Name of the Practical**
1	Estimation of Creatinine by Jaffe method
2.	Extraction and estimation of protein from green gram by Lowry method
3.	Adulteration of milk
4.	Estimation of TG
5.	Estimation of Urea by DAMO Method
6.	Estimation of Cholesterol
7.	Checking of adulteration in food.

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate

	Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Course Outcomes: On the successful completion of the course, the students will be able to understand
By learning this course students will acquire knowledge of qualitative determination of proteins and various parameters.
Students will gain a good understanding of extraction method used to extract proteins.
Students will develop the fundamentals of adulteration.

Suggested References:	
Sr. No.	**References**
1.	Standard Methods of Biochemical Analysis S.K. Thimmaiah Publishers: Kalyani
2.	An Introduction to Practical Biochemistry by David T. Plummer
3.	Textbook of Medical Laboratory Technology by Praful B. Godkar; Darshan P. Godkar

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https://biotech01.vlabs.ac.in/
https://www.nature.com/subjects/biochemistry
https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/
https://www.chem.fsu.edu/chemlab/bch4053l/resources.html

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B.Sc. Biochemistry Sem. 5

Course Code	**US05SEBIC01**	**Title of the Course**	**Tools and Techniques in Biochemistry-V**
Total Credits of The Course	**02**	**Hours per Week**	**02**

Course Objectives:	1) Students' will gain a good understanding of common laboratory instruments available in a biochemistry laboratory.
	2) By learning this course students will acquire knowledge of Electrophoresis, Chromatography and Spectrophotometer

Course Content

Unit	**Description**	**Weightage* (%)**
1.	**Electrophoresis and Chromatography** General Principle, method and applications for following methods a) Cellulose Acetate electrophoresis b) Gel electrophoresis. c) Thin layer electrophoresis d) Immuno electrophoresis **Chromatography** Classification on the bases of phases. Partition chromatography – types of` a) Adsorption chromatography b) Ion Exchange chromatography c) Molecular sieve chromatography d) Gas Liquid chromatography e) High Performance Liquid Chromatography.	**50%**
2.	**Spectrophotometer** 1. Types of Spectroscopy 2. Definition for Transmittance ,Absorbance, Optical density, ƛmax 3. Principle, flow diagram, working& applications of A. IR Spectroscopy B. Visible Spectroscopy C. NMR Spectroscopy	**50%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written/Practical Examination(AsperCBCSR.6.8.3)	25%
2.	InternalContinuousAssessmentintheformofPractical,Viva-voce,Quizzes,Seminars,Assignments,Attendance(AsperCBCS R.6.8.3)	25%
3.	University Examination	50%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
	By learning is course students will acquire knowledge of Electrophoresis, Chromatography and Spectrophotometer
	Students will gain a good understanding of common laboratory instruments available in a biochemistry laboratory.

Suggested References:	
Sr. No.	**References**
1.	Principles and techniques of biochemistry & molecular biology. Wilson and Walker .Andreas Hofmann and Samuelclokie
2.	Principles&TechniquesofPracticalBiochemistry–Wilson,Walker-Cambridge Univ. Press.
3.	Biophysical chemistry- Principles and techniques- Upadhyay, Upadyay and Nath Himalaya Publication house Mumbai.

On-linere sources to be used if available as reference material
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https://vlab.amrita.edu/?sub=3&brch=64
https://biotech01.vlabs.ac.in/
https://www.nature.com/subjects/biochemistry
https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/
https://www.chem.fsu.edu/chemlab/bch4053l/resources.html

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Course Code	**US05SEBIC01**	**Title of the Course**	**Biochemistry Practical**
Total Credits of the Course	**02**	**Hours per Week**	**04**

Course Objectives:	Student should be able to: 1. To develop understanding of DNA isolation from different sources 2. To learn the chromatographic technique for isolation of various compounds.

Sr No	**Name of the Practical**
1	Separation of amino acids by TLC
2.	Separation of plant pigments by Chromatography
3.	Isolation of lipids from egg yolk and separation by TLC
4.	Isolation of DNA from bacteria
5.	Agarose gel electrophoresis for DNA
6.	Isolation of Plasmid DNA
7.	Demonstration of Southern Blotting

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs

	Concept Mapping
Course Outcomes: On the successful completion of the course, the students will be able to understand	
To develop understanding of DNA isolation from different sources	
To learn the chromatographic technique for isolation of various compounds	

Suggested References:	
Sr. No.	**References**
1.	Standard Methods of Biochemical Analysis S.K. Thimmaiah Publishers: Kalyani
2.	An Introduction to Practical Biochemistry by David T. Plummer
3.	Textbook of Medical Laboratory Technology by Praful B. Godkar; Darshan P. Godkar

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https://www.nature.com/subjects/biochemistry
https://sbcihq.in/
https://iubmb.org/resources/biochemistry-education-movies/

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