

SARDAR PATEL UNIVERSITY  
B.Sc. (Biochemistry) Sem. 1

<b>Course Code</b>	<b>US01MABIC01</b>	<b>Title of the Course</b>	<b>Introduction to Biochemistry</b>
<b>Total Credits of the Course</b>	<b>04</b>	<b>Hours per Week</b>	<b>04</b>

<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To develop basic understanding of various subjects that are related with biochemistry and also understanding of significance. To get basic knowledge of structural organization and all systems of human body.</li> <li>2. To learn fundamentals of various biomolecules specially carbohydrates and their chemical reactions.</li> <li>3. To get aware about various types of cells, its structure and functions.</li> <li>4. To get familiar with basic blood cells of human body and their significance.</li> </ol>
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<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	<p><b>UNDERSTANDINGS OF BIOCHEMISTRY</b></p> <p>Definition of Biochemistry Importance (Scopes) of Biochemistry, Enlist subjects of Biochemistry</p> <p>Introduction to Physiology</p> <ul style="list-style-type: none"> <li>• Definition of anatomy &amp; physiology</li> <li>• Level of structural organization</li> <li>• Types of four basic tissues: Epithelial, connective, nervous and muscle</li> <li>• All systems of human body: Components &amp; their general functions</li> <li>• Homeostasis: Homeostasis and common feedback system</li> </ul>	<b>25%</b>
<b>2.</b>	<p><b>Blood</b></p> <p>Basics information of Blood, Plasma, Serum Blood Cells and Functions</p> <ul style="list-style-type: none"> <li>• RBCs</li> <li>• WBCs</li> <li>• Platelets</li> </ul> <p>Functions of Blood Types of Blood group- ABO system Anaemia: Blood loss Anaemia, Pernicious Anaemia and Aplastic Anaemia</p>	<b>25%</b>



<p><b>3.</b></p>	<p><b>Cell and Cell organelles</b></p> <p>Introduction to cells  Definition of cell, unicellular organism, multicellular organism, prokaryotic cells &amp; Eukaryotic cells  Difference between Plant Cell and Animal Cell.  Structure and Functions of following Organelles:-  a) Plasma membrane  b) Cytoplasm  c) Mitochondria  c) Ribosome  e) ER (Endoplasmic Reticulum)</p>	<p><b>25%</b></p>
<p><b>4.</b></p>	<p><b>CARBOHYDRATES</b></p> <p>Introduction and significance of Carbohydrates  Classification of carbohydrates with suitable examples</p> <ul style="list-style-type: none"> <li>• Monosaccharides- (Triose, Tetrose, Pentose &amp; Hexose sugars),  Aldose &amp; Ketose sugars,  Epimers, Anomers and Optical isomers</li> <li>• Disaccharides- Maltose, Lactose, Sucrose (Structure and Function)</li> </ul> <p>Polysaccharides- Homopolysaccharides and Heteropolysaccharides</p>	<p><b>25%</b></p>



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
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<b>Evaluation Pattern</b>		
<b>Sr. No.</b>	<b>Details of the Evaluation</b>	<b>Weightage</b>
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 biochemistry subject and career prospects in the field of biochemistry
	Students will expand their knowledge regarding structural organization of body and homeostasis.
	Students will gain a good understanding of types of carbohydrates, their chemical basis and significance.
	Students will get information about cell and cell organelles.
	Students will achieve knowledge about composition of blood and functions.

### Suggested References:

Sr. No.	References
1.	Lehninger Principles of Biochemistry by David L. Nelson, Michael Cox Publisher: WH Freeman
2.	Biochemistry by Donald Voet, Judith G. Voet Publisher: Wiley
3.	Biochemistry – By U Satyanarayana and U Chakrapani Publishers: Elsevier
4.	Principles of Anatomy and Physiology- By Gerard J. Tortora, Bryan H. Derrickson Publishers: John Wiley & Sons, Inc.
5.	Human Physiology By Dr C C Chatterjee Publishers: Medical Allied Agency
6.	Molecular Biology of the Cell by Bruce Alberts et al Publisher: Garland Science
7.	Cell and Molecular Biology: Concepts and Experiments By Gerald Karp and James G. Patton Publisher: John Wiley & Sons Inc
8.	The Cell by Cooper Publisher: Sinauer Associates



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/noc22_cy06/preview)

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**SARDAR PATEL UNIVERSITY**  
**With Effect from: June – 2023**  
**Bachelor of Science**  
**B.Sc. Biochemistry Semester - I**  
**Major Biochemistry Practical**

<b>Course Code</b>	<b>US01MABIC02</b>	<b>Title of the Course</b>	<b>Biochemistry Practical</b>
<b>Total Credits of the Course</b>	<b>04</b>	<b>Hours per Week</b>	<b>08</b>

<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To develop understanding good laboratory practices in a biochemistry laboratory</li> <li>2. To learn how to work in a laboratory responsibly and safely.</li> <li>3. To understand the use of equipment for doing experiments and handling glassware.</li> <li>4. To study how to make standards and standard biochemical reagents.</li> <li>5. To gain the knowledge of identification of various biomolecules like carbohydrates.</li> <li>6. To find out <math>I_{max}</math> of particular substance and verify Beer's Law.</li> <li>7. To learn handling of sophisticated instruments like Microscope.</li> <li>8. To study vital staining of Plant cell and Animal cell.</li> <li>9. To have understanding of blood group system, cross matching and haemoglobin estimation.</li> <li>10. To gain knowledge regarding bleeding and clotting time.</li> </ol>
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Sr No	Name of the Practical
<b>SECTION-I</b>	
1.	Laboratory safety rules and regulations
2.	Handling of chemicals
3.	Introduction of Laboratory Glasswares
4.	Introduction of laboratory instruments
5.	Handling of colorimeter
6.	Determination of $I_{max}$ (Absorption maxima)
7.	Verification of Beer's law using $KMnO_4$
8.	Identification of Biomolecules
9.	Qualitative analysis of Carbohydrate (Glucose)



<b>10.</b>	Qualitative analysis of Carbohydrate (Fructose)
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<b>SECTION-II</b>	
<b>1.</b>	Study of compound microscope
<b>2.</b>	Vital staining of plant cell
<b>3.</b>	Vital staining of animal cell
<b>4.</b>	Preparation of biochemical reagents <ul style="list-style-type: none"> <li>• Stock solution</li> <li>• Standard solution</li> </ul>
<b>5.</b>	Blood Grouping and Rh system
<b>6.</b>	Cross Matching
<b>7.</b>	Estimation of Hemoglobin by Sahli's Method
<b>8.</b>	ESR method
<b>9.</b>	Determination of Bleeding time and Clotting time

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
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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 lab safety rules and regulations

Students will gain a good understanding of preparation of various reagents and lab instruments.

Students will learn about qualitative analysis of carbohydrates and determination of blood groups.

Students will understand the structure of plant and animal cell.

Students will be able to determine the bleeding and clotting time.`





<b>Suggested References:</b>	
<b>Sr. No.</b>	<b>References</b>
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

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**SARDAR PATEL UNIVERSITY**  
**With Effect from: June – 2023**  
**Bachelor of Science**  
**B.Sc. Biochemistry Semester - I**

<b>Course Code</b>	<b>US01MIBIC01</b>	<b>Title of the Course</b>	<b>Fundamentals of Biochemistry-1</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>02</b>

<b>Course Objectives:</b>	<p>1. To develop basic understanding of various subjects that are related with biochemistry and also understanding of significance. To get basic knowledge of structural organization and all systems of human body.</p> <p>2. To learn fundamentals of various blood cells and their functions.</p>
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<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	<p><b>UNDERSTANDINGS OF BIOCHEMISTRY</b></p> <p>Definition of Biochemistry            Importance (Scopes) of Biochemistry,            Enlist subjects of Biochemistry</p> <p>Introduction to Physiology</p> <ul style="list-style-type: none"> <li>• Definition of anatomy &amp; physiology</li> <li>• Level of structural organization</li> <li>• Types of four basic tissues: Epithelial, connective, nervous and muscle</li> <li>• All systems of human body: Components &amp; their general functions</li> <li>• Homeostasis: Homeostasis and common feedback system</li> </ul>	<b>50%</b>
<b>2.</b>	<p><b>Blood</b></p> <p>Basics information of Blood, Plasma, Serum            Blood Cells and Functions</p> <ul style="list-style-type: none"> <li>• RBCs</li> <li>• WBCs</li> <li>• Platelets</li> </ul> <p>Functions of Blood</p>	<b>50%</b>



	Types of Blood group- ABO system Anaemia: Blood loss Anaemia, Pernicious Anaemia and Aplastic Anaemia	
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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
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<b>Evaluation Pattern</b>		
<b>Sr. No.</b>	<b>Details of the Evaluation</b>	<b>Weightage</b>
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 biochemistry subject and career prospects in the field of biochemistry
	Students will expand their knowledge regarding structural organization of body and homeostasis.
	Students will achieve knowledge about composition of blood and functions.

<b>Suggested References:</b>	
<b>Sr. No.</b>	<b>References</b>
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



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**SARDAR PATEL UNIVERSITY**  
**U. G. Syllabus under National Educational Policy**  
**With Effect from: June – 2023**  
**Bachelor of Science**  
**B.Sc. Biochemistry Semester I**  
**Minor (Elective) subject**

**Biochemistry Practical**

<b>Course Code</b>	<b>US01MIBIC02</b>	<b>Title of the Course</b>	<b>Biochemistry Practical</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>04</b>

<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To develop understanding good laboratory practices in a biochemistry laboratory</li> <li>2. To learn how to work in a laboratory responsibly and safely.</li> <li>3. To understand the use of equipment for doing experiments and handling glassware.</li> <li>4. To study how to make standards and standard biochemical reagents.</li> <li>5. To have understanding of blood group system, cross matching and haemoglobin estimation.</li> <li>10. To gain knowledge regarding bleeding and clotting time.</li> </ol>
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<b>Sr No</b>	<b>Name of the Practical</b>
1.	Laboratory safety rules and regulations
2.	Handling of chemicals
3.	Introduction of Laboratory Glasswares
4.	Introduction of laboratory instruments
5.	Handling of colorimeter
6.	Blood Grouping and Rh system
7.	Cross Matching



8.	Estimation of Hemoglobin by Sahli's Method
9.	ESR method
10.	Determination of Bleeding time and Clotting time

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
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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 lab safety rules and regulations
Students will gain a good understanding of preparation of various reagents and lab instruments.
Students will learn about qualitative analysis of carbohydrates and determination of blood groups.





Students will understand the structure of plant and animal cell.

Students will able to determine the bleeding and clotting time.



### 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

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<https://.nature.com/subjects/biochemistry>

<https://sbcihq.in/>

<https://iubmb.org/resources/biochemistry-education-movies/>

<https://.chem.fsu.edu/chemlab/bch40531/resources.html>

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SARDAR PATEL UNIVERSITY  
B.Sc. (Biochemistry) Sem. 1

<b>Course Code</b>	<b>US01IDBIC01</b>	<b>Title of the Course</b>	<b>Basic concepts of Biochemistry-I</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>02</b>

<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To develop basic understanding of various subjects that are related with biochemistry and also understanding of significance. To get basic knowledge of structural organization and all systems of human body.</li> <li>2. To learn fundamentals of various biomolecules specially carbohydrates and their chemical reactions.</li> </ol>
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<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	<p><b>BASICS OF BIOCHEMISTRY</b></p> <p>Definition of Biochemistry Importance (Scopes) of Biochemistry, Enlist subjects of Biochemistry</p> <p>Introduction to Physiology</p> <ul style="list-style-type: none"> <li>• Definition of anatomy &amp; physiology</li> <li>• Level of structural organization</li> <li>• Types of four basic tissues: Epithelial, connective, nervous and muscle</li> <li>• All systems of human body: Components &amp; their general functions</li> <li>• Homeostasis: Homeostatsis and common feedback system</li> </ul>	<b>50%</b>



2.	<b>UNDERSTANDING OF CARBOHYDRATES</b>  Introduction and significance of Carbohydrates Classification of carbohydrates with suitable examples <ul style="list-style-type: none"><li>• Monosaccharides- (Triose, Tetrose, Pentose &amp; Hexose sugars), Aldose &amp; Ketose sugars, Epimers, Anomers and Optical isomers</li><li>• Disaccharides- Maltose, Lactose, Sucrose (Structure and Function)</li><li>• Polysaccharides- Homopolysaccharides and Heteropolysaccharides</li></ul>	<b>50%</b>
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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
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### 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 biochemistry subject and career prospects in the field of biochemistry

Students will gain a good understanding of types of carbohydrates, their chemical basis and significance.

### Suggested References:

Sr. No.	References
1.	Lehninger Principles of Biochemistry by David L. Nelson, Michael Cox Publisher: WH Freeman
2.	Biochemistry by Donald Voet, Judith G. Voet Publisher: Wiley
3.	Biochemistry – By U Satyanarayana and U Chakrapani Publishers: Elsevier
4.	Principles of Anatomy and Physiology- By Gerard J. Tortora, Bryan H. Derrickson Publishers: John Wiley & Sons, Inc.
5.	Human Physiology By Dr C C Chatterjee Publishers: Medical Allied Agency



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SARDAR PATEL UNIVERSITY  
B.Sc. (Biochemistry) Sem. 1

<b>Course Code</b>	<b>US01IDBIC02</b>	<b>Title of the Course</b>	<b>Biochemistry Practical</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>04</b>

<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To develop understanding good laboratory practices in a biochemistry laboratory</li> <li>2. To learn how to work in a laboratory responsibly and safely.</li> <li>3. To understand the use of equipment for doing experiments and handling glassware.</li> <li>4. To study how to make standards and standard biochemical reagents.</li> <li>5. To gain the knowledge of identification of various biomolecules like carbohydrates.</li> <li>6. To find out <math>\lambda_{max}</math> of particular substance and verify Beer's Law.</li> </ol>
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<b>Sr No</b>	<b>Name of the Practical</b>
1.	Laboratory safety rules and regulations
2.	Handling of chemicals
3.	Introduction of Laboratory Glasswares
4.	Introduction of laboratory instruments
5.	Handling of colorimeter
6.	Determination of $\lambda_{max}$ (Absorption maxima)
7.	Verification of Beer's law using $KMnO_4$
8.	Identification of Biomolecules
9.	Qualitative analysis of Carbohydrate (Glucose)
10.	Qualitative analysis of Carbohydrate (Fructose)





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
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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 lab safety rules and regulations

Students will gain a good understanding of preparation of various reagents and lab instruments.

Students will learn about qualitative analysis of carbohydrates.



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<b>Course Code</b>	<b>US01SEBIC01</b>	<b>Title of the Course</b>	<b>Tools and Techniques in Biochemistry-I</b>
<b>Total Credits of the Course</b>	<b>02</b>	<b>Hours per Week</b>	<b>02</b>

<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To get the knowledge of common reagents used in the biochemical laboratory.</li> <li>2. To have awareness about sophisticated instruments and techniques available for experiments.</li> </ol>
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<b>Course Content</b>		
<b>Unit</b>	<b>Description</b>	<b>Weightage* (%)</b>
<b>1.</b>	<p><b>Preparation of reagent</b></p> <p>Introduction and handling of reagents  Types of Glasswares  Use of glass pipettes and micropipettes  Laboratory Mathematics:  Gram, Liter, Time  Preparation of reagents</p> <ul style="list-style-type: none"> <li>• Stock Solution</li> <li>• Working standard solution</li> <li>• Percentage solution (W/V, V/V)</li> <li>• Molar Solution</li> <li>• Normal Solution</li> </ul>	<b>50%</b>
<b>2.</b>	<p><b>Laboratory Instruments</b></p> <p>Principle and applications of common laboratory instruments</p> <ul style="list-style-type: none"> <li>• Weighing Balance</li> <li>• Magnetic Stirrer</li> <li>• Incubator</li> <li>• Colorimeter</li> <li>• Centrifuge</li> <li>• Hot Air Oven</li> </ul>	<b>50%</b>



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
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### 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 glasswares, biochemical reagents and their preparation.
	Students will gain a good understanding of common laboratory instruments available in a biochemistry laboratory.

### 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



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/noc22_cy06/preview)

[https://onlinecourses.nptel.ac.in/noc21\\_bt19/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://.nature.com/subjects/biochemistry>

<https://sbcihq.in/>

<https://iubmb.org/resources/biochemistry-education-movies/>

<https://.chem.fsu.edu/chemlab/bch40531/resources.html>

