

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**Department of Biochemistry**  
**Course Curriculum**

<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Science</b> <i>(Honors/Honors with Research)</i>		<b>Semester - VII</b>	<b>Session: 2024-2025</b>
1	<b>Course Code</b>	BCSE-06 T	
2	<b>Course Title</b>	Cell Biology	
3	<b>Course Type</b>	Discipline Specific Elective (Theory)	
4	<b>Pre-requisite (if, any)</b>	As per Program	
5	<b>Course Learning Outcomes (CLO)</b>	<p><i>On successful completion of the course, the student shall be able to:</i></p> <ul style="list-style-type: none"> <li>➤ Describe the chemical and molecular foundations of cell and the role in biological systems.</li> <li>➤ Define the structure, properties and roles of nucleus.</li> <li>➤ Explain the protein sorting and its transport in biological system.</li> <li>➤ Discuss cell signaling mechanism through various pathways.</li> <li>➤ Classify the cell cycle, its regulation and development.</li> </ul>	
6	<b>Credit Value</b>	<b>3 Credits</b>	<b>Credit = 15 Hours - learning &amp; Observation</b>
7	<b>Total Marks</b>	<b>Max. Marks: 100</b>	<b>Min Passing Marks: 40</b>
<b>PART -B: Content of the Course</b>			
<b>Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
<b>Unit</b>	<b>Topics (Course contents)</b>		<b>No. of Period</b>
<b>I</b>	<b>Molecular organization of membranes</b> - asymmetrical organization of lipids, proteins and carbohydrates. Osmosis, ion channels, membrane pumps and electrical properties of membranes. Active transport by ATP-powered pumps: types, properties and mechanisms.		<b>12</b>
<b>II</b>	<b>Cell Trafficking-</b> Transport of proteins into mitochondria, chloroplast and endoplasmic reticulum. Transport of proteins into and out of nucleus. Transport by vesicle formation: exocytosis, endocytosis and its molecular mechanism.		<b>11</b>
<b>III</b>	<b>Cell signalling:</b> Signalling via G-protein linked and enzyme linked cell surface receptors, MAP kinase pathways. Eukaryotic cell division cycle: different phases and molecular events, regulation and control of cell cycle. Apoptosis. Oncogenes and tumor suppressor genes: viral and cellular Oncogenes, retinoblastoma, E2F and p53 proteins.		<b>11</b>
<b>IV</b>	<b>Organization of chromosomes:</b> Structure of chromosomes, centromere and telomere. States of chromosomes during cell cycle. Mitotic chromosome. Organization of genes in chromosomes. Banding pattern of chromosomes. Lampbrush and Polytene chromosomes. Chromatin, nucleosomes, DNA packaging, heterochromatin and euchromatin.		<b>11</b>
<b>Keywords</b>	Membrane transport, cell signals, chromosomes		

Name and Signature of Convener & Members of CBoS:

<b>PART-C: Learning Resources</b>		
<b>Text Books, Reference Books and Others</b>		
<i>Text Books Recommended –</i>		
<ul style="list-style-type: none"> <li>➤ Lodish, A. Berk, S L Zipursky, P. Matsudaira Molecular Cell Biology</li> <li>➤ Alberts, D. Bray, K. Hopkin, A. Johnson Essential of Cell Biology</li> <li>➤ Lodish, A. Berk, C. A. Kaiser &amp; M. Krieger Molecular cell Biology</li> <li>➤ Gerald Karp Cell and Molecular Biology Concepts and experiments</li> </ul>		
<b>PART -D: Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks: 100 Marks</b>		
<b>Continuous Internal Assessment (CIA): 30 Marks</b>		
<b>End Semester Exam (ESE): 70 Marks</b>		
<b>Continuous Internal Assessment (CIA): (By Course Teacher)</b>	Internal Test / Quiz-(2): <b>20 +20</b> Assignment / Seminar - <b>10</b> Total Marks - <b>30</b>	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against <b>30</b> Marks
<b>End Semester Exam (ESE):</b>	<b>Two section – A &amp; B</b> Section A: <b>Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks</b> Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:




## FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)


### Department of Biochemistry

#### Course Curriculum

<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Science</b> <i>(Honors/Research)</i>		<b>Semester - VII</b>	<b>Session: 2024-2025</b>
1	Course Code	BCSE-06 P	
2	Course Title	Cell Biology	
3	Course Type	Discipline Specific Elective (Practical)	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p><i>On successful completion of the course, the student shall be able to:</i></p> <ul style="list-style-type: none"> <li>➤ Examine various cell organelles through micrograph techniques.</li> <li>➤ Analyze various nucleic acids through staining techniques.</li> <li>➤ Examine ployploidy through onion root with various treatments.</li> <li>➤ Analyze various stages of mitosis.</li> </ul>	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
<b>PART -B: Content of the Course</b>			
<b>Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)</b>			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> <li>➤ Study of chromosome behavior during Mitosis and meiosis (Onion / Garlic root tips, Onion buds, human lymphocytes, rat or bird testis /grass hopper testis or any other materials).</li> <li>➤ Calculation of mitotic index in growing Onion / Garlic root tips</li> <li>➤ Squash preparation: Polytene chromosome (in chironomus / Drosophila or other insect salivary gland) and Barr body (in buccal epithelial cells).</li> <li>➤ Demonstration of secretory granules in the salivary gland cells of insect.</li> <li>➤ Demonstration of mitochondria by vital staining.</li> <li>➤ Study of permanent slides.</li> <li>➤ Estimation of DNA</li> <li>➤ Estimation of RNA</li> <li>➤ Study of the effect of chemical agents on chromosomes plant cells.</li> <li>➤ Preparation of Karyotype of metaphase plate.</li> <li>➤ Preparation of Meiotic plate and determination of phases.</li> </ul>		<b>30</b>
<b>Keywords</b>	Chromosome, Cell division, DNA, RNA Estimation		

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<b>PART-C: Learning Resources</b>		
<b>Text Books, Reference Books and Others</b>		
<i>Text Books Recommended –</i>		
<ul style="list-style-type: none"> <li>➤ Text Book of Medical Physiology–Guyton–Prism Books Pvt.Ltd.–Bangalore.</li> <li>➤ Harper’s Biochemistry–Murray, Granner,Mayes,andRodwell– Prentice Hall International Inc.</li> <li>➤ Text book of medical physiology:A.C.Gyton,andJ.E Hall Saunders Elsevier.</li> </ul>		
<b>PART -D: Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks:</b>		<b>50 Marks</b>
<b>Continuous Internal Assessment (CIA):</b>		<b>15 Marks</b>
<b>End Semester Exam (ESE):</b>		<b>35 Marks</b>
<b>Continuous Internal Assessment (CIA): (By Course Teacher)</b>	Internal Test / Quiz-(2): <b>10 &amp; 10</b> Assignment/Seminar +Attendance - <b>05</b> Total Marks - <b>15</b>	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against <b>15 Marks</b>
<b>End Semester Exam (ESE):</b>	<b>Laboratory / Field Skill Performance: On spot Assessment</b> A. Performed the Task based on lab. work - <b>20 Marks</b> B. Spotting based on tools & technology (written) – <b>10 Marks</b> C. Viva-voce (based on principle/technology) - <b>05 Marks</b>	<b>Managed by Course teacher as per lab. status</b>

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