

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF ZOOLOGY**  
**COURSE CURRICULUM**

<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Life Science</b> <i>(Honors / Honors With Research)</i>		<b>Semester - VIII</b>	<b>Session: 2024-2025</b>
1	Course Code	ZOSC-08T	
2	Course Title	Biotechniques	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if, any)	<i>As per program</i>	
5	Course Learning Outcomes (CLO)	<p style="text-align: center;"><i>At the end of course, students will be able to -</i></p> <ul style="list-style-type: none"> <li>➤ Have comprehensive understanding of various tools and techniques commonly employed in scientific research across disciplines</li> <li>➤ Learn utilizing essential laboratory instruments such as microscopes, pH meter, spectrophotometers, chromatography systems, and centrifuges.</li> <li>➤ Understand cell culture techniques</li> <li>➤ Develop skills in experimental design, data acquisition, and analysis using modern software tools.</li> <li>➤ Develop critical thinking on the application of various modern instruments and correlate the knowledge for better development of society.</li> </ul>	
6	Credit Value	<b>3 Credits</b>	<i>Credit = 15 Hours - learning &amp; Observation</i>
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
<b>PART -B: Content of the Course</b>			
<b>Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
Unit	Topics (Course contents)		No. of Period
<b>I</b>	<b>Microscopy and Microtomy: Types of Microscope:</b> Basic Principle, configuration and working of Light Microscope (Bright and Dark Field), Magnification & Resolution, and Numerical Aperture. Phase Contrast Microscope, Fluorescence Microscope, Confocal Microscope. Electron Microscope (SEM and TEM). <b>Microtomy:</b> Permanent slide preparation through microtome: Tissue - preparation fixation, dehydration, <b>block</b> - preparation, trimming, <b>cutting sections (sectioning /Ribbon)</b> - handling, affixing on the side, labeling and storage, <b>staining</b> the microtomy slides.		<b>11</b>
<b>II</b>	<b>Tools and techniques in Physiology:</b> Principle and applications of pH meter, Centrifugation, Colorimetry and Spectrophotometry- UV, visible spectrophotometer, Infra-red spectrophotometer, NMR and ESR.		<b>11</b>
<b>III</b>	<b>Chromatography and Eletrophoresis: Chromatography:</b> Principle and Applications of Paper chromatography, Thin layer chromatography and Gel-filtration chromatography. <b>Electrophoresis:</b> Principle and Applications of Agarose gel electrophoresis, Polyacrylamide Gel electrophoresis, PAGE, 2D PAGE.		<b>12</b>
<b>IV</b>	<b>Cell culture and Lab Bioethics:</b> Cell culture and its basic requirements. <b>Culture media:</b> Nutrient and Non-nutrient media, Types of animal cell culture: Pure Culture- Pour Plate Method, Streak Plate Method and Spread Plate Method. <b>Media preparation</b> of Animal Cell culture, viability testing, cell harvesting and storage method with special reference to Lymphocytes and stem cell culture. <i>In Vitro</i> culture of <i>Entamoeba histolytica</i> , <i>Coenorhabditis elegans</i> . <b>Sterilization technique</b> (Physical Method: Autoclave sterilization, Hot air Sterlization, U V sterilization, filtration and chemical Method: alcohol, Formalin and Chromic acid), sterilization of glass wares, Media and laminar flow, Flow cytometry. <b>Lab Bioethics:</b> Lab safety, disposal of bio-waste.		<b>11</b>
Keywords	Cell culture, Sterilization, Cryopreservation, Media, viability testing, cell harvesting, Lymphocytes, stem cell.		
Signature of Convener & Members (CBoS) :			

## **PART-C: Learning Resources**

### **Text Books, Reference Books and Others**

#### **Text Books Recommended –**

- Robert Braun, Introduction to instrumental analysis, McGraw Hill Publication
- Clark and Swizer, Experimental Biochemistry, Freeman, 2000
- Boyer, R. (2000) Modern Experimental Biochemistry (3rd edition) Benjamin-Cummings.
- Recommended readings.
- Pearse, A.G.E. (1980-1993) Histochemistry - Theoretical and applied, Volume I-III, Churchill-Livingstones.
- Plummer, D. (2017) An Introduction to Practical Biochemistry (3 rd edition) McGraw Hill.
- Wilson, K. and Walker, J. (2010) Experimental Biochemistry, Cambridge. Practical
- Swarup N, Arora S and Pathak SC, Laboratory Techniques in Modern Biology. Kalyani Publishers
- Sharma B.K., Principles of Instrumentation Goel Publishing House
- Upadhayay Upadhayay & Nath, Principles of Instrumentation, Himalaya Publishing House
- Chatwal G R & Anand Sharma , Principles of Instrumental method of Chemical Analysis, Himalaya Publishing House
- Arumugam N, Kumaresan V, Biotechniques Saras Publication
- Ghatak K L, Techniques and Methods in Biology PHI Learning

#### **Online Resources–**

- <https://www.youtube.com/watch?v=t9Zh3PJ4F4>

#### **Online Resources–**

- e-Resources / e-books and e-learning portals

## **PART -D: Assessment and Evaluation**

### **Suggested Continuous Evaluation Methods:**

**Maximum Marks: 100 Marks**

**Continuous Internal Assessment (CIA): 30 Marks**

**End Semester Exam (ESE): 70 Marks**

<b>Continuous Internal Assessment (CIA): (By Course Teacher)</b>	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
<b>End Semester Exam (ESE):</b>	<b>Two section – A &amp; B</b> Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

*Name and Signature of Convener & Members of CBoS:*

*SRahakar* *de* *and* *Prof* *SRUK*  
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<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Life Science</b> <i>(Honors/ Honors with Research)</i>		<b>Semester - VIII</b>	<b>Session: 2024-2025</b>
1	Course Code	ZOSC-08P	
2	Course Title	Biotechniques	
3	Course Type	Discipline Specific Lab Course	
4	Pre-requisite (if, any)	<i>As Per Program</i>	
5	Course Learning Outcomes (CLO)	<p>After successfully completing this course, the students will be able to:</p> <ul style="list-style-type: none"> <li>➤ Understand the purpose of the technique, its proper use and possible modifications/improvement.</li> <li>➤ Developed skills in handling instruments.</li> <li>➤ Developed skills in the performance of experiments through scientific planning.</li> <li>➤ Develop critical thinking on reviewing, discussing and reporting the results.</li> <li>➤ Applied and Correlate the knowledge for better development of society.</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>			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<p style="text-align: center;"><b>List of labs to be conducted</b></p> <ul style="list-style-type: none"> <li>• Study and handling of Compound Microscope, pH meter, Colorimeter, Centrifuge, Spectrophotometer, Chromatography Chamber, Electrophoresis Unit, Microtome.</li> <li>• Sterilization of Lab equipments.</li> <li>• Determination of pH of different soil samples &amp; water samples.</li> <li>• Determination of maximum absorption.</li> <li>• Separation of Amino acids, plant pigment and sugar by paper and thin layer chromatography</li> <li>• Separation of DNA and RNA through Paper &amp; Gel Electrophoresis</li> <li>• Separation of particles by Centrifuge.</li> <li>• Preparation of Permanent slides through Microtome.</li> <li>• Preparation of Temporary and Permanente slides of some microscopic organisms.</li> <li>• Pure culture of cell.</li> <li>• Cell fractionation</li> <li>• Contour drawing through Camera Lusida</li> <li>• Preparation of Practical Record.</li> <li>• Group discussion/Viva or Seminar presentation on above mentioned and related topics.</li> </ul>		<b>30</b>
Keywords	Centrifuge, Spectrophotometer, Chromatography Chamber, Electrophoresis Unit, Microtome, Cell fractionation, Camera Lusida.		
<b>Signature of Convener &amp; Members (CBoS) :</b>			

## **PART-C: Learning Resources**

### **Text Books, Reference Books and Others**

#### **Text Books Recommended –**

- Sharma B.K., Principles of Instrumentation-
- Upadhyay Upadhyay & Nath, Principles of Instrumentation, Himalaya Publishing House
- Chatwal G R & Anand Sharma , Principles of Instrumental method of Chemical Analysis, Himalaya Publishing House

#### **Reference Books Recommended –**

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- Wilson, K. and Walker, J. (2010) Experimental Biochemistry, Cambridge. Practical
- Swarup N, Arora S and Pathak SC, Laboratory Techniques in Modern Biology. Kalyani Publishers
- Robert Braun, Introduction to Instrumental analysis

#### **Online Resources–**

- [http://ndl.iitkgp.ac.in/he document/swayam prabha/gb9ai2cttte](http://ndl.iitkgp.ac.in/he_document/swayam_prabha/gb9ai2cttte)

## **PART -D: Assessment and Evaluation**

### **Suggested Continuous Evaluation Methods:**

**Maximum Marks: 50 Marks**

**Continuous Internal Assessment (CIA): 15 Marks**

**End Semester Exam (ESE): 35 Marks**

<b>Continuous Internal Assessment (CIA): (By Course Teacher)</b>	Internal Test / Quiz-(2): <b>10 &amp; 10</b>	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against <b>15 Marks</b>	
	Assignment/Seminar +Attendance - <b>05</b> Total Marks - <b>15</b>		
<b>End Semester Exam (ESE):</b>	<b>Laboratory / Field Skill Performance: On spot Assessment</b>		<b>Managed by Course teacher as per lab. status</b>
	<b>A. Performed the Task based on lab. work - 20 Marks</b>		
	<b>B. Spotting based on tools &amp; technology (written) – 10 Marks</b>		
	<b>C. Viva-voce (based on principle/technology) - 05 Marks</b>		

**Name and Signature of Convener & Members of CBoS:**

*G. Babbar*

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