

Semester	PG SEMESTER 1
Course	<b>Major</b>
Paper Code	M2C4MB26014C
Paper Title	<b>Introductory Physiology For Microbes And Plants</b>
No. of Credits	<b>4</b>
Theory / Practical / Composite	<b>Composite</b>
Minimum No. of preparatory hours per week a student has to devote	4 hours/week
Number of Modules	No modules
Syllabus	<p><b>Unit 1: Microbial Physiology</b> Cell structure and its physiological significance in microbes. Physiological Adaptations of Microorganisms: Stress responses in microbes, Sporulation in bacteria, Biofilm formation, Microbial survival strategies in extreme environments.</p> <p><b>Unit 2: Plant Physiology</b> Water relations, mineral nutrition, nitrogen utilization &amp; metabolism, phosphorus and sulphur metabolism, stomatal physiology, source and sink relationship, physiology and biochemistry of seed dormancy and germination, hormonal regulation of growth and development, physiology of flowering, senescence. Stress physiology- causes and the effects of various plant stresses on plants including stress hormones. Brief mechanism of stress signalling in plant: Abiotic (Heat, cold, pH, etc.) &amp; Biotic (Fungi &amp; Bacteria); Control of plant diseases.</p> <p><b>Unit 3: Plant tissue culture</b> Totipotency: Plant growth regulators. Regeneration and micropropagation of plants. Cell suspension culture and its practical application. Plant transformation methods: <i>Agrobacterium</i>-mediated transformation and other methods, Agroinfiltration.</p> <p><b>Practical</b></p> <ol style="list-style-type: none"> <li>1. UV survival curve of <i>E.coli</i>.</li> <li>2. Effects of UV, pH, disinfectants, chemicals and heavy metals on spore germination of <i>Bacillus</i> spp.</li> <li>3. Determination of thermal death time (TDT) of a microbial culture.</li> <li>4. Assay for biofilm formation.</li> <li>5. Demonstration of hill activity, separation of plant pigments by paper chromatography, determination of stomatal frequency and estimation of transpiration</li> </ol>

	<p>rate. Comparative photosynthetic efficiency of different plants.</p> <p>6. Media preparation (White's and MS), sterilization of explants and inoculation, shoot tip culture, suspension culture, <i>Agrobacterium</i>-mediated transformation, production of secondary metabolites in tissue culture.</p>
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Learning Outcomes	<ul style="list-style-type: none"> <li>• To understand stress adaptation and remember the regulation in bacteria against response to environmental stress, development of bacterial biofilms, etc.</li> <li>• To understand, analyze the mechanisms of water/nutrient transport, and their impact on plant health.</li> <li>• To study the role of hormonal regulation in growth, development, flowering and senescence and stress response in plants.</li> <li>• To understand the basic concepts and techniques of plant tissue culture.</li> <li>• To analyze, utilize and develop the plant tissue culture skills in the field of plant biotechnology.</li> </ul>		
Reading/Reference Lists	<ol style="list-style-type: none"> <li>1. Fundamentals of Ecology-Odum.</li> <li>2. Environmental Studies-Mitra and Chakraborty</li> <li>3. Fundamentals of Ecological Modelling-Jorgensen</li> <li>4. Plant Physiology by Ross and Salisbury.</li> <li>5. Plant metabolism by Prof. S. N. Gupta</li> <li>6. Plant tissue culture: Theory and Practice by S.S. Bhojwani and M.K. Razdan</li> <li>7. Brock Biology of Microorganisms – Madigan et al.</li> <li>8. Microbial Physiology – Albert G. Moat, John W. Foster &amp; Michael P. Spector</li> <li>9. Prescott's Microbiology – Willey, Sherwood &amp; Woolverton</li> <li>10. Principles of Microbiology – Atlas &amp; Bartha</li> </ol>		
Evaluation	<table border="1"> <tr> <td>Theory 60 (45+15) CIA-10+3+2</td> <td>Practical 40 CA (38+2)</td> </tr> </table>	Theory 60 (45+15) CIA-10+3+2	Practical 40 CA (38+2)
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Paper Structure for Theory Semester Exam	<p>Full Marks: 45</p> <p>Short questions: 5 (each 1 mark) from 7 (5x1=5)</p> <p>Long questions: 4 (each 10 marks) from 6 (4x10=40)</p>		