

Semester	7
Course	Major
Paper Code	C4MB230742T/P
Paper Title	Introductory Physiology For Microbes And Plants
No. of Credits	4
Theory / Practical / Composite	Composite
Minimum No. of preparatory hours per week a student has to devote	4 hours/week
Number of Modules	No modules
Syllabus	Unit 1: Microbial Physiology 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. Unit 2: Plant Physiology Water relations, mineral nutrition, nitrogen utilization & 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.) & Biotic (Fungi & Bacteria); Control of plant diseases. Unit 3: Plant tissue culture 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. Practical 1. UV survival curve of <i>E.coli</i>. 2. Effects of UV, pH, disinfectants, chemicals and heavy metals on spore germination of <i>Bacillus</i> spp. 3. Determination of thermal death time (TDT) of a microbial culture. 4. Assay for biofilm formation. 5. Demonstration of hill activity, separation of plant pigments by paper chromatography, determination of stomatal frequency and estimation of transpiration

	rate. Comparative photosynthetic efficiency of different plants. 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.
--	--

Learning Outcomes	• To understand stress adaptation and remember the regulation in bacteria against response to environmental stress, development of bacterial biofilms, etc. • To understand, analyze the mechanisms of water/nutrient transport, and their impact on plant health. • To study the role of hormonal regulation in growth, development, flowering and senescence and stress response in plants. • To understand the basic concepts and techniques of plant tissue culture. • To analyze, utilize and develop the plant tissue culture skills in the field of plant biotechnology.	
Reading/Reference Lists	1. Fundamentals of Ecology-Odum. 2. Environmental Studies-Mitra and Chakraborty 3. Fundamentals of Ecological Modelling-Jorgensen 4. Plant Physiology by Ross and Salisbury. 5. Plant metabolism by Prof. S. N. Gupta 6. Plant tissue culture: Theory and Practice by S.S. Bhojwani and M.K. Razdan 7. Brock Biology of Microorganisms – Madigan et al. 8. Microbial Physiology – Albert G. Moat, John W. Foster & Michael P. Spector 9. Prescott's Microbiology – Willey, Sherwood & Woolverton 10. Principles of Microbiology – Atlas & Bartha	
Evaluation	Theory 60 (45+15) CIA-10+3+2	Practical 40 CA (38+2)
Paper Structure for Theory Semester Exam	Full Marks: 45 Short questions: 5 (each 1 mark) from 7 (5x1=5) Long questions: 4 (each 10 marks) from 6 (4x10=40)	