

Part B: Content of the Course

Total Periods: 60

Unit	Topics	No. of Period
I	Microbial Techniques & instrumentation: Microscopy – Light, phase contrast, scanning and transmission electron microscopy, staining techniques for light microscopy. Common equipment of microbiology lab and principle of their working – autoclave, oven, laminar air flow, centrifuge, colorimetry, spectrophotometry, electrophoresis, immobilization methods, fermentation and fermenters.	12
II	Microbial world: Cell structure of Eukaryotic and prokaryotic cells, Gram positive and Gram-negative bacteria, Structure of bacteria; Bacterial Growth curve, factors affecting growth of microbes; Sporulation, reproduction, recombination in bacteria. Viruses, general characteristics, Structure of viruses, Bacteriophages and TMV; Lytic and Lysogenic cycles, viroid, Prions & mycoplasma, phytoplasma, actinomycetes and their economic uses. Applied Microbiology: Food fermentations and food produced by microbes, Production of antibiotics, enzymes, alcoholic beverages, Lactic acid and Acetic acid production. Antigen, antibody and production of monoclonal antibodies (Hybridoma techniques).	12
III	Phycology: General characteristic features, classification and range of thallus organization. Classification and life cycle of – <i>Volvox</i> , <i>Oedogonium</i> , <i>Chara</i> , <i>Vaucheria</i> , <i>Ectocarpus</i> and <i>Polysiphonia</i> . Economic importance of algae - Role of algae in soil fertility, algae as biofertilizer, blue green algae and nitrogen economy of soil; algae as biofuel	12

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IV	Mycology, Mushroom Cultivation, Lichenology & Mycorrhiza: General characteristic features, Economic importance and Classification of Fungi. Distinguishing characters of Myxomycota: General characters of Mastigomycota: <i>Phytophthora</i> and <i>Albugo</i> , Zygomycota: <i>Rhizopus</i> and <i>Mucor</i> , Ascomycota: <i>Saccharomyces</i> , <i>Penicillium</i> , <i>Peziza</i> . Basidiomycota: <i>Ustilago</i> , <i>Puccinia</i> , <i>Agaricus</i> ; Deuteromycota: <i>Colletotrichum</i> , <i>Fusarium</i> , <i>Alternaria</i> . Heterothallism, Physiological specialization, Heterokaryosis & Parasexuality, Mushroom cultivation- Button and Oyster mushroom General account of lichens, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance.	12
V	Plant Pathology: Disease concept, Symptoms, Etiology, Primary and secondary inoculum, pathogenesis, Koch's Postulates. Mechanism of infection and predisposing factors. Disease reoccurrence, Defence mechanism: physical and biochemical, Disease Resistance, Systemic fungicides, Organomercurials and sulphur containing fungicides Diseases and Control: Symptoms, Causal organism, Disease cycle and Control measures of – Early & Late Blight of Potato, Damping of seedlings, False Smut of Rice/ Brown spot of rice, Black Stem Rust of Wheat, <i>Alternaria</i> spot and White rust of Crucifers, Red Rot of Sugarcane, Wilting of Arhar, Mosaic diseases on tobacco and cucumber, yellow vein mosaic of bhindi; Citrus Canker, Little leaf of brinjal; Disease management: Quarantine organization and Integrated plant disease management, Biological control	12

Keywords: Microbial techniques, Mushroom cultivation, Mycology, Lichenology & Mycorrhiza, Plant diseases

6.	Credit Value	Theory: 4	
7.	Total Marks	Max. Marks: 50	Min Passing Marks: 17

Part B: Content of the Course

Total Periods: 60

Unit	Topics	No. of Period
I	Introduction to Archegoniates & Bryophytes: Unique features of archegoniates, Bryophytes: General characteristic features and Affinities, adaptations to land habit, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of <i>Riccia</i> , <i>Marchantia</i> , <i>Anthoceros</i> and <i>Sphagnum</i> . (Developmental details not to be included). Economic importance of bryophytes.	12
II	Pteridophytes: General characteristic features and affinities, Classification (up to family) with examples, Heterospory and seed habit, stelar evolution, economic importance of Pteridophytes, Morphology, anatomy and life cycle of <i>Psilotum</i> , <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> and <i>Marselia</i> .	12
III	Gymnosperms: Classification and distribution of gymnosperms; Salient features of Cycadales, Ginkgoales, Coniferales and Gnetales, their examples, structure and reproduction; economic importance, Morphology, anatomy and life cycle of <i>Cycas</i> , <i>Pinus</i> and <i>Ephedra</i> .	12
IV	Palaeobotany: General account, Geological time scale; Brief account of process of fossilization & types of fossils and their study techniques; Fossil plants: <i>Rhynia</i> , <i>Williamsonia</i> , <i>Cycadeoidea</i> . Contribution of Prof. Birbal Sahni	12
V	Angiosperm Morphology (Stem, Roots, Leaves, Flowers and Inflorescence: Morphology and modifications of root; Stem, leaf and bud. Types of inflorescences; flowers, flower parts, fruits and types of placentation; Definition	12

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Part B : Content of the Course	
Total No. of Periods – 30	
Tentative Practical List	<p>Topic * (Minimum Any three from each unit depending on facilities and syllabus. 20% for spotting, 10% each for viva and sessional and rest 60 % marks equally in each unit.)</p> <p>INSTRUMENTS & TECHNIQUES: 1. Laboratory safety and good laboratory practices. 2. Principles and application of Laboratory instruments-microscope, incubator, autoclave, centrifuge, Laminar air flow, filtration unit, shaker, pH meter. 3. Buffer preparation & titration 4. Cleaning and Sterilization of glassware 5. Preparation of media- PDA and NAM 6. Inoculation and culturing of Fungi and bacteria</p> <p>BACTERIAL IDENTIFICATION: 1. Isolation of bacteria. 2. Staining techniques: Gram's, staining</p>
	<p>MYCOLOGY: 1. Study/ Slide preparation and . Staining of fungi. <i>Rhizopus</i>, <i>Saccharomyces</i>, <i>Penicillium</i>, <i>Peziza</i>, <i>Ustilago</i>, <i>Puccinia</i>; <i>Fusarium</i>, <i>Alternaria</i>. <i>Agaricus</i>:</p>

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	<p>2. . Lichens: crustose, foliose and fruticose specimens.</p> <p>PHYCOLOGY: 1. Study / Slide preparation and Staining of algae – <i>Volvox</i>, <i>Oedogonium</i> and <i>Chara</i>; <i>Vaucheria</i>; <i>Ectocarpus</i> <i>Polysiphonia</i></p> <p>EXPERIMENTAL PLANT PATHOLOGY Isolation of pathogen from diseased leaf. Identification: Pathological specimens of Brown spot of rice, Bacterial blight of rice, Loose smut of wheat, , red rot of sugar cane, Tikka disease of ground nut, Slides of uredial, telial, pycnial & aecial stages of <i>Puccinia</i>, Few viral and bacterial plant diseases. like- Leaf curl of Papaya, Citrus canker</p> <p>PRACTICALS IN APPLIED MICROBIOLOGY 1. Isolation of rhizosphere to non rhizosphere population of bacteria. 2. Isolation of phyllosphere microflora. 3. Alcohol production from grapes in anaerobic condition 4. Isolation of lactic acid bacteria from curd. 5. Enzyme production and assay – catalase, protease and amylase.</p> <p>Bryophyta: Study of morphology and anatomy of : 1. <i>Riccia</i> 2. <i>Marchantia</i> 3. <i>Anthoceros</i> 4. <i>Sphagnum</i></p> <p>Pteridophyta: Study of morphology and anatomy of : 1. <i>Lycopodium</i> 2. <i>Selaginella</i> 3. <i>Equisetum</i> 4. <i>Pteris</i> 5. <i>Marselia</i></p> <p>Gymnosperm: Study of morphology and anatomy of : 1. <i>Cycas</i> 2. <i>Pinus</i> 3. <i>Ephedra</i></p>
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