

CERTIFICATE COURSE IN MICROBIAL TECHNOLOGY & CLASSICAL BOTANY / B.Sc.-I

Programme: <i>Certificate Course In Microbial Technology & Classical Botany</i>		Year: I	Semester: I/Paper-I
Subject: Botany			
Course Code: B040101T		Course Title: Microbiology & Plant Pathology	
<p>Course outcomes: After the completion of the course the students will be able to:</p> <ol style="list-style-type: none"> 1. Develop understanding about the classification and diversity of different microbes including viruses, Algae, Fungi & Lichens & their economic importance. 2. Develop conceptual skill about identifying microbes, pathogens, biofertilizers & lichens. 3. Gain knowledge about developing commercial enterprise of microbial products. 4. Learn host –pathogen relationship and disease management. 5. Learn Presentation skills (oral & writing) in life sciences by usage of computer of computer & multimedia 6. Gain Knowledge about uses of microbes in various fields. 7. Understand the structure and reproduction of certain selected bacteria algae, fungi and lichens 8. Gain Knowledge about the economic values of this lower group of plant community. 			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic	No. of Lectures (60 hrs)	
I	<p>A. Introduction to Indian ancient ,Vedic and heritage Botany and contribution of Indian Botanists, in context with the holistic development of modern science and technology, has to be taught, practiced and assessed via class interaction/ assignments / self study mentioned under Continuous Internal Evaluation (CIE).</p> <p>B. Microbial Techniques & instrumentation Microscopy – Light, phase contrast, electron, scanning and transmission electron microscopy, staining techniques for light microscopy, sample preparation for electron microscopy. Common equipments of microbiology lab and principle of their working – autoclave, oven, laminar air flow, centrifuge. Colorimetry and spectrophotometry, immobilization methods, fermentation and fermenters.</p>	8	
II	<p>Microbial world Cell structure of Eukaryotic and prokaryotic cells, Gram positive and Gram negative bacteria, Structure of a bacteria; Bacterial Chemotaxis and Quorum sensing, Bacterial Growth curve, factors affecting growth of microbes; measurement of growth; Batch culture, fed batch culture and continuous culture; Synchronous growth of microbes; Sporulation and reproduction and recombination in bacteria; Viruses, general characteristics, viral culture, Structure of viruses, Bacteriophages, Structure of T4 & λ-phage; Lytic and Lysogenic cycles, viroids, Prions & myco& phytoplasma, Actinomycetes & plasmids and their economic uses.</p>	8	
III	<p>Phycology Range of thallus organization in Algae, Pigments , Reserve food –Reproduction - Classification and life cycle of – <i>Nostoc</i>; <i>Chlorella</i>, <i>Volvox</i>, <i>Oedogonium</i> , <i>Chara</i>; <i>Sargassum</i> , <i>Ectocarpus</i>, <i>Polysiphonia</i> . Economic importance of algae - Role of algae in soil fertility- biofertilizer – Nitrogen fixation-Symbiosis ;Commercial products of algae –biofuel, Agar.</p>	7	
IV	<p>Mycology General characteristics, nutrition, life cycle, Economic importance of Fungi, Classification upto class. Distinguishing characters of Myxomycotina -General characters. Zygomycotina – <i>Rhizopus</i> , Ascomycotina -<i>Saccharomyces</i>, <i>Penicillium</i>, <i>Peziza</i> , Basidiomycotina- <i>Ustilago</i>, <i>Puccinia</i> , <i>Agaricus</i> ; Deuteromycotina – <i>Fusarium</i>, <i>Alternaria</i> , Heterothallism, Physiological specialization, Heterokaryosis &Parasexuality</p>	7	

V	Mushroom Cultivation, Lichenology & Mycorrhiza Mushroom cultivation. General account of lichens, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance.	7
VI	Plant Pathology Disease concept, Symptoms, Etiology & causal complex, Primary and secondary inoculum, Infection, Pathogenicity and pathogenesis, Koch's Postulates. Mechanism of infection (Brief idea about Pre-penetration, Penetration and Post-penetration), Disease cycle (monocyclic, polycyclic and polyetic). Defense mechanism with special reference to Phytoalexin, Resistance- Systemic acquired and Induced systemic..fungicides- Bordeaux mixture, Lime sulphur, Tobacco decoction, Neem cake & oil	7
VII	Diseases and Control Symptoms , Causal organism, Disease cycle and Control measures of – Early & Late blight of Potato, Brown spot of rice, Black stem rust of wheat, Stem rot of Mustard , Red rot of Sugarcane, Wilting of Arhar, mosaic diseases on tobacco and cucumber, yellow vein mosaic of bhindi; citrus canker, little leaf of brinjal; damping off of seedlings, Disease management: - Quarantine, Chemical, Biological, Integrated pest disease management	8
VIII	Applied Microbiology Food fermentations and food produced by microbes, amino acids, Production of antibiotics, enzymes, vitamins, alcoholic beverages, organic acid & genetic recombinant vaccines. Mass production of bacterial biofertilizers, blue green algae, Azolla and mycorrhiza. Plant growth promoting rhizobacteria & biopesticides—Trichoderma sp. and Pseudomonas, Single cell proteins, Organic framing inputs, Microbiology of water, Biopolymers, Bioindicators, biosensors, Bioremediation, Production of biofuels, biodegradation of pollutants and biodeterioration of materials& Cultural Property	8

Suggested Readings:

Course Books published in Hindi may be prescribed by the Universities.

1. वनस्पति विज्ञान (संपूर्ण) शैवाल, कवक ,लाइकेन ,जीवाणु, विषाणु, ब्रायोफाइटा ,टेरिडोफाइटा , जिम्नोस्पर्म तथा पुरा- वनस्पति विज्ञान : लेखक - सिंह , पांडे व जैन प्रकाशन: रस्तोगी प्रकाशन ,मेरठ
2. सूक्ष्म जैविकी कवक एवं पादप रोग विज्ञान त्रिवेदी शर्मा एवं धनकर rbd publisher 2019
3. परिचयात्मक पादप रोग विज्ञान डॉ आशीष कुमार त्रिपाठी डॉ सनत कुमार त्रिपाठी 2018 एग्रोबॉयोस इंडिया पब्लिशर
4. पादप रोग विज्ञान : जिया लाल यादव 2012
5. डॉ आशीष कुमार त्रिपाठी डॉ सनत कुमार त्रिपाठी 2018. परिचयात्मक पादप रोग विज्ञान एग्रोबॉयोस इंडिया पब्लिशर
6. रीता वर्मा 2020. सूक्ष्म जैविकी, कवक एवं पादप रोग विज्ञान
7. प्रांजल आर्य 2020. पादप रोग: उत्पत्ति प्रसार एवं नियंत्रण
8. Microbiology Fundamental And Applications (hindi) (pb)
9. ISBN : 9788188826230Edition : 03Year : 2016Author : Dr. Purohit SS , Dr. Deo PPPublisher : Student Edition Language : Hindi
10. पादप रोग विज्ञान परिभाषा-कोश: Definitional Dictionary of Plant Pathology. Publisher Commission for Scientific and Technical Terminology.
11. Modern Microbiology (hindi) (hb) ISBN : 9788177543599Edition : 1Year : 2018Author : Dr. Purohit SS , Dr. Singh T Publisher : Agrobios (India)
- 12.

Unit-I A:

- <https://indianculture.gov.in/rarebooks/economic-botany-india>
https://www.infinityfoundation.com/mandala/t_es/t_es_tiwari_botany_frameset.htm
- https://www.researchgate.net/publication/335715457_Ancient_Indian_rishi's_Sages_knowledge_of_botany_and_medicinal_plants_since_Vedic_period_was_much_older_than_the_period_of_Theophrastus_A_case_study-who_was_the_actual_father_of_botany
- <https://www.scribd.com/presentation/81269920/Botany-of-Ancient-India>
- https://insa.nic.in/writereaddata/UpLoadedFiles/IJHS/Vol17_2_17_PKBhattacharyya.pdf
- http://wgbis.ces.iisc.ernet.in/biodiversity/sahyadri/wgbis_info/botany_history.pdf