| Part A : Introduction | | | | |
|---|---|---|---|---|
| **Programme: Certificate** | | **Class B.Sc.-I** | **Year: 2022** | **Session: 2022-23** |
| 1. | Course Code | **BOT-1P** | | |
| 2. | Course Title | **Microbial Techniques and Archegoniate identification** | | |
| 3. | Course Type | **Practical** | | |
| 4. | Pre-requisite (if any) | No | | |
| 5. | Course outcomes: | After the completion of the course the students will be able to:<br>• Understand the instruments, techniques and good lab practices for working in a microbiology laboratory.<br>• Develop skills for identifying microbes and using them for Industrial, Agriculture and Environment purposes.<br>• Practical skills in the field and laboratory experiments in Microbiology & Pathology.<br>• learn to identify Algae, Lichens and plant pathogens along with their Symbiotic and Parasitic associations.<br>• Can initiate his own Plant & Seed Diagnostic Clinic<br>• Can start own enterprise on microbial products | | |
| 6. | Credit Value | 2 | | |
| 7. | Total Marks | Max. Marks: 50 | Min. Passing Marks:17 | |

**Part B : Content of the Course**

Total No. of Periods – 30

| | |
|---|---|
| **Tentative Practical List** | **Topic * (Minimum Any three from each unit depending on facilities and syllabus.**<br>**20% for spotting, 10% each for viva and sessional and rest 60 % marks equally in each unit.)** |
| | **INSTRUMENTS & TECHNIQUES:** 1. Laboratory safety and good laboratory practices.<br>2. Principles and application of Laboratory instruments-microscope, incubator, autoclave, centrifuge, Laminar air flow, filtration unit, shaker, pH meter.<br>3. Buffer preparation & titration<br>4. Cleaning and Sterilization of glassware<br>5. Preparation of media- PDA and NAM<br>6. Inoculation and culturing of Fungi and bacteria<br>**BACTERIAL IDENTIFICATION:** 1. Isolation of bacteria.<br>2. Staining techniques: Gram's, staining |
| | **MYCOLOGY:**<br>1. Study/ Slide preparation and . Staining of fungi. *Rhizopus, Saccharomyces, Penicillium, Peziza, Ustilago, Puccinia; Fusarium, Alternaria, Agaricus*: |

Singh, JS Singh SP and Gupta SR. ***Ecology and Environmental Science and Conservation***, S. Chand Publishing, New Delhi

Sharma, PD. ***Ecology and Environment,*** Rastogi Publications, Merrut

Hopkins, WG and Huner, PA. ***Introduction to Plant Physiology,*** John Wiley and Sons.

Pandey SN and Sinha BK, ***Plant Physiology,*** Vikas Publishing, New Delhi

Taiz, L and Zeiger. E. ***Plant Physiology,*** 5th edition, Sinauer Associates Inc. M.A, USA

Srivastava, HS ***Plant Physiology and Biotechnology***, Rastogi Publications, Meerut

## B.Sc. II (BOTANY)

### Practical

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of $O_2$ in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Determination of BOD of a water body.
12. Demonstration of mitosis.

## PRACTICAL SCHEME

**TIME: 4 Hrs.** **M.M. : 50**

| | | |
|---|---|---|
| 1. | Anatomy | 08 |
| 2. | Economic Botany | 04 |
| 3. | Physiology | 08 |
| 4. | Ecology | 10 |
| 5. | Spotting | 10 |
| 6. | Viva-Voce | 05 |
| 7. | Project Work/ Field Study | 10 |

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( Dr.Ranjana Shristava)
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Cooper, GM, The Cell: A Molecular Approach, ASM Press & Sunderland, Washington, D.C. Sinauer Associates, MA.

Singh BD, Fundamental of Genetics, Kalyani Publication

Singh BD, Genetics, Kalyani Publication

Gupta, PK, Cell and Molecular Biology, Rastogi Publications, Meerut

Singh, BD, Biotechnology: Expanding Horizons, Kalyani Publications

Gupta, PK, Elements of Plant Biotechnology, Rastogi Publications, Meerut

Gupta, SN, concepts of Biochemistry, Rastogi Publications, Meeru

Jain, JL, Jain S, Jain, N, Fundamentals of Biochemistry, S Chand Publishing, New Delhi

## B.Sc.- III (Botany)

## Practical

1. Study of host parasite relationship pf plant diseases listed above.
2. Demonstration of preparation of Czapek's Dox medium and potato dextrose agar medium, sterilization of culture medium and pouring.
3. Inoculation in culture tubes and petriplates.
4. Gram Staining.
5. Microscopic examination of Curd.
6. Study of plant diseases as listed in the theory paper.
7. Biochemical test of carbohydrate and protein.
8. Instrumentation techniques

### PRACTICAL SCHEME

**TIME: 4 Hrs.** **M.M.: 50**

| | |
|---|---|
| 1. Plant Disease/Symptoms | 10 |
| 2. Instrumentation techniques | 05 |
| 3. Staining of Microbes | 05 |
| 4. Tissue Culture techniques | 05 |
| 5. Spotting | 10 |
| 6. Project Work/ Field Study | 05 |
| 7. Viva-Voce | 05 |
| 8. Sessional | 05 |

2. . Lichens: crustose, foliose and fruticose specimens.

**PHYCOLOGY:**

1.Study / Slide preparation and Staining of algae –

*Volvox, Oedogonium* and *Chara; Vaucheria; Ectocarpus Polysiphonia*

**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 *Puccinia*, Few viral and bacterial plant diseases. like- Leaf curl of Papaya, Citrus canker

**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.

**Bryophyta:**

Study of morphology and anatomy of :

1. *Riccia*
2. *Marchantia*
3. *Anthoceros*
4. *Sphagnum*

**Pteridophyta:**

Study of morphology and anatomy of :

1. *Lycopodium*
2. *Selaginella*
3. *Equisetum*
4. *Pteris*
5. *Marselia*

**Gymnosperm:**

Study of morphology and anatomy of :

1. *Cycas*
2. *Pinus*
3. *Ephedra*

## Part C - Learning Resource

Text Books, Reference Books, Other Resources

**d Readings:**

actical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika nghvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).

ndey, S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing mbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).

ubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., ew Delhi.