

**BOARD OF STUDIES IN B.Sc BOTANY
2021-2022**

**DEPARTMENT OF BOTANY, MICROBIOLOGY
AND HORTICULTURE**

SYLLABUS FOR B.Sc BOTANY



PITHAPUR RAJAH'S GOVERNMENT COLLEGE

Autonomous and Accredited with 'A' Grade by NAAC (3.17 CGPA)
KAKINADA – 533 001, E G Dist., ANDHRA PRADESH

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I B.Sc., -Botany-I/ I Semester End (W.E.F. 2021-22)
FUNDAMENTALS OF MICROBES AND NON-VASCULAR PLANTS
(COURSE: BO1207)

Total hours of Teaching 60hrs @ 4 hrs/week

Total Credits:03

UNIT – I: ORIGIN OF LIFE AND VIRUSES **12 Hrs.**

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions and Viroids.
4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
5. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.

UNIT – II: SPECIAL GROUPS OF BACTERIA AND EUBACTERIA **12 Hrs.**

1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria.
2. Cell structure and nutrition of Eubacteria.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation and medicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

UNIT – 3: FUNGI & LICHENS **12 Hrs.**

1. General characteristics of fungi and Ainsworth classification (upto classes).
2. Structure, reproduction and life history of (a) Rhizopus (Zygomycota) and (b) Puccinia (Basidiomycota).
3. Economic uses of fungi in food industry, pharmacy and agriculture.
4. A general account on symptoms of plant diseases caused by Fungi; Blast of Rice.
5. Lichens- structure and reproduction; ecological and economic importance.

UNIT – 4: ALGAE **12 Hrs.**

1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (upto classes).
2. Thallus organization and life cycles in Algae.
3. Occurrence, structure, reproduction and life cycle of (a) Spirogyra (Chlorophyceae) and (b) Polysiphonia (Rhodophyceae).
4. Economic importance of Algae.

UNIT – 5: BRYOPHYTES **12 Hrs.**

1. General characteristics of Bryophytes; classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) Marchantia (Hepaticopsida) and (b) Funaria (Bryopsida).
3. General account on evolution of sporophytes in Bryophyta.

Text books:

- Botany – I (Vrukshasastram-I): Telugu Akademi, Hyderabad
- Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi
- Hait, G., K. Bhattacharya & A.K. Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata
- Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial Diversity, Kalyani Publishers, New Delhi.

Books for Reference:

- Dubey, R.C. & D.K. Maheswari (2013) A Text Book of Microbiology, S. Chand & Company Ltd., New Delhi
- Pelczar Jr., M.J., E.C.N. Chan & N.R. Krieg (2001) Microbiology, Tata McGraw-Hill Co, New Delhi
- Prescott, L. Harley, J. and Klein, D. (2005) Microbiology, 6th edition, Tata McGraw – Hill Co. New Delhi.
- Alexopoulos, C.J., C.W. Mims & M. Blackwell (2007) Introductory Mycology, Wiley & Sons, Inc., New York
- Mehrotra, R.S. & K. R. Aneja (1990) An Introduction to Mycology. New Age International Publishers, New Delhi
- Kevin Kavanagh (2005) Fungi; Biology and Applications John Wiley & Sons, Ltd., West Sussex, England
- John Webster & R. W. S. Weber (2007) Introduction to Fungi, Cambridge University Press, New York
- Fritsch, F.E. (1945) The Structure & Reproduction of Algae (Vol. I & Vol. II) Cambridge University Press Cambridge, U.K.
- Bold, H.C. & M. J. Wynne (1984) Introduction to the Algae, Prentice-Hall Inc., New Jersey
- Robert Edward Lee (2008) Phycology. Cambridge University Press, New York
- Van Den Hoek, C., D.G. Mann & H.M. Jahns (1996) Algae : An Introduction to Phycology. Cambridge University Press, New York
- Shaw, A.J. & B. Goffinet (2000) Bryophyte Biology. Cambridge University Press, New York.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I B.Sc., BOTANY PRACTICAL PAPER – I PRACTICAL SYLLABUS
FUNDAMENTALS OF MICROBES AND NON-VASCULAR PLANTS

Total hours of laboratory Exercises 30 hrs @ 2 per week

Total credits:02

PRACTICAL SYLLABUS:

1. Knowledge of Microbiology laboratory practices and safety rules.
2. Knowledge of different equipment for Microbiology laboratory (Spirit lamp, Inoculation loop, Hot-air oven, Autoclave/Pressure cooker, Laminar air flow chamber and Incubator) and their working principles. (In case of the non-availability of the laboratory equipment the students can be taken to the local college/clinical lab. with required infrastructural facilities or they can enter a linkage with the college/lab for future developments and it will fetch credits during the accreditation by NAAC).
3. Demonstration of Gram's staining technique for Bacteria.
4. Study of Viruses (Corona, Gemini and TMV) using electron micrographs/ models.
5. Study of Archaeobacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.
6. Study of Anabaena and Oscillatoria using permanent/temporary slides.
7. Study of different bacteria (Cocci, Bacillus, Vibrio and Spirillum) using permanent or temporary slides/ electron micrographs/ diagrams.
8. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts:
 - a. Fungi: Rhizopus, Penicillium and Puccinia
 - b. Lichens: Crustose, foliose and fruiticose
 - c. Algae: Volvox, Spirogyra, Ectocarpus and Polysiphonia
 - d. Bryophyta : Marchantia and Funaria
9. Study of specimens of Tobacco mosaic disease, Citrus canker and Blast of Rice.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I B.Sc., Botany Practical Examinations at the End of Semester-I
FUNDAMENTALS OF MICROBES AND NON-VASCULAR PLANTS
Botany Practical Model Paper-I (w.e.f 2021-21)

Time: 2 hours

Max. Marks: 50

1. Take the T.S. of material 'A' (Fungi), make a temporary mount and make comments about identification. 10 M
2. Identify any 2 algae from the mixture (material 'B') given with specific comments about identification. 10 M
3. Take the T.S. of material 'C' (Bryophyta), make a temporary mount and make comments about identification. 10 M
4. Identify the following with specific reasons. 4 x 3 = 12 M
D. A laboratory equipment of Microbiology
E. Virus
F. Archaeobacteria /Ascomycete /Cyanobacteria/ Eu-Bacteria
G. Lichen
5. Record + Viva-voce 5+3 = 08 M

Suggested co-curricular activities for Botany Core Course-1 in Semester-I:

A. Measurable:

a. Student seminars:

1. Baltimore classification of Viruses.
2. Lytic and lysogenic cycle of T- even Bacteriophages.
3. Viral diseases of humans and animals.
4. Retroviruses
5. Bacterial diseases of humans and animals.
6. Significance of Bacteria in Biotechnology and Genetic engineering.
7. Fungi responsible for major famines in the world.
8. Poisonous mushrooms (Toad stools).
9. Algae as Single Cell Proteins (SCPs)
10. Parasitic algae
11. Origin of Bryophytes through: Algae vsPteridophytes
12. Fossil Bryophytes
13. Evolution of gametophytes in Bryophyta
14. Ecological and economic importance of Bryophytes.

b. Student Study Projects:

1. Isolation and identification of microbes from soil, water and air.
2. Collection and identification of algae from fresh /estuarine /marine water.
3. Collection and identification of fruiting bodies of Basidiomycetes andAscomycetes.
4. Collection and identification of Lichens from their native localities.
5. Collection of diseased plants/parts and identification of symptoms.

6. Collection and identification of Bryophytes from their native localities.
- c. **Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General:

1. Visit to Agriculture and/or Horticulture University/College/Research station to learn about microbial diseases of plants.
2. Visit to industries working on microbial, fungal and algal products.
3. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I Year B.Sc., Degree Examinations at I Semester End
Botany Paper I: FUNDAMENTALS OF MICROBES AND NON-VASCULAR
PLANTS

(Course: BO1207 Model Paper w.e.f. 2021-21)

Time: 2½ Hrs.

Max. Marks: 60

SECTION – A

3 × 10 = 30 M

Answer any **THREE** of the following by choosing atleast one question from each Part.

PART – I

1. a. Transmission of plant diseases caused by viruses and their control

OR

- b. Five kingdom classification

2. a. Reproduction of bacteria

OR

- b. Economic importance of bacteria

3. a. Lichen structure and reproduction

OR

- b. Reproduction and life history of puccinia

PART - II

4. a. Thallus organization in Algae

OR

- b. Life cycle of Polysiphonia

5. a. Life cycle of Marchantia

OR

- b. Evolution of sporophytes in Bryophytes

SECTION – B

4 × 5 = 20 M

Answer any **FOUR** of the following Questions

1. Germ theory of diseases
2. Prions
3. Actinomycetes
4. Nutrition in bacteria
5. Economic importance in fungi
6. General characteristics of bacteria
7. Gemma cups
8. Protonema in funaria

SECTION – C

5 × 2 = 10 M

Answer **ALL** Questions.

1. Abiogenesis theory
2. Heterocyst
3. Types of Lichen
4. Pigments in rhodophyceae
5. Zooidogamous oogamy

BLUE PRINT FOR QUESTION SETTER

UNIT NO / TITLE	SAQ	LAQ	VSAQ	Marks allotted to the Module
UNIT – I: ORIGIN OF LIFE AND VIRUSES	2	1	1	17
UNIT – II: SPECIAL GROUPS OF BACTERIA AND EUBACTERIA	2	1	1	17
UNIT – 3: FUNGI & LICHENS	2	1	1	17
UNIT – 4: ALGAE	2	1	1	17
UNIT – 5: BRYOPHYTES	2	1	1	17
Total marks allotted to all questions including choice				85

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

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I B.Sc-Botany-I/ I Semester End (W.E.F. 2021-22)
FUNDAMENTALS OF MICROBES AND NON-VASCULAR PLANTS
I B.Sc-Botany-I/ I Semester Question Bank

UNIT – I: ORIGIN OF LIFE AND VIRUSES

Essay Questions

1. Five kingdom classification
2. Transmission of plant viruses and their control
3. Miller & Urey experiment

Short Answer Questions

1. Viroid
2. Prions
3. Germ theory of diseases
4. Pasteurs experiment
5. Bio pesticides

Very short answer questions

1. Monera
2. Protesta
3. Fungi
4. Pasteurization
5. Germ theory
6. Prions
7. Viroid's
8. Capsid
9. virulent phage
10. Bio- Pesticides
11. Plant viral diseases
12. Control of plant viral diseases.

UNIT – II: SPECIAL GROUPS OF BACTERIA AND EUBACTERIA

Essay Questions

1. Reproduction in Bacteria
2. Economic importance of bacteria
3. Transmission of viral diseases and their control

Short Answer Questions

1. Nutrition in bacteria
2. Archaeobacterial
3. Cyanobacteria
4. Citrus canker

Very short answer questions

1. Archaeobacteria
2. Actinomycetes
3. Binary fission
4. Endospores
5. Cyano Bacteria

6. Conjugation
7. Fermentation
8. Bacterial plant Diseases
9. Citrus canker
10. Pasteurization

UNIT – III: FUNGI & LICHENS

Essay Questions

1. Lichen structure and reproduction
2. Structure and reproduction of puccinia
3. General characters and classification of Fungi

Short Answer Questions

1. Asexual reproduction of rhizopus
2. Blast of rice
3. Economic importance of Fungi
4. Economic importance of lichens

Very short answer questions

1. Mycorrhizae
2. Absorptive Nutrition
3. Plectenchyma
4. Rhizomorphs
5. Budding
6. Dimorphism
7. Cleistothesium
8. Perithecium
9. Teliospore
10. Pycnia
11. Photobiont
12. Prosenchyma
13. Diaspores
14. Isidia
15. Single cell, protein
16. mycitism

UNIT – IV: ALGAE

Essay Questions

1. Thallus organization in Algae
2. Life cycle of Polysiphonia
3. Classification of Algae

Short Answer Questions

1. Pigments in Algae
2. Economic importance of Algae
3. Reproduction in Spirogyra

Very short answer questions

1. Xanthophylls
2. Biloproteins

3. Hormogonia
4. Akinetes
5. Carposporophyte
6. Spirulina
7. Diatomaceous earth
8. Red tides
9. Bio- fouling
10. Harmful Algae
11. Algae in Agriculture

UNIT – V: BRYOPHYTES

Essay Questions

1. Life cycle of Marchantia
2. Evolution of sporophytes in Bryophytes
3. Life cycle of Funaria

Short Answer Questions

1. Funaria capsule
2. Protonema
3. Gemmacup
4. Gametophyte of Funaria

Very short answer questions

1. Amphibians of the plant kingdom
2. Horn –Worts
3. Liver –Worts
4. Apospory
5. Apogamy
6. Gemma cups
7. Assimilatory filaments
8. Calyptra
9. Elaters
10. Riccia-capsule
11. Apophysis
12. Peristomial teeth
13. Annulus