

MAHATMA GANDHI UNIVERSITY

B.Sc. BOTANY PROGRAMME

Semester III Course-3 BO3B03U

MICROBIOLOGY AND PHYCOLOGY

(Theory: 54 hours; Practical: 36)

(Theory Credit 3, Practical Credit1)

Course objectives

Enable the student to

1. Understand the world of microbes
2. Understand the identifying characters of the lower groups of plants
3. Have an idea on diverse groups of plants
4. Understand the application of microbiology in different fields.

MICROBIOLOGY

(Theory: 18 hours; Practical: 12 hours)

Module 1

1 hour

Introduction, Scope of Microbiology

Module 2

6 hours

- Bacteria - Morphology and classification based on staining, morphology and flagellation
- Fine structure - cell wall - Peptido glycan- cytoplasm - Nucleoid, Flagella
- Reproduction- Binary fission
- Genetic recombination - Conjugation, transformation & transduction
- Archaeobacteria, Mycoplasma - general characters

Module 3

6

hours

Virus- General composition and properties - Architecture of TMV, HIV and Bacteriophages ,Multiplication and transmission.

Module 4

5 hours

Applied Microbiology

1. Role in Nitrogen cycle.
2. Biofertilizers & Bio pesticides.
3. Biogas production.
4. Reconversion of waste products.
5. Bioremediation.
6. Spoilage and preservation of food.
7. Antibiotics.
8. Production of Vinegar, curd, Yoghurt, single cell protein and Probiotics.
9. Bio reactors.

PRACTICAL

12 hours

Students are expected to do the following practical

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1. Preparation of bacterial smear.
2. Grams staining.
3. Isolation of microbes from soil (Streaking method).

PHYCOLOGY

(Theory: 36 hours ; Practical: 24 hours)

Module 1

3 hours

Introduction - General characters of algae. Classification (Fritsch F. E, 1935; 1945.

Module 2

22 hours

General characters of the following major groups with special reference to the structure , reproduction and life cycles of the following types.

- a. Cyanophyceae: *Nostoc*
- b. Chlorophyceae: *Chlamydomonas, Volvox, Spirogyra, Oedogonium, Cladophora, Chara*
- c. Xanthophyceae: *Vaucheria*
- d. Bacillariophyceae: *Pinnularia*
- e. Phaeophyceae : *Sargassum*
- f. Rhodophyceae : *Polysiphonia*

Module 3

9 hours

Economic importance

- a. Algae as pollution indicator and in waste water treatment
- b. Commercial products: Agar, Alginates, Carrageenin, Diatomaceous earth
- c. Algae in soil fertility, Fertilizer, Nitrogen fixation, minerals, soil algae and symbiosis
- d. Sources of food & medicine
- e. Diatoms and nanotechnology
- f. As a source of Hydrogen as fuel
- g. Toxic algae – Algal blooms, red tides & fish poisoning
- h. Algae as primary producers – Oxygen liberators
- i. Cyanobacteria as a source of restriction endonuclease
- j. Role of algae in aquaculture.

Module 4

2 hours

Algal culture: scope and methods

Practicals

24 hours

1. Make micro preparation of vegetative and reproductive structures of the types mentioned in the syllabus.
2. Identify the algal specimens up to the generic level by noting their key characters.
3. Make labeled sketches of the specimens observed.

REFERENCES

1. Aneja K. R. 1996. *Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom cultivation*. Wishwa Prakasan, Delhi.
2. Carpenter P L, 1967. *Microbiology.*, W. B Saunder & Co, Philadelphia
3. Chapman, V J 1962. *The Algae.*: Macmillan & co. Ltd, London
4. Dule.H.C 2008. *Fungi, Bacteria and Viruses*, Agrobios, Meerut.
5. Frazier W C & Westhoff D C 1978. *Food Microbiology*. TMH Edn.
6. Fritsch F E 1945. *Structure and Reproduction of Algae*. Vol.1: Cambridge University Press, London.
7. Hans G Schlegel 1995. *General Microbiology*. Cambridge University Press, London.
8. Parihar. L, 2008. *Advances in Applied Microbiology*, Agrobios, Meerut.
9. Pelczar M J. Reid and Chan E C S 1977. *Microbiology*. Tata McGraw-Hill publishing Co., New Delhi.
10. Prescott.S.C, 2009.*Industrial Microbiology*, Agrobios, Meerut.
11. Sharma P D 2005. *Microbiology and Plant Pathology* Rastogi publication Meerut.
12. Kanika Sharma 2005 *Manual of Microbiology tools & Techniques*. Ane books, Ansari road, New Delhi.
13. Sharma O.P. 2004, *Text Book of Algae*, Tata Mc. Graw Hill Co.
14. Vasishta B R, Sinha A.K , Singh V.P 2004 *Botany For Degree Students . Algae*, S. chand & Co. Ltd. New Delhi.
15. Bilgrama K. S & Saha L. C 1996, *Text Book Of Algae*, C B S Publishers & Distributors
16. . Mamatha Rao, 2009, *Microbes and Non flowering plants- impact and application* Ane Boopks Pvt Ltd.

websites

<http://www.phycology.net/>

<http://www.algaebase.org/>

<http://www.seaweed.ie/>

<http://www.brphycsoc.org/> (the british phycological society)

<http://www.intphycsoc.org/> (international phycological society)

<http://www.isaseaweed.org/> (the international seaweed association)

<http://botany.si.edu/projects/algae/>

<http://botany.si.edu/projects/algae/> (Smithsonian national museum of natural history)