

B.Sc., BOTANY
First Year, I -Semester
Paper-I
Microbial Diversity and Lower Plants

DSC - 1A (4 hrs./week)

Credits- 4

Theory Syllabus

(60 hours)

UNIT - I

(15 hours)

- 1) **Bacteria:** Structure, nutrition, reproduction and economic importance. Brief account of Archaeobacteria, Actinomycetes and Mycoplasma with reference to little leaf of Brinjal and Papaya leaf curl
- 2) **Viruses:** Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro.
- 3) An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice.

UNIT-II

(15 hours)

- 1) General characters, structure, reproduction and classification of algae (Fritsch)
- 2) **Cyanobacteria:** General characters, cell structure their significance as biofertilizers with special reference to Oscillatoria, Nostoc and Anabaena.
- 3) Structure and reproduction of the following:
Chlorophyceae- Volvox, Oedogonium and Chara.
Phaeophyceae- Ectocarpus
Rhodophyceae- Polysiphonia.

UNIT-III

(15 hours)

- 1) General characters and classification of fungi (Ainsworth).
- 2) Structure and reproduction of the following:
(a) Mastigomycotina- Albugo
(b) Zygomycotina- Mucor
(c) Ascomycotina- Saccharomyces and Penicillium.
(d) Basidiomycotina- Puccinia
(e) Deuteromycotina- Cercospora.
- 3) Economic importance of lichens

UNIT-IV

(15 hours)

- 1) **Bryophytes:** Structure, reproduction, life cycle and systematic position of Marchantia, Anthoceros and Polytrichum, Evolution of Sporophyte in Bryophytes.
- 2) **Pteridophytes:** Structure, reproduction, life cycle and systematic position of Rhynia, Lycopodium, Equisetum and Marsilea.
- 3) Stelar evolution, heterospory and seed habit in Pteridophytes.

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References:

- 1) Alexopolous, J. and W. M. Charles. 1988. *Introduction to Mycology*. Wiley Eastern, New Delhi.
- 2) Mckane, L. and K. Judy. 1996. *Microbiology – Essentials and Applications*. McGraw Hill, New York.
- 3) Pandey, B. P. 2001. *College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta*. S. Chand & Company Ltd, New Delhi.
- 4) Pandey, B. P. 2007. *Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics*. S. Chand & Company Ltd, New Delhi.
- 5) Sambamurthy, A. V. S. S. 2006. *A Textbook of Plant Pathology*. I. K. International Pvt. Ltd., New Delhi.
- 6) Sambamurthy, A. V. S. S. 2006. *A Textbook of Algae*. I. K. International Pvt. Ltd., New Delhi.
- 7) Sharma, O. P. 1992. *Textbook of Thallophyta*. McGraw Hill Publishing Co., New Delhi.
- 8) Thakur, A. K. and S. K. Bassi. 2008. *A Textbook of Botany: Diversity of Microbes and Cryptogams*. S. Chand & Company Ltd, New Delhi.
- 9) Vashishta, B. R., A. K. Sinha and V. P. Singh. 2008. *Botany for Degree Students: Algae*. S. Chand & Company Ltd, New Delhi.
- 10) Vashishta, B. R. 1990. *Botany for Degree Students: Fungi*, S. Chand & Company Ltd, New Delhi.
- 11) Dutta A.C. 2016. *Botany for Degree Students*. Oxford University Press.
- 12) Watson, E. V. 1974. *The structure and life of Bryophytes*, B. I. Publications, New Delhi.
- 13) Pandey, B. P. 2006. *College Botany, Vol. II: Pteridophyta, Gymnosperms and Palcobotany*. S. Chand & Company Ltd, New Delhi.
- 14) Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. *Botany - Pteridophyta (Vascular Cryptogams)*. S. Chand & Company Ltd, New Delhi.
- 15) Pandey, B. P. 2001. *College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta*. S. Chand & Company Ltd, New Delhi.
- 16) Pandey, B. P. 2007. *Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics*. S. Chand & Company Ltd, New Delhi.
- 17) Thakur, A. K. and S. K. Bassi. 2008. *A Textbook of Botany: Diversity of Microbes and Cryptogams*. S. Chand & Company Ltd, New Delhi.
- 18) Vashishta, B. R., A. K. Sinha and Adarsha Kumar. 2008. *Botany for Degree Students: Bryophyta*. S. Chand & Company Ltd, New Delhi.

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Practical Syllabus

(45 hours)

1. Study of viruses and bacteria using electron micrographs (photographs).
2. Gram staining of Bacteria.
3. Study of symptoms of plant diseases caused by viruses, bacteria, Mycoplasma and fungi:
 Viruses: Tobacco mosaic
 Bacteria: Angular leaf spot of cotton and Rice tungro.
 Mycoplasma: Little leaf of Brinjal and Leaf curl of papaya
 Fungi: White rust on Crucifers, Rust on wheat & Tikka disease of Groundnut.
4. Vegetative and reproductive structures of the following taxa:
 Algae: Oscillatoria, Nostoc, Volvox, Oedogonium, Chara, Ectocarpus and Polysiphonia.
 Fungi: Albugo, Mucor, Saccharomyces, Penicillium, Puccinia and Cercospora
5. Section cutting of diseased material infected by Fungi and identification of pathogens as per theory syllabus. White rust of Crucifers, Rust on wheat & Tikka disease of Groundnut.
6. Lichens: Different types of thalli and their external morphology
7. Examination of important microbial, fungal and algal products:
 Biofertilizers, protein capsules, antibiotics, mushrooms, Agar-agar etc.
8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies).
9. Study of Morphology (vegetative and reproductive structures) and anatomy of the following
 Bryophytes: Marchantia, Anthoceros and Polytrichum.
10. Study of Morphology (vegetative and reproductive structures) and anatomy of the following
 Pteridophytes: Lycopodium, Equisetum and Marsilea.
11. Study of Anatomical features of Lycopodium stem, Equisetum stem and Marsilea petiole & rhizome by preparing double stained permanent mounts.

Practical Model Paper

Max. Marks: 25

Time : 3 hrs

1. Identify the given components 'A' & 'B' in the algal mixture .
 Describe with neat labeled diagrams & give reasons for the classifications. 2 X 2 = 4M
2. Classify the given bacterial culture 'D' using Gram – staining technique. 3M
3. Take a thin transverse section of given diseased material 'E'.
 Identify & describe the symptoms caused by the pathogen. 4M
4. Identify the given specimens 'F', 'G' & 'H' by giving reasons .
 (Fungal-1, Bacteria-1 & Viral-1) 3 X 1 = 3M
5. Comment on the given slides 'I' & 'J' (Algae-1, Fungi-1) 2 X 2 = 4M
6. Identify the given specimen 'K' & slide 'L' (Bryophytes & Pteridophytes) 2 X 2 = 4M
7. Record 3M

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