BOARD OF STUDIES IN M.Sc BOTANY
2023-2024

DEPARTMENT OF BOTANY

SYLLABUS FOR M.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
M.Sc – BOTANY, SEMESTER – I,
PAPER CODE: 101: BIOLOGY AND DIVERSITY OF VIRUSES, BACTERIA AND FUNGI

Theory

UNIT – I
Ultrastructure and Chemistry of viruses, Isolation and purification of viruses, Replication and transmission of Viruses.
Mycoplasma like organisms and their role in carrying plant diseases. Diseases caused by Plant Viruses.

UNIT – II
General account and Ultrastructure of Archaebacteria and Bacteria,
Nutritional types (autotrophs and heterotrophs), Growth of Bacteria, Isolation of Bacteria. Reproduction in Bacteria (transformation, transduction and conjugation) Economic importance.

UNIT – III
General account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina.
Ultrastructure of Fungal cell, Fungal classification.

UNIT – IV
Reproduction in Fungi: Vegetative, Asexual and Sexual. Heterothallism, Heterokaryosis and Para sexuality.
Nutrition of Fungi: Saprobic, bio trophic, and symbiotic. Phylogeny of fungi
Fungi in industry, medicine and as food and as biocontrol agents. Mushroom cultivation (Oyster and Button Mushrooms) Lichens ultra-structure, types and significance

SUGGESTED LABORATORY EXERCISES

1. Morphological study of Stemonitis, Saprolegnia, Mucor, Morchella, Aspergillus, Agaricus, Cyathus, Synchitrium, Helminthosporium
2. Symptomotology of some diseased specimens – White rust, Powdery mildew, Green ear of Bajra, Rust of Wheat, Rust of Linseed, Tikka disease of ground nut, Red rot of sugarcane, Blast of rice, Citrus canker, and Tobacco mosaic disease.
3. Sterilization methods
4. 4Preparation of media and stains
5. Gram staining of bacteria

SUGGESTED READINGS & TEXT BOOKS

1. Kaursethi I and Surinder KW 2011. Text Book of Fungi and their Allies. Macmillan publishers, New Delhi, India.
2. Ram Reddy S & Reddy SM 2007. Essentials of Virology. Scientific publishers, Jodhpur, India.
3. Sharma K 2005. Manual of Microbiology Tools and Techniques. Ane Book, New Delhi, India.
4. Matthew RH 2004. Plant virology. 4th edition. Academic press an imprint of Elsevier, California, USA.
5. Prescott et al. 2003. Microbiology. McGraw Hill Education, New York.
6. Aneja KR 2003. Experiments in Microbiology, Plant pathology and Biotechnology. New Age International publishers, New Delhi.
7. Verma HN 2003. Basics of plant Virology. IBH publishing co. Pvt. Ltd., New Delhi.
8. Mehrotra KS and Aneja KR 2003. An Introduction to Mycology. New Age International Publishers, New Delhi.
9. Sullia SB and Shantharam S 2001. General Microbiology. Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
10. Reddy SM and Ram Reddy S 2000. Microbiology a Laboratory Manual. BSC Publishers and Distributors, Hyderabad.
11. Flint SJ, Enquist LW, Krug RM, Racaniello VR, Skalka AM 2000. Principles of Virology, Molecular Biology, Pathogenesis and Control. ASM press, Washington DC.
12. Rao AS 1999. Introduction to Microbiology. Prentice Hall of India Pvt. Ltd., Delhi.
13. Paul S 1995. Bacteria in Biology, Biotechnology and Medicine. 5th edition. John Wiley and son Ltd., UK.
14. Pelczar, Chan and Krieg 1993. Microbiology. 5th edition. McGraw Hill Education, New York.
15. Stainer RT, Ingraham JL, Wheelis ML and Painter PR 1987. General Microbiology. 5th Edition. Macmillan, London.
16. Smith KM 1968. Plant viruses. Elsevier, New York.
17. Rangaswamy G 1962. Bacterial Plant disease in India. Asia Publishing House, Bombay.
18. Agrios, G.N. 2005. Plant pathology. 5th ed. Academic press.
19. Allen T. Bull.2004. Microbial diversity and Bioprospecting. ASM Press, Washington.
20. Brock, T.D. & Madigan. 1991. Biology of Microorganisms. Prentice-Hall.
21. Dube, R.C. & D.K.Maheswari 2005. Microbiology. S.Chand & Co. Ltd., New Delhi.
22. Gilbert, O.L.2000. Lichens. Collins New Naturalist.
23. Ainsworth, G.C. Sparrow, F.K. and Susman, A.S. 1973. The Fungi-An advances treatise, Vol. I to VIB.
24. Alexopoulus, C.J. Mims, C.W. and Blackwel, M. 1996. Introductory Mycology, John Wiley & Sons Inc.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
M.Sc – BOTANY, SEMESTER – I,
PAPER CODE: 102: BIOLOGY AND DIVERSITY OF ALGAE AND BRYOPHYTES

UNIT – I

General account and thallus organization in the classification of Algae with special reference to Fritsch, Bold and Winny system of classification.
General account on Structure and Reproduction of myxophyceae (Nostoc, Oscillatoria) Rhodophyceae (Porfira, Gracilaria) Bacillariophyceae (Centrales, Pinnales)

UNIT – II

General account on Structure and Reproduction of Chlorophyceae (Chlamydomonous, Chara), Xanthophyceae (Vaucheria), Phaeophyceae (Sargassum),
Economic importance of Algae, Single cell protein culture (Spirulina and Chlorella)
Cultivation of economically important seaweeds—Cappaphagus, Laminaria, Carragenon

UNIT – III

Bryophytes
Morphology, Structure, Reproduction and Life history, Distribution, Classification and General account of Marchantiales (Riccia), Jungermanniales (Porella), Anthocerotales (Anthocerous)

UNIT – IV

Morphology, structure, reproduction and life history, distribution, classification, General account of Sphagnales (Sphagnum), Funariales (Funaria) and Polytrichales (polytrichum).
Economic and ecological importance of Bryophytes.

SUGGESTED LABORATORY EXERCISES

1. Examination of vegetative and reproductive morphology of Chlophyceae members.
2. Examination of Thallus structure and reproductive bodies of Xanthophyceae, Bacillariophyceae and Phaeophyceae members.
3. Examination of external and internal structure and reproductive organs of Rhodophyceae and Cyanophyceae members.
4. Field work to get acquaintance with locally available algae.
5. An examination of the external and internal structure and reproductive organs of the
6. genera, Riccia, Targionia,, Plagiochasma, Marchantia, Pellia, Porella, Anthoceras, Notothylus, Sphagnum, Funaria, Polytrichum.
7.

SUGGESTED READINGS & TEXT BOOKS

1. Bold, H.C and Wyne.M.J. 1978. Introduction to the algae
2. Chapman, V.J.1962. The Algae
3. Graham, J.E, Lee W. Wilcox & L.E.Graham 2008. Algae. 2nd ed. Bejamin Cummings
4. Fritsch,F.E.1945. The structure and reproduction of Algae Vols. 1& II. Cambridge University Press, London
5. Kumar, H.D.1988.Introductory Phycology
6. Kashyap, S. 1929. Liverworts of the Western Himalayas and Punjab Plains Part I and Part II.
7. Lewin,R.A. 1962. Physiology and Biochemistry of Algae
8. Morris, I 1967. An Introduction to the Algae
9. Presscot, G.W. 1969. The Algae- a review
10. Bernard Goffinet & A. Jonathan Shaw. 2008. Bryophyte Biology. 2nd ed. Cambridge
11. Parihar, N.S. 1991. Bryophyta
12. Puri,P. 1980. Bryophytes
13. Round, E.E. 1986. The Biology of Algae
14. Round, E.E. 1962. Ecology of algae
15. Smith, G.M. 1955. Cryptogamic Botany Vol. II Chopra, R.N. & P.K.Kumar, 1988. Biology of Bryophytes. Wiley Eastern.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
M.Sc – BOTANY, SEMESTER – I,
PAPER CODE: 103: BIOLOGY AND DIVERSITY OF PTERIDOPHYTES AND GYMNOSPERMS

Theory
Pteridophytes

UNIT – I
General characters and classification of Pteridophytes.
Salient features and classification of Psilophytosida (Rhynia), Psilotopsida (Psilotum), Lycopsida, (Lycopodium) Sphenopsida (Equisetum) and Pteropsida (Pteris).

UNIT – II
Origin and phylogeny of pteridophytes - Telome theory, Stelar Evolution, Heterospory and seed habit. Economic importance of Pteridophytes

Gymnosperms

UNIT – III
General account and classification of Gymnosperms
Geological periods, fossil formation and their types
General account of Pteridospermales, Bennettitales, Pentoxylales, Cordaitales

UNIT - IV
Structure and Reproduction of living Gymnosperms: Cycadales(Cycus), Coniferales(Taxus) and Gnetales(Ephidra); their economic importance
Endemic and endangered Gymnosperm species of India

SUGGESTED LABORATORY EXERCISES

Pteridophytes

1. Examination of the external features, anatomy and reproductive structures of Psilotum, Selaginella, Isoetes, Equisetum, Adiantum, Salvinia and Azolla.
   Observations of the slides of the following fossil plants:
   Rhynia, Lepidodendron, Lepidocarpon, Miadesmia, Sphenophyllum, Calamites.

Gymnosperms

2. Examination of the external features, anatomy (TS, TLS&RLS) and reproductive structures of Ginkgo, Pinus, Cupressus, Cryptomeria, Araucaria, Ephedra & Gnetum.
   Study of fossil gymnosperms from prepared slides. Lyginopteris, Lagenostoma, Medullosa, Triganocarpus, Conostoma, Heterangium, Cordaites

SUGGESTED READINGS & TEXT BOOKS

1. Arnold, C.A. 1974. An introduction to Paleobotany, New York
2. Agashe, S.N. 1995. Palaeobotany. Oxford & IBH, New Delhi.
3. Bhatnagar, S.P. & Alok Mitra 1997. Gymnosperms. New Age Int. (P) Ltd.
4. Charles C. Beck and Charles B. Beck (Ed.). 1988. Origin and Evolution of Gymnosperms. CUP.
5. Kramer, K.U., P. S. Green & Erich Gvtz. 2008. Pteridophytes and Gymnosperms. Springer.
6. Sambamurty AVSS. 2005. A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. Ik International Pvt Ltd.
7. Vashista, P.C. 2005. Gymnosperms.S. Chand & Co, New Delhi.
8. Vashista, P.C. 2005. Pteridophyta. Rev. ed. By Sinha & Anil, S. Chand & Co, New Delhi.
9. Saxena P and Pathak C. 2012. A Text Book of Pteridophyta., Wisdom Press, New Delhi.
10. Chamberlain, C.J. 1935. Gymnosperms structure and evolution, University of Chicago Press
11. Coulter, J.M. and Chamberlain, C.J. Morphology of Gymnosperms, Central Book Depot, Allahabad
12. Evans, A.J. 1936. Morphology of Vascular Plants (Lower groups) McGraw Hill Book Company, New York
13. Maheswari, P. and Vasil, V. Genetum CSIR (Monographs)
14. Parihar, N.S. 1996. Biology and Morphology of Pteridophytes, Central Book Depot, Allahabad
15. Sporne, K.R. 1962. The Morphology of Pteridophytes, Hutchinson University Library

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
M.Sc – BOTANY, SEMESTER – I,
PAPER CODE: 104: CYTOLOGY AND CYTOGENETICS

Theory

UNIT – I

Nucleus – Structure of nuclear membrane, Nuclear pore complex; Chromosome structure, molecular organization of chromatin, centromeres and telomeres; Special types of chromosomes
(lamp brush, Polytene)
Chromosome identification - Karyotype analysis; Chromosome banding techniques; Flow cytometry and confocal microscopy in karyotype analysis; computer assisted karyotype analysis – chromosome micro-dissection and micro-cloning.

UNIT – II

Chromosomal structural aberrations – Origin, meiosis and breeding behavior of duplications, deficiencies and inversions and interchanges; types of inversions. Robertsonian translocations; Basic concept of Complex translocation heterozygotes
Chromosomal numerical aberrations I – Classification of numerical aberrations; Aneuploids– Trisomics (Primary, Secondary, Tertiary), Monsosomic and nullisomics – meiotic behavior and chromosome mapping

UNIT – III

Chromosomal numerical aberration II – Polyploids – Origin and production of auto and allopolyploids; Meiosis in autotetraploid ; Genome analysis in Tobacco, wheat and Arabidopsis
Nuclear DNA content – C-value paradox, hyperchromicity, Cot curves and significance-Molecular organization of nuclear genome, cp-DNA, Mt-DNA

UNIT – IV

Cell Cycle and its regulation – check points, cyclins and cyclin dependent kinases, experimental
control of cell division
Apoptosis - mechanism and significance; Initiation of cancer at cellular level – proto oncogenes and oncogenes

SUGGESTED LABORATORY EXERCISES

1. Observation and identification of meiotic stages.
2. Preparation of karyotypes and construction of ideograms
3. Observation of slides/photographs showing structural and numerical aberrations and chromosome banding.

SUGGESTED READINGS & TEXT BOOKS

1. Singh RJ. 2014. Plant Cytogenetics. 2ndEdition.CRC Press, India
2. David M. Prescott. Cells. 1988. Jones and Bartlett Publ. Boston.
3. Gupta, P.K. 1995. Cytogenetics. Rastogi & Company, Meerut.
4. Pierce BA. 2013. Genetics: A Conceptual Approach. 5th Edition. W. H. Freeman, California.
5. Swanson, Merz and Young. Cytogenetics. Prentice Hall. India.
6. Sybenga, J. 1973. General Cytogenetics. North Hall and American Elsevier.
7. C. B. Powar. 1992. Cell Biology. Himalaya Publishers, New Delhi
8. Ajoy Paul. 2015. Text Book of Cell and Molecular Biology. Books and Allied Pvt, Ltd
9. De Robertis E.D.P and E.M.F. De Robertis. Cell and Molecular Biology 2001. CBS Publisher and Distributors.
10. Darnell, Lodish and Baltimore: Molecular Biology, Scientific American Books, New York
11. Bass H and Birchler J. 2011. Plant cytogenetics: Genome structure and chromosome Function Springer, New York