BOTANY I YEAR SYLLABUS FOR 2020-21 & 2021-22

CBCS / Semester System (w.e.f. 2020-21 Admitted Batch)I Semester /Botany Core Course - 1

Fundamentals of Microbes and Non-vascular Plants

(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

(Total hours of teaching – 60 @ 04 Hrs./Week)

Theory:

Learning Outcomes:

On successful completion of this course, the students will be able to:

- Explain origin of life on the earth.
- Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- Classify fungi, lichens, algaeand bryophytes based on theirstructure, reproduction and life cycles.
- Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
- Recall and explain theevolutionary trends among amphibians of plant kingdom for their shift to land habitat.
- Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

Unit – 1:Origin of life and Viruses 12Hrs.

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; multiplicationof 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 – 2:Special groups of Bacteria and Eubacteria 12Hrs.

1. Brief account of Archaebacteria, 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, reproductionand 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
- Presscott, 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 UniversityPress 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.

Practical syllabus ofBotanyCoreCourse – 1/ Semester – I
Fundamentals of Microbes and Non-vascular Plants
(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)
(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

Course Outcomes: Onsuccessful completion of this practical course, student shall be ableto;

1. Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears.
2. Observe and identify microbes and lower groups of plants on their own.
3. Demonstrate the techniques of inoculation, preparation of media etc.
4. Identify the material in the permanent slides etc.

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 creditsduring 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 Archaebacteriaand 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.

II Semester /Botany Core Course – 2

Basics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)

(Total hours of teaching – 60 @ 02 Hrs./Week)

Theory:

Learning Outcomes:

On successful completion of this course,the students will be able to:

- Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycles.
- Justifyevolutionary trends in tracheophytes to adapt for land habitat.
- Explain the process of fossilization and compare the characteristics of extinct and extant plants.
- Critically understand various taxonomical aids for identification of Angiosperms.
- Analyze the morphology of the most common Angiospermplantsof their localities and recognize their families.
- Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welfare.
- Locate different phytogeographical regions of the world and India and can analyze their floristic wealth.

Unit – 1:Pteridophytes **12 Hrs.**

1. General characteristics of Pteridophyta; classification of Smith (1955)uptodivisions.
2. Occurrence, morphology,anatomy, reproduction (developmental details are notneeded) and life historyof (a) *Lycopodium* (Lycopsida) and (b) *Marsilea* (Filicopsida).
3. Stelar evolution in Pteridophytes;
4. Heterospory and seed habit.

Unit – 2:Gymnosperms **14 Hrs.**

1. General characteristics of Gymnosperms; Sporneclassification uptoclasses.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) *Cycas*(Cycadopsida) and (b) *Gnetum* (Gnetopsida).
3. Outlines of geological time scale.
4. A brief account on *Cycadeoidea.*

Unit – 3:Basic aspects of Taxonomy **13Hrs.**

1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques,BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the following families: (a) Annonaceae (b) Curcurbitaceae

Unit – 4: Systematic Taxonomy **13 Hrs.**

1. Systematic description and economic importance of the following families:
   (a) Asteraceae (b) Asclepiadaceae (c)Amaranthaceae(d) Euphorbiaceae
   (e) Arecaceaeand (f) Poaceae
2. Outlines of Angiosperm Phylogeny Group (APG IV).

Unit – 5:Phytogeography **08 Hrs.**

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Endemism – types and causes.
3. Phytogeographic regions of World.
4. Phytogeographic regions of India.
5. Vegetation types in Andhra Pradesh.

Text books:

1. Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad
2. Botany – II (Vrukshasastram-II) : Telugu Akademi, Hyderabad
3. Acharya, B.C., (2019) *Archchegoniates*, Kalyani Publishers, New Delhi
4. Bhattacharya, K., G. Hait&Ghosh, A. K., (2011) *A Text Book of Botany, Volume-II,* New Central Book Agency Pvt. Ltd., Kolkata
5. Hait,G., K.Bhattacharya&A.K.Ghosh (2011) *A Text Book of Botany, Volume-I,*
   i. New Central Book Agency Pvt. Ltd., Kolkata
6. Pandey, B.P. (2013)*College Botany, Volume-I,* S. Chand Publishing, New Delhi
7. Pandey, B.P. (2013)*College Botany, Volume-II,* S. Chand Publishing, New Delhi

Books for Reference:

1. Smith, G.M. (1971)*CryptogamicBotanyVol. II*., Tata McGraw Hill, New Delhi
2. Sharma,O.P.(2012)Pteridophyta. Tata McGraw-Hill, New Delhi
3. Kramer, K.U.&P. S. Green (1990) *The Families and Genera of Vascular Plants, Volume –I*: *Pteridophytes and Gymnosperms*(Ed.K.Kubitzki) Springe-Verlag, New York
4. Bhatnagar, S.P. &AlokMoitra (1996)*Gymnosperms*. New Age International, New Delhi
5. Coulter, J.M. &C.J.Chamberlain(1910) *Morphology of Gymnosperms,*The University of Chicago Press, Chicago, Illinois
6. Govil, C.M. (2007)*Gymnosperms : Extinct and Extant*. KRISHNA PrakashanMedia (P) Ltd.Meerut& Delhi
7. Sporne, K.R.(1971)*The Morphology of Gymnosperms.*Hutchinsons Co. Ltd., London
8. Arnold, C.A., (1947) *An introduction to Paleobotany* McGraw –Hill Book Company,INC, New York
9. Stewart,W.N., and G.W.Rothwell (2005) *Paleobotany and the evolution of plants*
   i. Cambridge University Press, New York
10. Lawrence, George H.M. (1951) *Taxonomy of Vascular Plants.* The McMillan Co., New York
11. Heywood, V. H. and D. M. Moore (1984)*Current Concepts in Plant Taxonomy.*
   i. Academic Press, London.
12. Jeffrey, C. (1982) *An Introduction to Plant Taxonomy.* Cambridge UniversityPress, Cambridge. London.
13. Sambamurty, A.V.S.S. (2005) *Taxonomy of Angiosperms* I. K .International Pvt. Ltd., New Delhi
14. Singh, G. (2012*). Plant Systematics: Theory and Practice.*Oxford & IBH Pvt. Ltd., NewDelhi.
15. Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA,U.S.A.
16. Cain, S.A . (1944) *Foundations of Plant Geography*Harper & Brothers, N.Y.
17. Good, R. (1997) *The Geography of flowering Plants (2nd Edn.)*Longmans, Green&
   i. Co., Inc., London & Allied Science Publishers, New Delhi
18. Mani, M.S (1974) *Ecology & Biogeography of India*Dr. W. Junk Publishers, The Haque

Practical syllabus ofBotanyCore Course – 2/
Semester – IIBasics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)(Totalhours of laboratory exercises 30 Hrs. @ 02 Hrs. /Week)

Course Outcomes:

On successful completion ofthiscourse students shall be able to:

1. Demonstrate the techniques of section cutting, preparing slides, identifying of thematerialand drawing exact figures.
2. Compare and contrast the morphological, anatomical and reproductive features ofvascular plants.
3. Identify the local angiosperms of the families prescribed to their genus and specieslevel and prepare herbarium.
4. Exhibit skills of preparing slides, identifying the given twigs in the lab anddrawing figures of plant twigs, flowers and floral diagrams as they are.
5. Prepare and preserve specimens of local wild plants using herbarium techniques.

Practical Syllabus:

1. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/specimens/ mounts :
   a. Pteridophyta : *Lycopodium* and *Marselia*
   b. Gymnosperms : *Cycas*and *Gnetum*
2. Study of fossil specimens of *Cycadeoidea* and *Pentoxylon*(photographs /diagramscan be shown if specimens are not available).
3. Demonstration of herbarium techniques.
4. Systematic / taxonomicstudy of locally available plants belonging to the families prescribed in theory syllabus. (Submission of 30 number of Herbarium sheets ofwild plants with the standard system is mandatory).
5. Mapping of phytogeographical regions of the globe and India.