

SHRI DHARMASTHALA MANJUNATHESHWARA COLLEGE, UJIRE-574240

(AUTONOMOUS)

(Re-Accredited by NAAC at 'A' Grade with CGPA 3.61 out of 4)



DEPARTMENT OF BOTANY

Syllabus

(With effect from 2019-20)



SRI DHARMASTHALA MANJUNATHESHWARA COLLEGE, UJIRE-574240

(Autonomous)

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DEPARTMENT OF BOTANY

Syllabus of

Bachelor's Degree in

Botany

(CHOICE BASED CREDIT SYSTEM)

2019– 2020 onwards.

Approved by the: BOS meeting held on 14-06-2019

Academic Council meeting, held on 10-10-2019



VISION

Empowering the students through competency development in lifescience knowledge & Skills with ethical values.

MISSION

- To inculcate scientific temperament to analyse the natural facts with logical thinking and scientific veracity.
- Adopting learner centered approach by the staff.
- To Provide & Maintain good laboratory facilities
- Giving emphasis on character building
- To develop a passion towards ecological developments and affinity towards conservation strategies.



Learning outcomes
Faculty of Science – Botany
Programme Specific Outcomes

PSO1: Understand the morphological and structural organization of Cryptogams and Phanerogams, economics Botany and plant utilization in concern with human life, diversity of national plant wealth, developmental biology of plants and industrial application of microorganism

PSO2: Understand the concept and mechanism of plant physiology

PSO3: Understand the various metabolic pathways in plants.

PSO4: Understand structure and functioning of the diverse ecosystems.

PSO5: Analysis and evaluation of the biodiversity status with due importance to the conservation strategies.

PSO6: Correlation of plant structures in carrying out physiological functions of plants

PSO7: Understand & recall the Molecular and cyto-genetic basis for plant structures & functions

PSO8: Undertake self-employment in the fields such as mushroom Cultivation, organic manure preparation, horticultural plant production, cultivation of crops in poly-house condition, plant tissue culture laboratories etc



SDM College (Autonomous), Ujire - 574240
COURSES AND CREDITS
B.Sc. with Botany as an Optional Subject
Department of Botany

	Semester-wise Course Topics	Teaching hrs/ week	Exam duration (Hrs)	Marks			No. of Credits
				I.A	Exam	Total	
SEMESTER - I							
Group I	BSCBOC 131 Microbiology and Phycology (T)	4	3	20	80	100	02
	BSCBOP 132 Microbiology and Phycology (P)	3	3	10	40	50	01
Group II	BSCBOCE 133 Elective Course:	2	2	10	40	50	01
SEMESTER - II							
Group I	BSCBOC 181 Mycology, Lichens, Plant Pathology & Bryophytes (T)	4	3	20	80	100	02
	BSCBOP 182 Mycology, Lichens, Plant Pathology & Bryophytes (P)	3	3	10	40	50	01
Group II	BSCBOCE 183 Elective Course:	2	2	10	40	50	01
SEMESTER - III							
Group I	BSCBOC 231 Pteridophytes, Gymnosperms and Angiosperm embryology (T)	4	3	20	80	100	02
	BSCBOP 232 Pteridophytes, Gymnosperms and Angiosperm embryology (P)	3	3	10	40	50	01
Group II	BSCBOCE 233 Elective Course:	2	2	10	40	50	01
SEMESTER - IV							
Group I	BSCBOC 281 Taxonomy and Economic Botany (T)	4	3	20	80	100	02
	BSCBOP 282 Taxonomy and Economic Botany (P)	3	3	10	40	50	01
Group II	BSCBOOE 283 Open Elective Course:	2	2	10	40	50	01
SEMESTER - V							
Group I	BSCBOC 331 Plant Physiology I & Ecology I (T1)	3	3	20	80	100	02
	BSCBOC 332 Cell Biology, Molecular Biology and Genetics (T2)	3	3	20	80	100	02
	BSCBOP 333 Plant Physiology I & Ecology I (P1)	2	4	20	80	100	02
	BSCBOP 334 Cell Biology, Molecular Biology and Genetics (P2)	2					
SEMESTER - VI							
Group I	BSCBOC 381 Plant Physiology II & Ecology II (T1)	3	3	20	80	100	02
	BSCBOC 382 Plant Anatomy, Plant Propagation and Applied Botany (T2)	3	3	20	80	100	02
	BSCBOP 383 Plant Physiology II & Ecology II (P1)	2	4	20	80	100	02
	BSCBOP 384 Plant Anatomy, Plant Propagation and Applied Botany (P2)	2					
	T = Theory, P = Practicals					Total Credits	28



List of Elective Courses:

BSCBOCE 133: Mushroom Cultivation Technology

BSCBOCE 183: Herbal Technology

BSCBOCE 233: Vegetative and Reproductive Morphology of Angiosperms

BSCBOOE 283: Plant Diversity for Human Welfare



B.Sc. Degree – Botany

SEMESTER – I

BSCBOC 131: Microbiology and Phycology -Theory

Objectives:

- To study the diversity & distribution of microbes
- To appreciate the ultrastructure, reproductive features and mode of transmission of viruses & bacteria
- To study the plant diseases caused by microbes.
- To study the diversity distribution, thallus organization, reproduction and economic significance of Blue greens & algal representatives.
- To understand economic importance of lower cryptogams.

Total 48 hrs

UNIT – 1

12 hrs

Botany; History & Scope: Introduction to Botany, main branches and scope. Contributions of Indian Botanists – Sir J. C. Bose, Birbal Sahni, P. Maheshwari, B.G.L. Swamy, E. K. Janaki Ammal and M. S. Swaminathan. Whittaker's Five kingdom system of classification of organisms with examples.

Viruses: Discovery, occurrence, nomenclature, morphology, chemical nature, replication, transmission, infectivity and symptoms of plant viral diseases with examples. A detailed account of TMV and T4 Bacteriophage.

Phytoplasma: Nature, structure and reproduction; Sandal spike disease – symptoms and management.

UNIT- 2

12hrs

Bacteria: Discovery, distribution, morphology, nutrition, spore formation and reproduction- budding, fission, conjugation, transformation and transduction.

Economic importance- Beneficial and Harmful aspects.

Fritsch's classification of algae up to the level of classes with examples.

Myxophyceae – General characteristics; Ultra structure of cyanobacterial cell and heterocyst. Thallus structure of *Gloeocapsa*, *Nostoc*, *Oscillatoria* and *Scytonema*.

Algae: Economic importance of algae:

Useful aspects- food, SCP with a special reference to *Spirulina*, industrial products, medicine, sewage treatment, bio-fertilisers, pollution indicators and energy source. Harmful aspects- algal blooms, algal toxins and parasitic algae.

UNIT – 3

12hrs

Algae – Occurrence with examples: aquatic, terrestrial and extreme habitats.

Thallus organization with examples: unicellular- *Chlorella*, *Chlamydomonas*, colonial- *Volvox*, filamentous- *Spirogyra*, *Oedogonium*, *Cladophora*, pseudo parenchymatous- *Polysiphonia*, siphonaceous - *Vaucheria*, parenchymatous - *Ulva*.



General methods of reproduction with examples: vegetative –fission, fragmentation, hormogones and tubers. Asexual - exospore, endospore, nanospore, akinetes, zoospores, aplanospores, hypnospores and tetraspores. Sexual – isogamy, anisogamy and oogamy. Pigmentation in different classes of algae.

Chlorophyceae: Classification, thallus structure and reproduction of *Oedogonium* & *Chara*

UNIT – 4

12hrs

Xanthophyceae:

Classification, thallus structure and reproduction of *Vaucheria*

Bacillariophyceae:

Types of diatoms with examples: pennales and centrales. Classification, thallus structure and reproduction of a pennales diatom (*Pinnularia/Navicula*).

Phaeophyceae:

Classification, thallus structure and reproduction of *Sargassum*.

Rhodophyceae:

Classification, thallus structure and reproduction of *Polysiphonia*.

Bioprospecting and Sea weed Culture

Course Outcomes

CO1: Understanding the diversity & distribution of microbes

CO2: Appreciation of the ultra structure, reproductive features and mode of transmission of viruses & bacteria

CO3: Analysis of the plant diseases caused by microbes

CO4: Understanding the diversity, distribution, thallus organization, reproduction and economic significance of Blue greens & algal representatives.

CO5: Articulation of the economic importance of lower cryptogams.



SEMESTER – I

BSCBOP 132: Microbiology and Phycology –Practicals

(10 practicals of 3 hrs duration each, One practical per week)

1. Microscopy technique: Study of Light compound and Dissecting microscopes – Parts, working Principle, handling and preparation of temporary mountings
2. Study of TMV and Phytoplasma with the help of electron micrographs.
Study of viral and phytoplasma diseases mentioned in theory with the help of specimens/photographs
3. Microscopic observation of Bacterial cells by simple staining
Differential staining of Bacteria - Gram's staining and Study of root nodule Bacteria
4. Study of thallus structure of *Nostoc*, *Oscillatoria* and *Scytonema*
5. Study of thallus and reproductive structures of *Volvox* & *Spirogyra*
6. Study of thallus and reproductive structures of *Oedogonium*
7. Study of thallus and reproductive structures of *Chara*
8. Study of thallus and reproductive structures of *Vaucheria* and Diatoms
9. Study of thallus and reproductive structures of *Sargassum*
10. Study of thallus and reproductive structures of *Polysiphonia*

Note:

- The students shall be taken for field visit to some nearby places for specimen collection.
- The students shall submit THREE specimens with field notes in a field note book during practical examination (the specimens should be from Viruses, Bacteria or Algae).

REFERENCES

Youtube:

<https://www.youtube.com/watch?v=kqkdyPsk4y4>

<https://www.khanacademy.org/science/biology/biology-of-viruses/virus-biology/v/viruses>

<https://www.khanacademy.org/science/high-school-biology/hs-human-body-systems/hs-the-immune-system/v/viral-replicaiton-lytic-vs-lysogenic>

<https://www.youtube.com/watch?v=qCn92mbWxd4>

<https://www.youtube.com/watch?v=R5WrU72Ja4A>

<https://youtu.be/vcYPI6y-Udo>

<https://youtu.be/CB2XlpD-Ld4>

<https://youtu.be/bf6RvQQNZ8Q>



Google

https://biocyclopedia.com/index/algae/algae/occurrence_and_distribution.php
<http://www.biologydiscussion.com/algae/algae-definition-occurrence-and-affinities/53530>
<http://www.biologydiscussion.com/algae/thallus-organisation-in-algae-botany/53555>
<http://www.biologydiscussion.com/algae/reproduction-in-algae-3-modes/46735>
<https://www.easybiologyclass.com/life-cycle-in-algae-lecture-notes-animations/>
<http://sparknotes4pak.blogspot.com/2012/03/describe-pigmentation-and.html>

Basic reading

1. Kumar H.D. 1990. Introductory Phycology, Affiliated East- West Press.
2. Lee R.E. 1980. Phycology, Cambridge Univ. Press
3. Luria S.E. et al 1978. General Virology 3 edition John Wiley & Sons
4. Mandahar C.L. 1987. Introduction to Plant viruses, S. Chand.
5. Nester W.E. et al 1983. Microbiology 3 edition John Wiley & Sons.
6. Pandey S.N. & P.S. Trivedi. 1977. A text book of Botany Vol. L, Vikas
7. Pelczar M.J., E.C.S. Chan & N.R. Krieg. 1988. Microbiology 5 edition, Mc Grow Hill
8. Purohit S.S. 1989. Viruses, Bacteria & Mycoplasmas, Agrobotanical Publ.
9. Smith G.M. 1955. Cryptogamic Botany Vol I, Algae & Funghi. McGraw Hill Book Co. Inc.

Additional Reading

10. Ananthanarayanan R. & C.K. Jayaram Paniker. 1996. Text Book of Microbiology, Orient Longman
11. Aneja K.R. 1966. Experiments in Microbiology, Plant Pathology, tissue culture & Mushroom cultivation 2 edition Wishwa Prakashan, New Delhi.
12. Bhatia K.N. 1994. Algae, R. Chand
13. Desikachary T.V. 1959. Cyanophyta, ICAR, New Delhi
14. Fritsch F.E. 1952. The Structure & Reproduction of the Algae Vol. I & II Cambridge at the Univ. Press.
15. Frobisher M.R.D. Hinsdill, K.T. Crabtree, C.R. Goodheart. 1974. Fundamentals of Microbiology Sannders Co. 9 edition
16. Jacquelyn G. Black. Microbiology, Principles and Explorations, Prentice hall
17. Kumar H.D. & H.N. Singh. 1996. A Text Book of Algae, East West Press, New Delhi
18. Madigan M.T., J.M. Martinko, J.Parker, 2003. Biology of Microorganism 10 edition
19. Presacott G.W. 1969. The Algae: A review Thomas Nelson & Sons Ltd.
20. Smith K.M. 1990. Plant viruses 6 edition Universal Book stall New Delhi
21. Srivastava H.N. 1998. Algae, Pradeep
22. Vasishtha B.R., A.K. Sinha & V.P. Singh. 2004. Botany for degree students – Algae, S. Chand.
23. Venkataraman G.S. 1972. Algal biofertilisers & rice cultivation. Today & Tomorrows Printers & Publishers, New Delhi.



B.Sc. Degree – Botany

SEMESTER – II

BSCBOC 181: Mycology, Lichens, Plant Pathology & Bryophytes -Theory

Objectives:

- To study the diversity & distribution of fungi
- To study the diversity, distribution, classification, morphology, reproduction and life cycle of Fungi.
- To study the causative agent, etiology, epidemiology, management of selected plant diseases.
- To study the diversity distribution thallus organization reproduction and economic significance of lichens.

Total 48hrs

UNIT – 1

12 hrs

Fungi:

Salient features, mycelial organization- prosenchyma, pseudo parenchyma, rhizomorph and sclerotium.

General methods of reproduction with examples: vegetative -fragmentation, fission and budding. Asexual – zoospores, chlamydospores, oidia and aplanospores. Sexual – planogametic copulation, gametangial contact, gametangial copulation, spermatization and somatogamy.

Alexopoulos system of classification up to the level of classes with examples.

Type study of the following:

Class ZYGOMYCETES – Structure and reproduction of *Rhizopus*

Class ASCOMYCETES – Structure and reproduction of *Aspergillus* and *Peziza*

Class BASIDIOMYCETES – Structure, reproduction and life cycle of *Puccinia*.

UNIT – 2

12 hrs

Fungi and Human welfare:

Economic Importance – Edible Mushrooms, Fungal Antibiotics, Fermentation process.

Ecological Importance as decomposers.

LICHENS

General account, structure, nutrition, reproduction and economic importance of Lichens

Mycorrhizae: definition, types – ecto and endomycorrhizae, significance to plants and fungi.

UNIT – 3

12hrs

PLANT PATHOLOGY

Introduction to Plant pathology, Types of diseases, Etiology, Epidemiology, Symptoms, transmission and disease management of the following:

1. Katte disease of cardamom
2. Bunchy top disease of banana
3. Citrus canker



4. Bud rot of coconut
5. Koleroga of arecanut
6. Stem bleeding disease of coconut
7. Leaf rust of coffee
8. Blast disease of rice
9. Root knot of Brinjal.

An account of seed borne diseases.

Biological control of plant diseases (*Trichoderma*), Biopesticides (**Neem**).

UNIT – 4

12hrs

BRYOPHYTA

General characters & Classification (Home's)

Study of distribution, general characters, structure and reproduction of the following:

Class- HEPATICOPSIDA - *Riccia* and *Porella*

Class – ANTHOCEROTOPSIDA - *Anthoceros*

Significance of *Anthoceros* in the evolution of land plants

Class BRYOPSISIDA –*Funaria*.

Ecological Importance of **Bryophytes**.

Special activity:

- Students should submit assignment on Horticultural crops
- Field visits to study plants of commercial and Horticultural importance.

Course Outcomes

CO1: Understanding the diversity & distribution of fungi

CO2: Understanding the diversity, distribution, classification, morphology, reproduction and life cycle of Bryophytes.

CO3: Learning the causative agent, etiology, epidemiology, management of selected plant diseases.

CO4: Comparison of the diversity, distribution, thallus organization reproduction and economic significance of lichens



SEMESTER – II

BSCBOP 182: Mycology, Lichens, Plant Pathology & Bryophytes - Practicals

(10 practical of 3 hrs duration each, one practical per week)

1. Study of Asexual & Sexual stages of *Rhizopus* and asexual stage of *Aspergillus*
2. Study of Fructification of *Peziza* and study of stages in the life cycle of *Puccinia*
3. Study of Lichens – types, asexual stages and apothecial study
4. Demonstration of seed borne fungi by standard blotter method. & **Mycorrhiza**
5. Katte disease of Cardamom, Bunchy top disease of banana, Citrus canker, Bud rot of coconut and Kole roga of Arecanut
6. Stem bleeding of Coconut, Leaf rust of Coffee, Blast disease of Rice and Root knot disease of Brinjal
7. Study of thallus and reproduction of *Riccia*
8. Study of thallus and reproduction *Porella*
9. Study of thallus and reproduction of *Anthoceros*
10. Study of thallus and reproduction of **Moss**. (locally available)

Note:

- Study of plant diseases mentioned in the theory (specimens/photos/ herbarium Sheets can be used)
- The students shall be taken to some nearby places for collection of available specimens.
- The students shall submit THREE specimens with field notes in a field note book during practical examination (The specimens should be from Fungi, Plant diseases, Lichens and Bryophytes)

REFERENCES

Youtube:

https://www.youtube.com/watch?v=cfUGCZIP6_0

<https://www.youtube.com/watch?v=Kax4n7vaH7M>

<https://www.youtube.com/watch?v=utjtJHmh75M>

<https://www.youtube.com/watch?v=bwhseVfWHPk>

Basic Reading

1. Alexopoulos C.J. 1962. Introductory Mycology Wiley Eastern Ltd
2. Kamat M.N. 1967. Introductory Plant Pathology 3 edition. Prakash Publ. House, 360, Budhwar Pet, Poona-2
3. Misra A. & R.P. Agarwal 1978. Lichens- A Preliminary Text Oxford & IBH
4. Pandey B.P. 1999. Plant Pathology S. Chand & Co.
5. Smith G.M. 1955. Cryptogamic Botany Vol 1. Algae & Fungi, McGraw Hill Book Co. Inc. 2 edition
6. Vasishtha B.R. 1963. Bryophyta. S.Chand.



Additional Reading

7. Agrios G.N. 1969. Plant Pathology 4 edition Harcourt Asia Pte Ltd. Academic Press.
8. Barnett H.L. (1972) & B.B. Hunter 3/e illustrated genera of imperfect Fungi. Burgess Publ. Co. Minnesota
9. Dube H.C. 1983. An Introduction to Fungi Vikas Publications
10. Dubey R.C. & Maheshwar K.(200) A Text book of Microbiology, S. Chand
11. Jha D.K. (1995), Laboratory Manual of Seed Pathology. Vikas
12. Pandey S.N. & P.S. Trivedi 1977. A text Book of Botany vol I. Vikas
13. Rangaswami G. 1972. Diseases of Crop Plants in India. Prentice Hall of India Pvt. Ltd. New Delhi
14. Sharma P.D. (1989) Plant Pathology Rastogi
15. Singh R.S. 1963. Plant diseases 2 edition. Oxford & IBH
16. Smith G.M. 1955. Cryptogamic Botany Vol II. Bryophytes and Pteridophytes. Mc.GrowHill.
17. Vashishta B.R. 1999. Fungi 9 edition S. Chand Co
18. Srivathsava H.N. 1988 Bryophyta. Pradeep.
19. Webster J. 1980. Introduction to Fungi 2 edition



B.Sc. Degree – Botany

SEMESTER – III

BSCBOC 231: Pteridophytes, Gymnosperms and Angiosperm Embryology – Theory

Objectives:

- To study the diversity & distribution of cryptogams
- To study the distribution, morphology, reproduction, life cycle and economic significance of Pteridophytes and Gymnosperms.
- To study the stages of formation and development of plant embryo.

Total 48 hrs

UNIT – I

12 hrs

Pteridophytes: General characters and Smith's classification

Psilotum:

Morphology of sporophyte and gametophyte, anatomy of stem and synangium.

Lycopodium:

Morphology of sporophyte. Stem anatomy of *L. cernuum*, *L. Clavatum* and *L. phlegmaria*.

Morphology and anatomy of strobilus of *L. cernuum*, *L. phlegmaria*. Structure of the gametophyte.

Selaginella:

Morphology of sporophyte, anatomy of stem, rhizophore and strobilus. Heterospory and seed habit with its significance.

Equisetum:

Morphology of sporophyte, anatomy of internodal part of stem. Structure of cone- L.S. of cone, sporangiophore and spores with elaters.

UNIT – II

12 hrs

Pteridophytes (contd.) and Palaeobotany:

Ophioglossum:

Morphology of sporophyte, Structure of spike- L.S.

Osmunda-

Morphology of sporophyte, Structure of tassel – T.S.

Hymenophyllum : Study of morphology and Sorus.

Pteris/Pteridium: Study of morphology and asexual reproduction.

Marsilea:

Morphology of sporophyte, anatomy of rhizome, structure of sporocarp – H.L.S.

Palaeobotany: Introduction, Geological time scale, Types of plant fossils – compressions, impressions, incrustations, petrifications and actual remains with examples.

Fossil Pteridophytes: Rhynia – Morphology of sporophyte, anatomy of stem, structure of sporangium. Lepidodendron – Morphology of sporophyte, anatomy of stem.

UNIT – III

12 hrs

Gymnosperms:

General characters and classification, Brief account of Origin and Evolution



Economic importance of Gymnosperms : Timber, Medicine and food

Study of the following genera.

1. **Cycas** :Morphology, Anatomy of coralloid root & leaflet, study of reproductive organs – male cone, microsporophyll, megasporophyll, structure of ovule.
 2. **Pinus**: Morphology, Anatomy of Stem – young and old, needle. Study of reproductive organs – male & female cone, structure of pollen grain, structure of ovule.
 3. **Gnetum**: Morphology, anatomy- anomalous secondary growth of stem, study of reproductive organs - male & female cone, structure of ovule
- Xerophytic characters of Cycas & Pinus, Affinities of Gnetum with Angiosperms.

UNIT – IV

12 hrs

EMBRYOLOGY OF ANGIOSPERMES

1. General life cycle of angiosperms showing alternation of generation.
2. Development of male reproductive structures: Brief account on structure of stamen. Structure of young anther, mirosprogenesis,structure of mature anther T.S. Nature of pollen tetrads,structure of microspore, formation of male gametophyte,
3. Development of female reproductive structures: Brief account on structure of carpel. Structure of anatropus ovule, types of ovules and placentation. Megasporogenesis with breif note on tenunucellate and cracinucellate types of development. Monosporic- (*Polygonum*) type of embryo sac development. Study of female gametophyte: structure of embryosac with functional details of egg apparatus, antipodal cells and primary nucleus.

4. Pollination

Types of pollination: self pollination- homogamy, cleistogamy, cross pollination – **entemophily**, adaptations for entemophily-colour, nector, scent. **Anemophily** – pollination in maize. Brief note on **hydrophily & zoophily** (birds, squirrels, bats and snails – one example for each)

Advantages & disadvantages of self & cross pollinations.

Contrivances to cross pollination: dicliny, self sterility, dichogamy, heterostyly and herkogamy with one example each.

5. Stages of Fertilization

Entry of pollen tube - chalazogamy, porogamy & mesogamy.

Process & significance of double fertilization and triple fusion.

6. Post fertilization processes

Endosperm: development of endosperm, types of endosperm development – nuclear type, cellular type and helobial type.

Seed: development of monocot embryo, structure of maize grain (*Zea mays*).
Development of dicot embryo, structure of gram seed (*Cicer arietinum*)



SEMESTER – III

BSCBOP 232

Pteridophytes, Gymnosperms and Angiosperm embryology - Practicals

(10 Practicals of 3hrs duration each, one practical per week)

1. Study of Psilotum: Morphology, Free hand sectioning of stem, Internal structure of Stem, structure of Synangium. Study of Lycopodium - morphology of L. cernuum, Anatomy – T.S of stem of L. cernuum. L.S of strobilus
2. Study of Selaginella : Morphology, Free hand sectioning of stem and Rhizophore. Anatomy – T.S of stem, T.S Rhizophore, L.S of Strobilus.
Study of Equisetum: Morphology, Free hand sectioning of stem, Anatomy – T.S of stem, L.S of Strobilus, T.S of Strobilus and spores.
3. Study of Ophioglossum: Morphology with spike, L.S Of Spike. T.S of Spike. Osmunda morphology of sporophyte, TS. of tassel. Hymenophyllum with sorus.
4. Study of Pteris : Morphology, Anatomy- T. S of Pinnae through sorus.
Marsilea : Morphology, Anatomy- T.S Rhizome, T.S. of petiole. Sporocarp HLS
5. Study of Cycas: Morphology of leaflet, Coralloid root, male cone, female sporophyll. Anatomy of Leaflet, Coralloid root and Ovule.
6. Study of Pinus : Morphology of Needle, male and female cones. Anatomy of Needle, Primary and Secondary wood, Male & Female Cone and Ovule.
7. Study of Gnetum: Morphology of wood , male and female cones, Anatomy of Male and female cones and Ovule.
8. Study of types of plant fossils, and examples of Pteridophyte and Gymnosperm fossils included in the syllabus, with the help of slides / photographs.
9. Study of T.S. of anther, morphology of pollen grains, types of ovules and placentation – with the help of permanent slides or temporary mountings
10. Study of monocot and dicot embryos by temporary mountings and permanent slides, Study of pollination mechanisms.

Note:

Students should be trained to take free hand sections , Staining with safranin, washing or destaining and mounting in dilute glycerine.

Special activity:

- **Assignment of Floriculture**
- **Field visit to study Floriculture**

Course Outcomes

CO1: Understanding the diversity & distribution of cryptogams

CO2: Understanding the distribution, morphology, reproduction, life cycle and economic significance of Pteridophytes and Gymnosperms.

CO3: Learning the stages of formation and development of plant embryo



REFERENCES

Youtube:

<https://www.youtube.com/watch?v=30dxEVDtZ20>

https://www.youtube.com/watch?v=2_bLHzIbl6c

<https://www.youtube.com/watch?v=zKnrUI85ys>

<https://www.toppr.com/guides/biology/plant-kingdom/gymnosperms/>

<https://youtu.be/gE1DjCLFeNo>

Google

<http://www.biologydiscussion.com/microsporogenesis/microsporogenesis-and-microspore-with-diagram/13535>

<http://www.biologydiscussion.com/gametophytes/megasporogenesis-and-development-of-the-female-gametophyte/13521>

Basic Reading

1. Bhojwani S.S, and Bhatnagar, S.P., 2000. The embryology of Angiosperms 4th revised and enlarged ed. Vikas Publishing house, Delhi
2. Eames A.J. 1936. Morphology of vascular plants. Tata McGraw Hill.
3. Parihar N.S. 1973. The biology and morphology Pteridophytes. Central Book Depot, Allahabad.
4. Sporne K.R. 1965. The morphology of Gymnosperms. B.I. Publ.
5. Srivastava H.N. 1998. Gymnosperms. Pradeep.
6. Dwivedi J.N. 1990. Embryology of Angiosperms 2 edition Rastog & Co. Meerut

Additional Reading

7. Campbell D.H. 1918. The structure and development of mosses and ferns 3rd edition. MacMillan.
8. Chopra G.L. and Verma 1988. Gymnosperms. Pradeep Publ. Jalandhar-144008.
9. Delevoryas T. 1966. Plant diversification. Publ. Gulab Primlani, Amerind Publ. Co. Ltd. N.88 Connaught circus New Delhi.
10. Gupta K.M. 1962. Marselia. CSIR New Delhi.
11. Maheshwari P and R.N. Konar. 1971. Pinus. CSIR, New Delhi.
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B.Sc. Degree – Botany

SEMESTER – IV

BSCBOC 281: Taxonomy and Economic Botany -Theory

Objectives:

- To learn Identification, Nomenclature & classification of Plants
- To study Family level organization with the help of APG system of classification
- To study the distribution, cultivation pattern, extraction and economical importance of various Plants & Plant products.

Total 48 hrs

UNIT – 1

12 hrs

Plant Taxonomy:

An introduction - Definition, Brief history, Importance

Systems of classifications: Artificial - Carlous Linnaeus, Natural- Bentham and Hooker, Phylogenetic - Engler and Prantl, their merits and demerits.

Brief introduction to cytotaxonomy, chemotaxonomy, numerical taxonomy and molecular taxonomy, DNA barcoding of plants.

A brief study of APG system of plant classification with focus to latest APG IV system.

Botanical nomenclature: Binomial nomenclature, a brief introduction to

ICN – principles and rules, ranks of taxa and taxonomic types.

Herbaria and herbarium techniques, digital herbaria.

Botanical Survey of India, Botanical gardens and their functions.

UNIT – 2

12hrs.

Plant families -I: General description with special emphasis on Diagnostic Characters, Morphological Peculiarities and Economic Importance of the following families of angiosperms, according to Bentham and Hooker system:

POLYPETALAE

1) Magnoliaceae:

a) **Diagnostic characters-** Aromatic flowers, Perianth lobes with Spiral arrangement. Gynoecium with Apocarpous condition.

b) **Morphological peculiarities** – Apocarpous ovary, Aggregate fruits

c) **Economic importance** – *Magnolia*, *Michelia* as fragrant flowers.

2) Malvaceae:

a) **Diagnostic characters-** stellate hairs, mucilage on stem, Solitary cyme inflorescence, Bracteoles with Epicalyx, Monadelphous stamens, Axile placentation.

b) **Morphological peculiarities** – Solitary cyme, Epicalyx, Monadelphous stamens, Axile placentation. Fruit as capsule.

c) **Economic importance** – *Gossypium* as fibre yielding plant, *Abulmoschus esculentus* as vegetable, *Hibiscus* Ornamental plant, *Sida* as medicinal plant.



3) **Anacardiaceae**

- a) Diagnostic characters – Trees, Caustic juice, Panicle inflorescence, Small, polygamous flowers, false fruit in cashew.
- b) Morphological peculiarities – Drupe, Nut.
- c) Economic importance – Fruits – Mango, Cashew, *Spondias pinnata*

4) **Fabaceae** : Pulvinous leaf base, Monocarpeal gynoecium with marginal Placentation, Fruit a legume.

a) **Papilionoidae:**

- i) **Diagnostic characters** – Nature of leaves. Papilionaceous corolla. Nature of Stamens.
- ii) **Morphological peculiarities** – Pinnately compound leaves. Papilionaceous corolla, Vexillary aestivation, Adelphous condition of stamens, Marginal Placentation. Presence of Gynophore, Legume.
- iii) **Economic importance:** Pulse yielding – *Cicer arietinum*, *Lens culinaris*, *Cajanus cajan*, *Pisum sativum*, *Phaseolus aureus*, *P. mungo*. Vegetables – *Dolichos lablab*, *Vigna sinensis*, *Phaseolus vulgaris*. Timber Yielding – *Dalbergia sissoo*, *D. Latifolia*. Oil yielding – *Arachis hypogaea*.

b) **Caesalpinoidae:**

- i) **Diagnostic characters** – Nature of leaves.
- ii) **Morphological peculiarities** – Corymb inflorescence,
- iii) **Economic importance** – Ornamental Plants, Timber Yielding plants

c) **Mimosae:**

- i) **Diagnostic characters** – Thygmonastic movement of Leaves, Globose Head inflorescence, Tetramerous Flower, Lomentum.
- ii) **Morphological peculiarities** – Lomentum.
- iii) **Economic importance** – Condiments, Gum yielding,

5) **Myrtaceae:**

- i) **Diagnostic characters** – Peeling of bark, Intramarginal Venation, Inward curvature of stamens in Buds. Epigyny.
- ii) **Morphological peculiarities** – Intramarginal Venation, Epigyny.
- iii) **Economic importance** – Eucalyptus, Clove, Guava, Ornamental

6) **Cucurbitaceae:**

- i) **Diagnostic characters** – Fistular stem, Tendrils, Leaf structure and venation, Unisexual flowers, Union of Stamens, Epigyny. Parietal placentation. Pepo
- ii) **Morphological peculiarities** – Nature of Tendrils, Syngenacious and Synandrous stamens, Parietal placentation and Pepo.
- iii) **Economic importance** – Vegetables of Cucurbitaceae.

7) **Apiaceae:**

- i) Diagnostic characters – Aromatic herbs, Decompound leaves, Umbel inflorescence, Antero-posterior ovary, Stylopodium, Cremocarp.
- ii) Morphological peculiarities – Decompound leaves, Umbel inflorescence, Stylopodium, Cremocarp.
- iii) Economic importance – Spices and Condiments. Carrot, *Centella asiatica*.



UNIT – 3

12hrs.

Plant families-II:

General description with special emphasis on Diagnostic Characters, Morphological Peculiarities and Economic Importance of the following families of angiosperms, according to Bentham and Hooker system:

GAMOPETALAE:

- 8) **Rubiaceae:**
 - i) Diagnostic characters – Opposite Decussate phyllotaxy, intra or interpetiolar stipules, cymose inflorescence, salver shaped corolla, Epipetalous stamens,
 - ii) Morphological peculiarities – Opposite Decussate phyllotaxy, intra or interpetiolar stipules, cymose inflorescence, salver shaped corolla, Epipetalous stamens,
 - iii) Economic importance – Medicinal plants, Ornamental Plants, Coffee.
- 9) **Asteraceae:**
 - i) Diagnostic characters – Presence of Latex, Head inflorescence, Ray & Disc Florets, Calyx as Cappus, Syngenesious and epipetalous stamens, Basal placentation, Cypsella.
 - ii) Morphological peculiarities – Head inflorescence- Homozygous & Heterozygous heads, Ligulate corolla, Cypsella.
 - iii) Economic importance – Sunflower, Ornamental plants.
- 10) **Apocynaceae:**
 - i) Diagnostic characters – Presence of Latex, Apocarpous ovary, Hour glass shaped Stigma, Pair of follicles.
 - ii) Morphological peculiarities – Gynoecium of Apocynaceae.
 - iii) Economic importance – Medicinal Plants.
- 11) **Asclepiadaceae**
 - i) Diagnostic characters – Presence of Latex, Pollinia, Pentangular Stigma, Apocarpous ovary, Gynostegium, Pair of follicles.
 - ii) Morphological peculiarities – Gynostegium of Asclepiadaceae.
 - iii) Economic importance – Medicinal Plants.
- 12) **Solanaceae:**
 - i) Diagnostic characters – Rotate corolla, Oblique ovary, Berry.
 - ii) Morphological peculiarities – Persistent calyx, Oblique ovary, Berry.
 - iii) Economic importance – Vegetables, Medicinal plants, Narcotic plants.
- 13) **Acanthaceae:**
 - i) Diagnostic characters – Conspicuous bracts & Bractioles, Bilipped corolla, Dydinamous stamens, Seeds with Jaculators.
 - ii) Morphological peculiarities – Bilipped corolla, Dydinamous stamens and Jaculators.
 - iii) Economic importance – Medicinal Plants, Ornamental Plants.
- 14) **Lamiaceae:**
 - i) Diagnostic characters - Quadrangular stem, leaves with Oil glands, Verticillaster inflorescence, Persistent calyx, Bilabiate corolla, Didynamous & epipetalous stamens, Gynobasic Style, Nutlets.
 - ii) Morphological peculiarities – Quadrangular stem, Verticillaster inflorescence, Gynobasic Style and Nutlets.



iii) Economic importance – Medicinal plants.

MONOCHLAMYDEAE:

15) **Amaranthaceae:**

- i) Diagnostic characters – Herb, Bisexual or unisexual flower, Scarious bracts and bracteoles, Perianth lobe, fruit-Urticle.
- ii) Morphological peculiarities – Urticle.
- iii) Economic importance – Leafy vegetables.

16) **Euphorbiaceae :**

- i) Diagnostic characters – Plants with acrid milky juice, stipulate leaves, cyathium inflorescence, Unisexual flowers, Tricarpellary condition.
- ii) Morphological peculiarities – Cyathium inflorescence, Fruit – regma.
- iii) Economic importance – Castor, Indian Goosberry, Rubber, Ornamental.

17) **Orchidaceae:**

- i) Diagnostic characters – Epiphytic plants, Clinging roots, Epigynous flower, Perianth structure, Stamens with staminodes.
- ii) Morphological peculiarities – Clinging roots with Velamen, Perianth- Labellum, Stamen- Rostellum, Polinia, Gynostemium.
- iii) Economic importance – Ornamental Plants.

18) **Musaceae:**

- i) Diagnostic characters – Psuedostem, Sheathing leaf bases, Spadix Inflorescence, Perianth structure, Tricarpellary ovary.
- ii) Morphological peculiarities – Spadix Inflorescence, Berry
- iii) Economic importance – Banana.

19) **Arecaceae:**

- i) Diagnostic characters – Leaves forming a crown, pinnate and palmate leaves, spadix or spike inflorescence, flower – sessile, small, unisexual, monoicous, tricarpellary ovary.
- ii) Morphological peculiarities – Pinnate and palmate leaves
- iii) Economic importance – Oil yielding, Date-palm. Ornamental Palms.

20) **Poaceae:**

- i) Diagnostic characters – Culms, Sheathing leaf base, Spikelet inflorescence, Lodicules feathery stigma, Caryopsis.
- ii) Morphological peculiarities – Spikelet inflorescence, Caryopsis
- iii) Economic importance – Cereals, Millets, Sugar yielding Plants.

UNIT – 4

12hrs.

ECONOMIC BOTANY:

Distribution, family, botanical name, parts used, extraction and processing of the commercially important products of the following:

1. **Oil yielding plants :**

- a) Ground nut, Coconut, Oil palm, , Sunflower.
- b) Sandal wood and Eucalyptus.

2. **Medicinal Plants:** *Rauwolfia serpentina*, *Cinchona officinalis*, *Digitalis purpurea*, *Papaver somniferum*, *Atropa belladonna*, *Strychnos nuxvomica*, *Aloe vera* and *Catharanthus roseus*.



3. **Beverages:** Coffee, Tea and Cocoa.
4. **Rubber yielding plants:** *Hevea*.
5. **Sugar yielding plants :** Sugarcane. Beetroot
6. **Fibre yielding plants :** Cotton ,Coir and Jute.
7. **Timber yielding plants:**
 - i) Teak, Rosewood,
 - ii) Jack and Wild Jack,
 - iii) Bogi and Rakta Chandana.
8. **Cereals and Millets:** Wheat, Maize, Paddy, Raagi and Jowar. Small millets
9. **Spices and Condiments:** Pepper, Clove, Coriander, Ginger, Cardamom, Garlic, Onion, Turmeric, Chilli And Cinnamomum.
10. **Pulses:** *Cajanus, Dolichos, Cicer* and *Pisum*.

A general account of ethnobotany: definition, branches and significance.

Note:

Students should prepare assignments on morphology of stem, root, leaf, Inflorescence, flower and fruits.

Special Activity:

- **On Job Training (OJT) to needy students.**

Course Outcomes

CO1: Understanding the morphology of angiosperms with a special reference to flower and its various parts in detail

CO2: Learning the Identification, Nomenclature & classification of Plants

CO3: Evaluation of Family level organization, with the help of APG system of classification

CO4: Understanding the distribution, cultivation pattern, extraction and economical importance of various Plants & Plant products.



MORPHOLOGY OF ANGIOSPERMS, TAXONOMY & ECONOMIC BOTANY –PRACTICALS

(10 practicals of 3 hrs duration each, one practical per week)

1. Study of at least 3 families selected from the locally available plants as per the syllabus.
2. Study of at least 3 families selected from the locally available plants as per the syllabus
3. Study of at least 3 families selected from the locally available plants as per the syllabus
4. Study of at least 3 families selected from the locally available plants as per the syllabus
5. Study of at least 3 families selected from the locally available plants as per the syllabus
6. Study of at least 3 families selected from the locally available plants as per the syllabus
7. Study of at least 3 families selected from the locally available plants as per the syllabus
8. Study of at least 3 families selected from the locally available plants as per the syllabus
9. Economic Botany
10. Study of Herbarium techniques Note:
 - The students shall be given training in herbarium methods and making field notes of plants collected. Herbarium (5 sheets) with field notes to be submitted at the time of practical examination.
 - A botanical excursion to study the flora and vegetation is recommended. Local field trips: the students shall be taken around the college campus and nearby places for the study of local flora and a field diary shall be maintained by them.

REFERENCES

Youtube:

<https://www.youtube.com/watch?v=2wFN9YmkBOQ>

https://swayam.gov.in/nd2_cec19_bt10/

<https://www.youtube.com/watch?v=3j1fmeWGJO4>

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Basic Reading

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2. Gupta R.K. 1972. Text Book of Systematic Botany. Atma Ram & Sons. Delhi-6
3. Mukerjee S.K. 1984. College Botany vol III. New Central Book Agency.
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5. Sambamurthy A.V.S.S. & N.S.Subrahmanyam 1989. A Text Book of Economic Botany Wiley Eastern Ltd.



Additional Reading

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B.Sc. Degree –Botany

V Semester – Paper V

PLANT PHYSIOLOGY –I AND ECOLOGY-I

Objectives:

- To understand and appreciate the basic functioning pattern of plant system.
- To study the role of Biological molecules in various metabolic activities.
- To study the structure, functioning pattern and operative systems of Ecosystem.

Total: 36 hrs

UNIT – I

09 hrs

PLANT WATER RELATIONS:

Water absorption – Physical concepts of absorption – Imbibition, Diffusion and Osmosis. Plant cell as an osmotic system – water potential; $\psi = \psi_p + \psi_s + \psi_m$, Plasmolysis.

MECHANISM OF WATER ABSORPTION – Passive and active absorption, apoplast and symplast concepts.

ASCENT OF SAP: Path and mechanism of ascent of sap – Root pressure theory, Cohesion tension theory.

TRANSPIRATION – Definition, significance, Cuticular, Lenticular and Stomatal transpiration, mechanism of stomatal movement – Starch hydrolysis theory and K^+ /proton ion exchange theory, factors affecting the rate of transpiration.

GUTTATION – Brief account.

UNIT –II

09 hrs

MINERAL NUTRITION: Soil solution, availability of mineral salts, Hydroponics, Mineral nutrition – role of micro and macro elements.

SALT ABSORPTION MECHANISM – Passive and Active absorption of salts by land plants, Lundegardh's theory and Bennett Clark's theory.

PLANT ENZYMES: Nomenclature, classification, structure and composition of enzymes, co-enzymes and co-factors, properties of enzymes, mode of enzyme action, enzyme inhibitors, factors affecting enzyme activity.

An account on Biomolecules – Carbohydrates, Lipid and Proteins.

UNIT –III

09 hrs

ECOLOGICAL FACTORS :

Climatic factors – influence of light, temperature, precipitation, humidity and wind on vegetation.

Edaphic factors – soil formation, soil profile, types of soil, soil complex – soil water, mineral particles, organic matters, soil humus, soil pH and soil microorganisms.

Biotic factors – plants, animals and human being as biotic factors.

Topographic factors.

ECOLOGICAL Groups: Morphological and Anatomical adaptations of Hydrophytes, Mesophytes, Xerophytes, Epiphytes and Halophytes.



UNIT-IV

09 hrs

ECOSYSTEM – Concept of ecosystem: Introduction, Types, components, Structure and Functioning, pond ecosystem, energy flow, food chain and ecological pyramids.

BIO-GEO CHEMICAL CYCLES: Gaseous cycles -carbon and nitrogen, Sedimentary cycle- Phosphorus.

PLANT SUCCESSION: Definition, stages and Types of succession.

Study of Hydrosere and Xerosere in detail.

Special Activity:

- **Assignment on Agricultural/Commercial Crops**
- **Field visit to study cultivation practices of agricultural & Commercial crops.**

Course Outcomes

CO1: Learning the basic functioning pattern of plant system.

CO2: Evaluation of the role of Biological molecules in various metabolic activities.

CO3: Learning the structure, functioning pattern and operative systems of Ecosystem.



SEMESTER –V
BSCBOP 333: PLANT PHYSIOLOGY – I AND ECOLOGY-I –
Practicals

(10 practicals of 2 hrs duration each, one practical per week)

MAJOR EXPERIMENTS (1-5)

1. Experiment to measure the solute potential of the cell sap by plasmolytic method.
2. Determination of the relation between absorption and transpiration.
3. Experiment to determine the Suction due to Transpiration.
4. Experiment to show the effect of environmental factors on transpiration rate using Ganong's potometer .
5. Determination of porosity and pH by pH paper, of forest, field and coastal soils
6. Biochemical tests for proteins,carbohydrates and fat

DEMONSTRATION EXPERIMENTS

1. Experiment to demonstrate imbibition pressure by germinating seeds and Potato osmoscope experiment.
2. Thistle funnel experiment to demonstrate endosmosis and Determination of differential rate of transpiration on the two surfaces of leaf using Garreau's apparatus.
3. Experiment to prove aeriferous system in plants
4. The study of pond ecosystem

REFERENCES

Youtube:

<https://youtu.be/bMFQ6QS2raY>

<https://youtu.be/nDZud2g1RVY>

<https://youtu.be/tk5IwL2iNgU>

<https://youtu.be/7rWHT02n47k>

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Basic Reading

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3. Sharma P.D. 1990, Elements of Ecology Rastogi.
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6. Weaver J.E. & Clements F.E. 1929. Plant Ecology 2 edition Tata McGraw Hill

Additional Reading

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23. Voet Donald & J.G. Voet 1998. Biochemistry, John Wiley



B.Sc. Degree – Botany
SEMESTER –V
BSCBOC 332: CELL BIOLOGY, MOLECULAR BIOLOGY & GENETICS -
Theory

Objectives:

- To understand the concept of cell structure with respect to biological molecules, organelles & membranes.
- To study the structure and role of genes in the pattern of inheritance.
- To study the concept of inheritance & variations.

Total: 36 hrs

UNIT – 1

09hrs

CYTOLOGY – Structure of plant cell, Cell wall, Cytoskeleton, Plasma membrane, Endoplasmic reticulum, Lysosomes, Plastids, Ribosomes, Golgi complex, Mitochondria, Peroxisome, Living and non living inclusions,

Nucleus in general, nuclear membrane and nucleolus.

CHROMOSOMES – Chromosome morphology – size, structure, number, centromere, telomere, Structure of the chromosome – nucleosome model

CELL DIVISION – Cell cycle, mitosis and meiosis

UNIT – 2

09 hrs

STRUCTURE AND CHEMISTRY OF THE GENE:

DNA as genetic material, evidences from bacterial transformation – experiments of Griffith and Avery Mac Leod.

Evidence from experiment with Bacteriophage – Hershey & Chase.

Molecular structure of DNA, Watson and Crick model of DNA, DNA replication, types of RNA. Genetic code and Protein synthesis- transcription & Translation in prokaryotes. Splicing

UNIT – 3

09 hrs

Gene concept (Cistron, recon and muton), Types of genes (Prokaryotic and Eukaryotic genes) transposons, Gene expression in prokaryotes – Lac operon,

Gene expression in Eukaryotes; levels, Transcription, Translation – Split genes – exons, introns and splicing – comparison of gene expression in prokaryotes and Eukaryotes.

MENDELISM: Mendel's work –mono and dihybrid crosses. Mendel's laws of inheritance. Back cross and test cross. Exceptions to Mendelism: Incomplete dominance

Sex determination in plants: Melandrium, Maize, Asparagus.

LINKAGE: Introduction – Typs – complete and incomplete, cis & trans, coupling & repulsion. Linkage in maize.

UNIT – 4

09 hrs

INTERACTION OF GENES: concept of epistasis, recessive epistasis, complementary genes, dominant epistasis,



MULTIPLE FACTORS or polygenic inheritance with example from plants.

GENE MUTATIONS: Gene mutations – mutagenesis by tautomer shifts: mutagens – physical mutagens and chemical mutagens. Role of mutations in plant breeding and evolution.

CHROMOSOMAL ABERRATIONS – deficiencies, duplication, inversions and translocations.

POLYPLOIDY : Autopolyploids and allopolyploids

Significance of polyploidy.

Course Outcomes

CO1: Understanding the concept of cell structure with respect to biological molecules, organelles & membranes.

CO2: Evaluation of the structure and role of genes in the pattern of inheritance.

CO3: Learning the concept of inheritance & variations.



SEMESTER – V
BSCBOP 334
CELL BIOLOGY, MOLECULAR BIOLOGY & GENETICS -
Practicals

(10 practicals of 2 hrs duration each, one practical per week)

1. Study of cell organelles under light microscope
2. Study of ergastic substances – starch (potato, rice grain), aleurone (wheat grain), calcium oxalate (*Pistia*), calcium carbonate (*Ficus* leaf) and oil globules (Castor seed).
3. Training in fixing, acetocarmine staining, squashing and making micro preparations for cytological studies – Study of mitosis – root tip of onion
4. Identification of stages of mitosis
5. Study of meiosis – flower buds of onion
6. Identification of stages of meiosis
7. Translocation of heterozygote in *Rhoeo/ Tradescantia*
8. Solving genetic problems in monohybrid and dihybrid crosses
9. Solving genetic problems in incomplete dominance
10. Solving genetic problems in interaction of genes.

REFERENCES

Youtube:

<https://youtu.be/UykwXkLb0xU>

<https://youtu.be/Dn3eNoxQdL0>

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30. Winter P.C., G.I. Hickey & H. L. Fletcher 1999. Instant Notes in Genetics. Viva Books Pvt. Ltd. New Delhi.



B.Sc. Degree – Botany
SEMESTER –VI

BSCBOC 381: PLANT PHYSIOLOGY – II & ECOLOGY – II -
Theory

Objectives:

- To study the concept & mechanism of vital processes like Photosynthesis, Translocation, Respiration & growth.
- To understand plant adaptations to various ecological conditions & types of vegetation.
- To study an account of environmental pollution and its consequences.
- To study biodiversity and its conservation.

Total 36 hrs
09 hrs

UNIT –I

PHOTOSYNTHESIS : Definition, photosynthetic apparatus, photosynthetic pigments and their composition, two pigment system.

Mechanism of photosynthesis – light reactions - Photolysis of water, cyclic and noncyclic electron transport and photophosphorylation,

C₃ pathway (Calvin cycle)

C₄ pathway.

Factors affecting photosynthesis, law of limiting factors.

TRANSLOCATION OF ORGANIC SOLUTES: Definition, Path of translocation, mechanism of translocation – Munch hypothesis.

PHYSIOLOGY OF PLANT GROWTH: Plant growth – Definition, phases of growth, sigmoid curve, factors affecting growth.

Plant growth regulators:

Growth promoters – Auxins, Gibberellins & Cytokinins

Growth inhibitors – Ethylene & Abscisic acid (ABA).

UNIT –II

09 hrs

RESPIRATION: Definition and significance of respiration, types of respiration, mechanism of aerobic respiration – Glycolysis (EMP pathway) in detail, Substrate level phosphorylation in glycolysis, breakdown of pyruvic acid and formation of acetyl co-enzyme – A; Krebs' cycle – electron transport system (ETS chain),

Anaerobic respiration, fermentation [enzymes in respiration must be mentioned], Pasteur's effect,.

Respiratory Quotient (RQ) and its significance.

DORMANCY: Bud dormancy – induction and removal of bud dormancy, Seed dormancy, Method to break seed dormancy.

PHYSIOLOGY OF FLOWERING : Photoperiodism – short day, long day and photoneutral plants, photoperiodic stimulus, induction and response, practical application of photoperiodism; Vernalisation.

PLANT MOVEMENTS – Introduction – Types of movements – Tactic, Tropic and Nastic



UNIT –III

09 hrs

Phytogeography & Environmental Issues

Vegetational types of India with special reference to Karnataka- composition and distribution of evergreen, semi-evergreen, deciduous, scrub, mangroves, shola forests and grasslands.

ENVIRONMENTAL POLLUTION:

Air pollution and water pollution- Primary causes, consequences and their impact on vegetation and control measures.

Green house effect, Acid rain, Ozone layer depletion.

UNIT –IV

09 hrs

BIODIVERSITY AND CONSERVATION ECOLOGY

Biodiversity- Definition, Types- Habitat, Species, Genetic and Global and Indian Diversity.

Hot spots in India

Concept of endemism in plants, endemic plants of Western Ghats

Concept of Rare, Endangered and Threatened plants (RET plants), RET plants of Western Ghats.

Conservation of nature and natural resources – Water, Soil, and Forests.

Conservation of water - problem of water scarcity, rain water harvesting, watershed management.

Soil erosion and conservation methods.

Conservation of Forests: Forests, Afforestation, Reforestation, Monoculture and its effects

Wildlife conservation, *in-situ* conservation -National parks, sanctuaries and bioreserves. Ex-situ conservation – Arboretum. seed banks, gene banks and botanical gardens.

Course Outcomes

CO1: Understanding the concept & mechanism of vital processes like Photosynthesis, Translocation, Respiration & growth.

CO2: Understanding the plant adaptations to various ecological conditions & types of vegetation.

CO3: Learning the environmental pollution and its consequences.

CO4: Evaluation of the biodiversity and its conservation.



SEMESTER –VI
BSCBOP 383: PLANT PHYSIOLOGY – II & ECOLOGY – II-
PRACTICALS

(10 Practicals of 2 hrs duration each, one practical per week)

MAJOR EXPERIMENTS

1. Experiment on liberation of oxygen in photosynthesis
2. Extraction of leaf pigments by Paper chromatography
3. Measurement of Respiration Quotient using Ganong's respirometer
4. Experiment on Fermentation using Kuhne's fermentation tube.
5. Study of Plant adaptations (Anatomical & Morphological) of Hydrophytes & Xerophytes (Any two specimens mentioned in the syllabus may be given)

DEMONSTRATION EXPERIMENTS

1. Demonstration of
 - a. Ganong's colored light screen apparatus.
 - b. Moll's half leaf experiment
2. Demonstration of
 - a. Geotropism by Clinostat
 - b. Hydrotropism by Porous clay funnel
3. Demonstration of
 - a. Heliotropism using heliotropic chamber
 - b. Growth using Pfeffer's auxanometer
4. Study of Ecological groups of Plants
 - a. Mesophytes – Anatomy of leaf and stem of any mesophyte (Dicot plant).
 - b. Halophytes: External morphology of Spinifex, Rhizophora – stilt roots and vivipary, Avicennia – pneumatophore, T.S. of pneumatophore.
 - c. Epiphytes – external morphology of Vanda, Bulbophyllum, Drynaria with mantle leaf.

5. Study of Spotters : Effect of growth regulators, Plant movements

Note: Students of Botany should be taken to nearby forests and coastal regions to make them study different types of vegetation.

REFERENCES:

- <https://www.khanacademy.org/science/biology/photosynthesis-in-plants/introduction-to-stages-of-photosynthesis/v/photosynthesis>
<https://www.youtube.com/watch?v=QXdujo4PZ7c>
<https://www.youtube.com/watch?v=dZdYImQaOEk>
<https://www.youtube.com/watch?v=0SWpo1mt9x4>

Basic Reading

1. Agarwal K.C. 1993. Environmental biology 2 edition Agro Botanical Publ. India
2. Devlin R.M. & F.H. Witham 1983. Plant Physiology 4 edition CBS Publ.



3. Hall H.O.& Rao K.K. 1994. Photosynthesis 5 edition Cambridge Low Price Edn.
4. Hopkins W.G. 1999. Introduction to Plant Physiology John Wiley & Sons Inc.2 edition.
5. Levitt Jacob. 1969. Introduction of Plant Physiology. The C.V. Mosby Co. Tokyo
6. Purohit S.S. & S.Ranjan 2002. Photosynthesis Agrobios, India

Additional Reading

7. Abrol Yashpal, P. Mohanty & Govindiee 1993. Photosynthesis Oxford & IBH.
8. Ananda Rao T. & A.N. Sheriff 2002. Coastal Ecosystems of Karnataka State, India. I Mangroves II Beaches.
9. Atlas & Bartha(2005) Microbial Ecology
10. Blankenship R.E. 2002. Molecular mechanism of Photosynthesis. Blackwell Science Ltd. Oxford
11. Conn.E.E., P.K. Stumpf, G.Bruening, R.H. Doi 1995. Cutilines of Biochemistry 5 edition John Wiley & Sons
12. Devlin T.M. 1997. Text Book of Biochemistry with clinical correlations. Wiley –Liss 4 edition
13. Groombridge Brain & M.D. Jenkins 2002. World Atlas of Biodiversity: Earth’s Living Resources in the 21st century. Univ. of California Press
14. Lawlor D.W.2001. Photosynthesis 3 edition viva Books Pvt.Ltd. 4262/3, Ansar Road, Daryaganj, New Delhi –110 002
15. Lechinger A.L., D.L. Nelson & M.M. Cox 1993. Biochemistry CBS Publ. Delhi- 32
16. Mackie 7 Mc Cartney (2001) Microbial Infections ELBS
17. Mackie&Mc Cartney(2001)Medical Practical Microbiology Vol.1&2 ELBS
18. McKinney M.L. & R.M. Shoch. 1998. Environmental Science – Web enhanced edition Jones & Bartlett Publ. Boston
19. Noggle G.R. & G.J. Fritz 1983. Plant Physiology 2 edition EEE 2002 reprint
20. Prathibha M. 1988. Biology – Photosynthesis & Respiration. HKES College, Bangalore 6
21. Raghavendra A.S. 1998. Photosynthesis –Cambridge Univ. Press.
22. Ramakrishnan P.S. 2001. Ecology & Sustainable development. National Book Trust, India
23. Rao K.N.G. Sudhakara Rao & S. Bharatan 1987. A Text Book of Plant Physiology – The functioning Plant. S. Vishwanathan, Madras
24. Rawn David J. 1983. Biochemistry, Harpen & Row, New York.



B.Sc. Degree – Botany
SEMESTER –VI
BSCBOC 382

ANATOMY, PLANT PROPAGATION & APPLIED BOTANY -Theory

Objectives:

- To study the internal Structure of Plant organs.
- To study the basic concept of Microbiology
- To study the principles of Plant biotechnology
- To study the tools & techniques in Plant propagation.

Total 36 hrs

UNIT – 1

09 hrs

ANATOMY – Meristems and their classification. Structure of the shoot apex and root apex .
Simple permanent Tissues: Parenchyma, Collenchyma, Sclerenchyma
Position , distribution and significance.
Complex permanent Tissues: Xylem and Phloem
Secretory tissues, glandular and laticifer tissue system.

UNIT –II

09hrs

Leaf –structure of dicot and monocot leaf.
Stem – Primary structure of dicot and monocot stem
Root – Primary structure of dicot and monocot root.
Secondary structures of dicot stem
Annual rings, rays, phellogen, periderm, cork, bark, and lenticels.

UNIT –III

09 hrs

Vegetative propagation – seeds and other propagules, cutting, grafting and layering.
Micropropagation through tissue culture, culture media, sterilization, incubation. Explant, callus, totipotency. Applications of tissue culture.
Applications of Microbiology
Microbes in Household products: Curd, Cheese, Dough for making foods, Single Cell Proteins (SCP).
Microbes in industrial products: Fermented beverages, Antibiotics, Organic acids, Enzymes
Microbes in Sewage treatment, production of Biogas
Microbes as bio-control agents and biofertilizers

UNIT –IV

09 hrs

Plant Biotechnology - Principle and Process
Recombinant DNA technology:
Tools of recombinant DNA technology- Restriction enzymes, Cloning vectors – Agrobacterium Ti plasmid, Ri Plasmid.



Process of recombinant DNA technology : Isolation of genetic material, Cutting of DNA at Specific locations, Amplification of gene of interest using PCR, Insertion of Recombinant DNA into the Host cell/Organism, Obtaining the foreign gene Product, Downstream processing.
Transgenic plants and their applications: - Golden Rice, Bt cotton, flavr savr tomato, Pest resistant Plants

Course Outcomes

- CO1:** Analysis of the internal Structures of Plant organs.
- CO2:** Learning the basic concept of Microbiology
- CO3:** Understanding the principles of Plant biotechnology
- CO4:** Application of the tools & techniques in Plant propagation.



SEMESTER –VI
BSCBOP 383

ANATOMY, PLANT PROPAGATION & APPLIED BOTANY–Lab

(10 practicals of 2 hrs duration each, one practical per week)

1. A study of following tissues from locally available plant materials: meristems, parenchyma, collenchyma, sclerenchyma, sclereids.
2. A study of following tissues from locally available plant materials: Xylem and phloem.
3. T.S. of primary and secondary structures of dicot stem and root
4. T.S. of monocot stem and root
5. T.S. of dicot and monocot leaf
6. Demonstrating grafting methods – Approach, wedge, tongue and bud grafting
7. Instruction in Microbiology and Biotechnology: Autoclave, Hot air oven, pH meter, Laminar flow, Centrifuge incubator, Neubaur Haemocytometer- Counting chamber, Colori meter.
8. Air sampling of microflora by Agar plate method.
9. Observation of Lactobacillus in curds, yeasts in toddy and Rhizobium in root nodule. Study of bacterial motility by hanging drop technique.
10. Media preparation- Potato dextrose agar

Note: Visit to nearby Microbiology/ Biotechnology lab is recommended

REFERENCES

<https://www.youtube.com/watch?v=bHsqrgt5QJM>

<https://www.youtube.com/watch?v=EDReGW95EGk>

<https://www.youtube.com/watch?v=eMdWguzXDgY>



Question paper pattern
S.D.M.College(Autonomous) – Ujire
B.Sc — Semester
Botany

Time 3 hrs.

Max. Marks:80

Note:

1. Answer Part A and Part B
2. Answer Three full questions from Part B choosing one full question from each unit
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer any Ten of the following

2 x 10 = 20

- i.
- ii.
- iii.
- iv.
- v.
- vi.
- vii
- viii
- ix
- x
- xi
- xii

PART – B

UNIT - I

- | | | |
|-------|---|---|
| 2. a. | | 4 |
| b. | | 5 |
| c. | 6 | |

OR

- | | | |
|-------|---|---|
| 3. a. | | 4 |
| b. | | 5 |
| c. | 6 | |

UNIT - II

- | | | |
|-------|---|---|
| 4. a. | | 4 |
| b. | | 5 |
| c. | 6 | |

OR

- | | | |
|-------|---|---|
| 5. a. | | 4 |
| b. | | 5 |
| c. | 6 | |

UNIT - III

- | | | |
|-------|--|---|
| 6. a. | | 4 |
|-------|--|---|



b.			5
c.		6	
	OR		
7. a.			4
b.			5
c.		6	
	UNIT - IV		
8. a.			
4			
b.			5
c.		6	
	OR		
9. a.			4
b.			5
c.		6	

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Shri Dharmastala Manjunatheshwara College (Autonomous) Ujire – 574240 D.K.
Department of Botany
CBCS

BSCBOCE 133 Mushroom Cultivation Technology

Duration: 24 Hours

Marks: 50

Objectives:

- To know about edible and non edible mushrooms and their differences.
- To know the cultivation technology of Mushrooms
- To know the storage pattern and nutritional value of mushrooms
- To know the types of foods prepared from mushrooms

Learning outcomes:

- Knowledge related to the Mushrooms
- Skill related to the cultivation of Mushrooms

Syllabus

Unit	Topics	Teaching Hours
I	Introduction – Edible and non-edible mushrooms. Edible mushrooms commercially cultivated in India – <i>Volvariella volvacea</i> , <i>Pleurotus citrinopileatus</i> , <i>Agaricus bisporus</i> . Cultivation Technology: History. Infrastructure- substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, stove, sieves, culture rack, mushroom unit (Thatched house), water sprayer, tray. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, banana leaves, areca sheath and coconut leaves. Composting technology in mushroom production.	12
II	Storage and nutrition: Short-term storage (Refrigeration – up to 24 hours) Long term Storage (canning, pickles, pappads), drying, storage in salt solutions. Chemical composition and their nutritional values : Proteins - amino acids, minerals, carbohydrates, vitamins and crude fiber. Food Preparation: Types of foods prepared from mushrooms. Research Centers - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.	12

Evaluation

Continuous Internal Evaluation (10 Marks): Methodology: It is done based on

1. Assignments
2. Projects
3. Presentation
4. Specimen submission
5. Quizzing



Question Paper Pattern
S.D.M.College(Autonomous) – Ujire
Botany - Elective Course Paper 1
Mushroom Cultivation Technology

Time 2 hrs.

Max. Marks: 40

Note:

1. Answer Part A and Part B
2. Answer THREE full questions from Part B choosing one full question from each unit
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer any EIGHT of the following

2 x 08 = 16

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

PART – B
UNIT - I

- | | |
|-------|---|
| 2. a. | 3 |
| b. | 4 |
| c. | 5 |

OR

- | | |
|-------|---|
| 3. a. | 3 |
| b. | 4 |
| c. | 5 |

UNIT - II

- | | |
|-------|---|
| 4. a. | 3 |
| b. | 4 |
| c. | 5 |

OR

- | | |
|-------|---|
| 5. a. | 3 |
| b. | 4 |
| c. | 5 |

Suggested readings & Reference Books:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, PankajKapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
<https://www.youtube.com/watch?v=sfpkPJw32f0>
<http://vikaspedia.in/agriculture/farm-based-enterprises/mushroom-production/oyster-mushroom-production>



Sri Dharmastala Manjunatheshwara College (Autonomous) Ujire – 574240 D.K.
Department of Botany - CBCS
BSCBOCE 183 Herbal Technology

Duration: 24 Hours

Marks: 50

Objectives:

- To know role and scope of medicinal plants in traditional and modern systems of Medicine.
- To learn the cultivation pattern of medicinal plants
- To study the pharmacognostic characters of medicinal plants
- To learn the analytical aspects of pharmacognosy

Learning outcomes

- Knowledge related to the Herbal technology
- Skill related to the Herbal technology

Syllabus

Unit	Topics	Teaching Hours
I	Medicinal Plants: History and scope, role of medicinal plants in traditional and modern systems of medicine; Medicinal plant cultivation and trade – global and Indian scenario. Pharmacognosy - systematic position, medicinal uses, active principles and pharmacognostic features of the following: <i>Ocimum sanctum</i> , <i>Gingiber officinale</i> , <i>Trigonella graceum</i> , <i>Phyllanthus emblica</i> and <i>Saraca asoca</i> General methods of herbal extraction with examples.	12
II	Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds).	12

Evaluation:

Continuous Internal Evaluation (10 Marks) : Methodology: It is done based on

1. Assignments
2. Projects
3. Presentation
4. Specimen submission
5. Quizzing



Question Paper Pattern
S.D.M.College (Autonomous) – Ujire
Botany- Elective Course - Herbal Technology

Time 2 hrs.

Max. Marks: 40

Note:

1. Answer Part A and Part B
2. Answer THREE full questions from Part B choosing one full question from each unit
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer any EIGHT of the following

2 x 08 = 16

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

PART – B
UNIT - I

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|-------|--|---|
| 2. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

OR

- | | | |
|-------|--|---|
| 3. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

UNIT - II

- | | | |
|-------|--|---|
| 4. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

OR

- | | | |
|-------|--|---|
| 5. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

Suggested readings & Reference Books:

1. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
- 2 Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
3. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
4. Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
5. Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
6. Pharmacognosy, Dr.C.K.Kokate et al. 1999. NiraliPrakashan. of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R

<https://www.naturalremedy.com/services>

<https://www.youtube.com/watch?v=yMetfR7c65w>



Sri Dharmastala Manjunatheshwara College (Autonomous) Ujire – 574240

D.K.

Department of Botany - CBCS

BSCBOCE 233 Vegetative and Reproductive Morphology of Angiosperms

Duration: 24 Hours

Marks: 50

Objectives:

- To know role and scope of morphology in plant propagation.
- To learn the propagation techniques using modified organs
- To study the various modifications in organs

Learning outcomes

- Knowledge related to the Morphology of Angiosperms
- Skill related to the Vegetative plant propagation

Syllabus

Unit	Topics	Teaching Hours
I	Angiosperms: Introduction, parts of plant body and their functions. Roots- Types, modifications and functions. Stem- types, modifications and functions. Leaf – Morphological structure and types, phyllotaxy, modifications and functions. Inflorescence- types.	12
II	Flower - General structure, insertion of floral parts; calyx, corolla and their variations. Androecium-structure and its variations. Gynoecium- structure and its variations. Fruits and their types Seeds – structure of dicot and monocot seeds; albuminous and exalbuminous seeds.	12

Evaluation:

Continuous Internal Evaluation (10 Marks) : Methodology: It is done based on

1. Assignments
2. Projects
3. Presentation
4. Specimen submission
5. Quizzing



Question Paper Pattern
S.D.M. College (Autonomous) – Ujire
Elective Course - Botany
Vegetative and Reproductive Morphology of Angiosperms

Time 2 hrs.

Max. Marks: 40

Note:

1. Answer Part A and Part B
2. Answer THREE full questions from Part B choosing one full question from each unit
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer any EIGHT of the following

2 x 08 = 16

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

PART – B
UNIT - I

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|-------|---|
| 2. a. | 3 |
| b. | 4 |
| c. | 5 |

OR

- | | |
|-------|---|
| 3. a. | 3 |
| b. | 4 |
| c. | 5 |

UNIT - II

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|-------|---|
| 4. a. | 3 |
| b. | 4 |
| c. | 5 |

OR

- | | |
|-------|---|
| 5. a. | 3 |
| b. | 4 |
| c. | 5 |

Suggested readings & Reference Books:

1. Akhil Baruah, 2008. Advanced morphology of Angiosperms, Aavishkar Publishers, New Delhi.
2. Narayana Rao B.N. 1972. Plant Modifications, Wisdom Publications, Mysore.
3. Singh, Pandey and Jain, A text book of Botany, Rastogi Publications.
4. Eams A.J. 2011, Morphology of Angiosperms, Nabu Press
5. Pandey, B.P., 2007. Botany for Degree Students, S. Chand Publishers.

<https://www.youtube.com/watch?v=ziDgtSJ5nZI>

https://www.youtube.com/watch?v=HwyHs_IqSjI



Department of Botany
CBCS
BSCBOOE 283: Plant Diversity for Human Welfare

Duration: 24 Hours

Marks: 50

Objectives:

- To know role and scope of Plant Diversity for Human Welfare.
- To learn the methods of conservation of Biodiversity
- To study the various aspects of Biodiversity

Learning outcomes

- Knowledge related to Plant diversity
- Skill related to the Conservation of Biodiversity

Syllabus

Unit	Topics	Teaching Hours
I	<p>Diversity and values of Plants: The Concept of Biodiversity, types of biodiversity-genetic, species and ecosystem diversity. Species diversity of plants – global, Indian and Karnataka. General values of plants and forests with examples- ethical value, consumptive use value, productive use value, ecosystem services value, aesthetic value and optional use value.</p> <p>Plants as sources of food and medicine: Plants as sources of protein, carbohydrate and dietary fibres. Important cereals and pulses. Agrobiodiversity and its importance. Brief history of domestication of rice.</p> <p>Plant based medicinal systems – Ayurveda, sidda, unani and folk medicine. Diversity of medicinal plants of India. Plants in beauty care. Contribution of medicinal plants to modern medicine – Important plant derived modern medicines and their uses. History of development of <i>Rauwolfia serpentina</i>, <i>Cinchona officinalis</i> and <i>Catharanthus roseus</i> based drugs.</p>	12
II	<p>Plants in industry, culture and climate regulation: Industrially and commercially important plants and their products- paper, rubber, timber, cane, spices, beverages and sugar. Plants as sources of biofuel. Garden and ornamental plants. Religious and cultural use of plants. Role of plants and forests in climate and environment regulation- carbon sequestration and control of global warming, flood control, pollution control, regulation of water cycle and water purification.</p> <p>Conservation of plant diversity: Major threats to plant diversity and forests- habitat destruction, over exploitation and natural extinction. Rates of plant extinctions with examples. Concept of endangered and endemic plants. Methods of plant and forest conservation- botanical gardens, sacred groves, reserve forests, national parks and biosphere reserves.</p>	12
Total		24 Hours

Evaluation:

Continuous Internal Evaluation (10 Marks) : Methodology: It is done based on

1. Assignments
2. Projects
3. Presentation
4. Specimen submission
5. Quizzing

<https://study.com/academy/lesson/the-effects-of-seed-plants-on-human-welfare.html>

<https://www.youtube.com/watch?v=7tgNamjTRkk>



Question Paper Pattern
S.D.M. College (Autonomous) – Ujire
Botany- Elective Course
Plant Diversity for Human Welfare

Time : 2 hrs.

Max. Marks: 40

Note:

1. Answer Part A and Part B
2. Answer THREE full questions from Part B choosing one full question from each unit
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer any EIGHT of the following

2 x 08 = 16

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

PART – B
UNIT - I

- | | | |
|-------|--|---|
| 2. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

OR

- | | | |
|-------|--|---|
| 3. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

UNIT - II

- | | | |
|-------|--|---|
| 4. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

OR

- | | | |
|-------|--|---|
| 5. a. | | 3 |
| b. | | 4 |
| c. | | 5 |

Suggested readings & Reference Books:

1. Daubenmire, R.F. (): Plants & Environment (2nd Edn.,) John Wiley & Sons., New York 22
2. Billings, W.B. (1965): Plants and the Ecosystem Wadsworth Publishing Co., Inc., Belmont.
3. Misra, R. (1968): The Ecology work Book Oxford & INH Publishing Co., Calcutta
4. Odum E.P. (1971): Fundamentals of Ecology (2nd Edn.,) Saunders & Co., Philadelphia
5. S.K. Jain 1995. Manual of Ethnobotany. Scientific publishers.
6. S. Sundar Rajan-2007. College Botany Vol-V, Part 1: Taxonomy and Economic Botany Himalaya Publishing House.
7. Susil Kumar Mukharjee-2004. College Botany Vol-III. New Central Book agency, London
8. P. Vasanth Kumar 2014. Economic Botany. Sonali Publications New Delhi.
9. Erach Bharucha, 1998. Environmental Studies for UG Students. Universities Press, New Delhi.



SYLLABUS
ENVIRONMENTAL SCIENCE AND
DISASTER MANAGEMENT
III/IV Semester Degree classes

Total Teaching Hours: 24 (Two classes per week)
Multiple choice question Type Online Examination for 100 marks

ENVIRONMENTAL SCIENCE **12hours**

I. Components of Environment Science:

1. Ecological organization (Organism, Population, Community, Ecosystem and Biome)
2. Energy flow, Food web, Ecological Pyramids, Hydrologic cycle.

II. Environmental pollution

1. Human population growth as a factor to increase pollution
2. Causes and control measures for soil, air (Noise to be included under Air pollution), water and radioactive pollution

III. Conservation and Preservation of Environment

1. Water conservation techniques
2. Solid waste management
3. Afforestation and Reforestation
4. Agencies involved in environmental protection– CPCB, IUCN, NEERI

DISASTER MANAGEMENT **12 Hours**

1. Disaster Risks in India
2. Health Disasters : Accidents, First Aid and medical kit
3. Pre – Disaster Phases: Prevention, Mitigation and Preparedness.
4. Post Disaster Phases – Response, Rehabilitation, reconstruction and recovery
5. Disaster Management Act

Books for reference

Basic Reading

1. NCERT Biology Text Books Class XI and XII
2. Textbook of Environmental Studies by D.K. Astana and Meera Astana; S. Chand Publications New Dehli
3. Environmental Science by Erach Barucha UGC Publication.
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