

A .G & S .G. SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE, VUYYURU

(An Autonomous college in the jurisdiction of Krishna University)

BOTANY	BOTT11A	WEF: 2021-2022	B. Sc (BZC), AQUA
SEMESTER- I	PAPER- I		CREDITS: 04

Title of the paper: Fundamentals of Microbes and Non-vascular Plants

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

NO OF HOURS: 60

Learning Objectives:

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

1. To understand origin of life on the earth and analyze structure, disease symptoms and transmission of plant viruses.
2. To understand the diversity and characteristics of Prokaryotes.
3. To understand the characteristics of Fungi and Lichens.
4. To understand the characteristics of Algae.
5. To understand the characteristics of Bryophyta.

PREREQUISITE

- Knowledge of microbes, thallophytes and Bryophytes at +2 level

COURSE OUTCOMES

By the end of the course students will be able to

CO 1	Explain origin of life on the earth.
CO 2	Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
CO 3	Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
CO 4	Classify fungi, lichens, algae and bryophytes based on their structure, reproduction and life cycles.
CO 5	Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

SYLLABUS

UNIT – I

(12 HOURS)

1.0. Origin of life and viruses

- 1.1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdoms classification of R.H. Whittaker
- 1.2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
- 1.3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV, a brief account of Prions and Viroids.
- 1.4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
- 1.5. Significance of viruses in vaccine production, bio-pesticides

UNIT – II

(12 HOURS)

2.0. Special groups of Bacteria and Eubacteria

- 2.1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria.
- 2.2. Cell structure and nutrition of Eubacteria
- 2.3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
- 2.4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation and medicine).
- 2.5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

UNIT – III

(12 HOURS)

3.0 Fungi & Lichens

- 3.1. General characteristics of fungi and Ainsworth classification (upto classes).
- 3.2. Structure, reproduction and life history of
(a) *Rhizopus* (Zygomycota) and (b) *Puccinia* (Basidiomycota).
- 3.3. Economic uses of fungi in food industry, pharmacy and agriculture.
- 3.4. A general account on symptoms of plant diseases caused by Fungi; Blast of Rice.
- 3.5. Lichens- structure and reproduction.

UNIT – IV

(12 HOURS)

4.0 Algae

- 4.1. General characteristics of Algae (pigments, flagella and reserve food material), Fritsch classification (upto classes).
- 4.2. Thallus organization and life cycles in Algae.
- 4.3. Occurrence, structure, reproduction and life cycle of
(a) *Spirogyra* (Chlorophyceae) and (b) *Polysiphonia* (Rhodophyceae).
- 4.4. Economic importance of Algae.

UNIT – V

(12 HOURS)

5.0 Bryophytes

- 5.1. General characteristics of Bryophytes; classification upto classes.
- 5.2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed)

and life cycle of (a) *Marchantia* (Hepaticopsida) and (b) *Funaria* (Bryopsida).
5.3. General account on evolution of sporophytes in Bryophyta.

Text books:

1. Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad
2. Pandey, B.P. (2013) *College Botany, Volume-I*, S. Chand Publishing, New Delhi

Books for Reference:

1. Prescott, L. Harley, J. and Klein, D. (2005) *Microbiology, 6th edition*, Tata McGraw –Hill Co. New Delhi.
2. Alexopoulos, C.J., C.W.Mims & M.Blackwell (2007) *Introductory Mycology*, Wiley & Sons, Inc., New York
3. Fritsch, F.E. (1945) *The Structure & Reproduction of Algae (Vol. I & Vol.II)* Cambridge University Press Cambridge, U.K..

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MODEL QUESTION PAPER- Theory Examination(s) at Semester end 2021-2022

TITLE OF THE PAPER: Fundamentals of Microbes and Non-vascular Plants (Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

Course Code: BOTT11A

Max. Time: 3 Hrs.

Max. Marks: 75 M

SECTION – A

**Answer FIVE of the following questions. Draw labelled diagrams wherever necessary. 5 x 5=25M
ONE question should be given from each Unit in the syllabus.**

1. Five kingdom classification of Whittaker **CO1-L2**
2. Germ theory of diseases **CO1-L2**
3. Which groups of organisms are once considered as algae? Give an account of general characters of that group **CO2- L1**
4. What are the symptoms of citrus canker? Mention the causal organism of citrus canker. **CO2- L2.**
5. Ainsworth classification of fungi **CO-3 L2**
6. Why lichens are considered as unique and composite organisms? **CO-3 L1**
7. Why diplobiontic life cycle is called so? Mention an alga that shows diplobiontic life cycle. List out the phases exhibited in one such life cycle studied by you. **CO-4 L1**
8. Vegetative reproduction in Bryophytes. **CO5-L2**

SECTION – B

Answer the following questions.

5x10= 50 M

**Two questions (A & B) are to be given from each Unit in the syllabus (internal choice in each unit).
Student has to answer 5 questions by choosing one from a set of questions given from a Unit.**

- 9 a) Give an account of structure and multiplication of TMV? **CO1- L2**
OR
b) Explain the significance of viruses in vaccine production, bio-pesticides and as cloning vectors. **CO1-L2**
10. a) Whether bacteria exhibit sexual reproduction or not ? Elucidate different methods of bacterial recombination. **CO2- L2**
OR
b) Explain the role of bacteria in agriculture and industry . **CO2- L2**
- 11 a) Why *Puccinia* is called as macro cyclic rust? Explain the stages of the fungus on Primary host. **CO3-L1.**
OR
b) Why lichens are considered as ‘pioneers of colonization’? Write about reproduction in Lichens. **CO3-L1**
- 12 a). What is thallus? Describe various types of thalli found in algae. **CO4-L2**
OR
b) Explain life cycle of *Spirogyra* . **CO-4 L2**
13. a) Describe morphological and anatomical features of *Marchantia*. **CO5- L2**
OR
b) What is the dominant phase in the life cycle of bryophytes?
Give account on of sporophyte evolution in Bryophytes. **CO5-L 2**

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Practical Syllabus

BOTANY	BOTT11A	WEF: 2021-2022	B. Sc (BZC), AQUA
SEMESTER- I	PAPER- I		CREDITS : 02

Title of the paper: Fundamentals of Microbes and Non-vascular Plants

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

NO OF HOURS: 30

Learning outcomes: On successful completion of this practical course, student shall be able to

- Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears.
- Observe and identify microbes and lower groups of plants on their own.
- Demonstrate the techniques of inoculation, preparation of media etc.
- 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 credits during 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 Archaeobacteria and 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 fruticose
 - 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.

Suggested Manuals:

1. Vasista, B.R. (2018). Botany for degree students - Algae - S. Chand and company Ltd., New Delhi.
2. Dubey, H.C (2018). A text book of Fungi, bacteria and Viruses. Vikas publishing House, New Delhi.
3. Smith, G.M (1955). Cryptogamic Botany (Vol. I Algae, Fungi, & Lichens)
McGraw-Hill Book Co., New York

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MODEL QUESTION PAPER FOR PRACTICAL EXAMINATION

Semester – I/ Botany Core Course – 1

**TITLE OF THE PAPER: Fundamentals of Microbes and Non-vascular Plants
(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)**

Max. Time: 3 Hrs.

Max. Marks: 40

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1. Take the T.S. of material 'A' (Fungi), make a temporary mount and make comments about identification. 8M
 2. Identify any 2 algae from the mixture (material 'B') given with specific comments about identification. 8M
 3. Take the T.S. of material 'C' (Bryophyta), make a temporary mount and make comments about identification. 8M
 4. Identify the following with specific reasons 4x2=8M
 - A. A laboratory equipment of Microbiology
 - B. B. Virus
 - C. Archaeobacteria /Ascomycete /Cyanobacteria/ Eu-Bacteria
 - D. Lichen
 5. Record + Viva-voce 5+3 = 8 M

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SEMESTER- III

PAPER- III

CREDITS: 02

BOTANY	BOTT11A	WEF: 2021-2022	B. Sc (BZC), AQUA
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Title of the paper: Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

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

THEORY: Learning outcomes:

- On successful completion of this course, the students will be able to;
- Understand on the organization of tissues and tissue systems in plants.
- Illustrate and interpret various aspects of embryology.
- Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities.
- Appraise various qualitative and quantitative parameters to study the population and community ecology.
- Correlate the importance of biodiversity and consequences due to its loss.
- Enlist the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation.

SYLLABUS:

Unit – 1: Anatomy of Angiosperms

12 Hrs.

1. Organization of apical meristems: Tunica-carpus theory and Histogen theory.
2. Tissue systems–Epidermal, ground and vascular.
3. Anomalous secondary growth in *Boerhaavia* and *Dracaena*.
4. Study of timbers of economic importance - Teak, Red sanders and Rosewood.

Unit – 2: Embryology of Angiosperms

12 Hrs.

1. Structure of anther, anther wall, types of tapetum. Microsporogenesis and development of male gametophyte.
2. Structure of ovule, megasporogenesis; monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*) types of embryo sacs.
3. Outlines of pollination, pollen – pistil interaction and fertilization.
4. Endosperm - Types and biological importance - Free nuclear, cellular, helobial and ruminant.
5. Development of Dicot (*Capsella bursa-pastoris*) embryo.

Unit – 3: Basics of Ecology**12 Hrs.**

1. Ecology: definition, branches and significance of ecology.
2. Ecosystem: Concept and components, energy flow, food chain, food web, ecological pyramids.
3. Plants and environment: Climatic (light and temperature), edaphic and biotic factors.
4. Ecological succession: Hydrosere and Xerosere.

Unit – 4: Population, Community and Production Ecology**12 Hrs.**

1. Population ecology: Natality, mortality, growth curves, ecotypes, ecads
2. Community ecology: Frequency, density, cover, life forms, biological spectrum
3. Concepts of productivity: GPP, NPP and Community Respiration
4. Secondary production, P/R ratio and Ecosystems.

Unit – 5: Basics of Biodiversity**12 Hrs.**

1. Biodiversity: Basic concepts, Convention on Biodiversity - Earth Summit.
2. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity
3. Biodiversity Hot spots in India. Biodiversity in North Eastern Himalayas and Western Ghats.
4. Principles of conservation: IUCN threat-categories, RED data book
5. Role of NBPGR and NBA in the conservation of Biodiversity.

Text books:

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

Books for Reference:

- Esau, K. (1971) *Anatomy of Seed Plants*. John Wiley and Son, USA.
- Fahn, A. (1990) *Plant Anatomy*, Pergamon Press, Oxford.
- Cutler, D.F., T. Botha & D. Wm. Stevenson (2008) *Plant Anatomy: An Applied Approach*, Wiley, USA
- Paula Rudall (1987) *Anatomy of Flowering Plants: An Introduction to Structure and Development*. Cambridge University Press, London
- Bhojwani, S. S. and S. P. Bhatnagar (2000) *The Embryology of Angiosperms (4th Ed.)*, Vikas Publishing House, Delhi.
- Pandey, A. K. (2000) *Introduction to Embryology of Angiosperms*. CBS Publishers & Distributors Pvt. Ltd. , New Delhi
- Maheswari, P. (1971) *An Introduction to Embryology of Angiosperms*. McGraw Hill Book Co., London.
- Johri, B.M. (2011) *Embryology of Angiosperms*. Springer-Verlag, Berlin
- Pandey, B.P. (2013) *College Botany, Volume-III*, S. Chand Publishing, New Delhi
- Bhattacharya, K., A. K. Ghosh, & G. Hait (2011) *A Text Book of Botany, Volume- IV*, New Central Book Agency Pvt. Ltd., Kolkata
- Kormondy, Edward J. (1996) *Concepts of Ecology*, Prentice-Hall of India Private Limited, New Delhi
- Begon, M., J.L. Harper & C.R. Townsend (2003) *Ecology*, Blackwell Science Ltd., U.S.A.
- Eugene P. Odum (1996) *Fundamentals of Ecology*, Natraj Publishers, Dehradun
- Sharma, P.D. (2012) *Ecology and Environment*. Rastogi Publications, Meerut, India
- U. Kumar (2007) *Biodiversity : Principles & Conservation*, Agrobios (India), Jodhpur.

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BOTANY	BOT- 301C	w.e.f. 2021-22	B. Sc. (BZC), AQUA
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II B. Sc – BOTANY

Model Question Paper

SEMESTER- III

PAPER-III: Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Time: 3 Hours

Max. Marks: 70

SECTION-A

Answer any **four** of the following questions.

4x 5 = 20Marks

(Draw diagrams wherever necessary)

1. Histogen theory.
2. Rosewood.
3. Ruminant endosperm
4. Energy flow
5. Significance of ecology.
6. Natality
7. GPP.
8. NBPGR

SECTION-B

Answer any **five** of the following questions.

5x10 = 50Marks

(Draw diagrams wherever necessary)

9. Explain about Organization of apical meristems:
10. Describe the Anomalous secondary growth in *Boerhaavia*?
11. Write an essay on ICBN.
12. Describe vegetative & floral characters of Asclepiadaceae.
13. Write an essay on ecological pyramids?
14. What is Ecological succession: Write an essay on Hydrosere?
15. Write the characteristics of population ecology?
16. Give an account of Value of Biodiversity?

Guide lines for paper setter: (for Paper III – BOT- 301) w.e.f 2021-22

1. In **section A**: Unit II, V must carry **one** question, Unit I,III & IV must carry **two** questions.
2. In **section- B**: Set minimum **two** questions from Unit I, II, III . **One** question each from Unit IV and Unit V.
3. See the following table and Model paper for marks distribution.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	2		2		
	10		20		30
Unit - II	1		2		
	05		20		25
Unit – III	2		2		
	10		20		30
Unit – IV	2		1		
	10		10		20
Unit – V	1		1		
	05		10		15
Max. Q & marks	8	(x 5) = 40	8	(x 10) = 80	(Total questions =16) Total marks = 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4 (4 X 5M) = 20 M		5 (5 X 10M)= 50 M		70M

INTERNAL EXAMS - 30Marks

(**20 marks** for unit tests, 5marks for Attendance **5** marks for seminars)

Practical syllabus of Botany Core Course – 3 /Semester – III

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

Course Outcomes:

On successful completion of this practical course students shall be able to:

1. Get familiarized with techniques of section making, staining and microscopic study of vegetative, anatomical and reproductive structure of plants.
2. Observe externally and under microscope, identify and draw exact diagrams of the material in the lab.
3. Demonstrate application of methods in plant ecology and conservation of biodiversity and qualitative and quantitative aspects related to populations and communities of plants.

Practical Syllabus

1. Tissue organization in root and shoot apices using permanent slides.
2. Anomalous secondary growth in stems of *Boerhavia* and *Dracaena*.
3. Study of anther and ovule using permanent slides/photographs.
4. Study of pollen germination and pollen viability.
5. Dissection and observation of Embryo sac haustoria in *Santalum* or *Argemone*.
6. Structure of endosperm (nuclear and cellular) using permanent slides / Photographs.
7. Dissection and observation of Endosperm haustoria in *Crotalaria* or *Coccinia*.
8. Developmental stages of dicot and monocot embryos using permanent slides / photographs.
9. Study of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, rain gauge, and lux meter. (visit to the nearest/local meteorology station where the data is being collected regularly and record the field visit summary for the submission in the practical).
10. Study of morphological and anatomical adaptations of hydrophytes and xerophytes (02 each).
11. Quantitative analysis of herbaceous vegetation in the college campus for frequency, density and abundance.
12. Identification of vegetation/various plants in college campus and comparison with Raunkiaer's frequency distribution law.
13. Find out the alpha-diversity of plants in the area.
14. Mapping of biodiversity hotspots of the world and India

Model paper for Practical Examination

Semester – III/ Botany Core Course – 3

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Max. Time: 3 Hrs.

Max. Marks: 50

1. Take T.S. of the material 'A' (Anatomy), prepare a temporary slide and justify the identification with specific reasons. 10 M
2. Write the procedure for the experiment 'B' (Embryology) and demonstrate the same. 10 M
3. Take T.S. of the material 'C', prepare a temporary slide and justify the identification with specific reasons. 10 M
4. Identify the following with specific reasons. 4 x 3 = 12 M
 - D. Anatomy/Embryology
 - E. Ecology instrument
 - F. Mapping of Biodiversity hot spot
 - G. Endemic/endangered plant/animal
5. Record + Viva-voce 5 + 3 = 8 M

Suggested co-curricular activities for Botany Core Course-3 in Semester-III:

A. Measurable :

a. Student seminars :

1. Anatomy in relation to taxonomy of Angiosperms.
2. Nodal anatomy
3. Floral anatomy
4. Embryology in relation to taxonomy of Angiosperms.
5. Apomictics and polyembryony.
6. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.
7. Deforestation and Afforestation.
8. Green house effect and ocean acidification.
9. The Montreal protocol and the Kyoto protocol.
10. Productivity of aquatic ecosystems.
11. Mangrove ecosystems in India.
12. Kollerulake – Ramsar site.
13. Biodiversity hotspots of the world.
14. Origin of Crop plants - Vavilov centers
15. Agrobiodiversity
16. International organizations working on conservation of Biodiversity
17. Nagoya protocol – ABS system.
18. Endemic and endangered plants in Andhra Pradesh.

b. Student Study Projects :

1. Stomata structure in plants from college campus/ their native place.
2. Report on xylem elements in plants using maceration technique.
3. Collection of information on famous herbaria in the world and preparation of a report.
4. Microscopic observations on pollen morphology from plants in college Campus/ their native locality.
5. Study report on germination and viability of pollen in different plants.
6. Observation of anthesis time in different plants and their pollinators.
7. A report on autecology and synecology of some plants in college campus or their native place.
8. Collection of photos of endemic/endangered plant and animal species to Make an album.

9. Biodiversity of the college or their own residential/ native area.
10. Collection of seeds/vegetative organs of rare plant species from their localities and to raise/grow in college garden

C .Assignments: Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General :

1. Visit to an arboretum/silviculture station/Forest research institute to see the live timber yielding plants or to visit a local timber depot. to observe various woods.
2. Field visit to a nearby ecosystem to observe the abiotic-biotic relationships.
3. Visit to National park/Sanctuary/Biosphere reserve etc., to observe in-situ conservation of plants and animals.
4. Visit to a Botanical garden or Zoo to learn about ex-situ conservation of rare plants or animals.
5. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

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BOTANY	BOT-501C	2021-22	B.Sc. (BZC)
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PAPER – V Cell Biology, Genetics and Plant Breeding SEMESTER-V (2021-22)
Total Hours of teaching 60 hrs @ 6 hrs for Week Credits: 03

UNIT-I Cell Biology (12 hrs)

1. Cell, Ultra Structure and functions of cell wall.
2. Molecular Organization of cell membranes.
3. Chromosomes; morphology, organization of DNA in a chromosome (Nucleosome model) Euchromatin and Heterochromatin.

UNIT-II Genetic Material (12 hrs)

1. DNA as the Genetic Material: Griffith's and Avery's Transformation Experiment. Hershey - Chase Bacteriophage experiment.
2. DNA Structure (Watson & crick model) and replication of DNA (Semi Conservative).
3. Types of RNA (mRNA, tRNA, rRNA), their structure and function.

UNIT-III Mendelian Inheritance (12 hrs)

1. Mendelian Inheritance (Mono – Di-hybrid Crosses), Back cross and Test cross.
2. Linkage: concept, complete and In-complete Linkage, Coupling and Repulsion; Linkage Maps Based on Two and Three Point cross.
3. Crossing over concept and significance.

UNIT-IV Gene Expression (12 hrs)

1. Organization of gene, Transcription and Translation.
2. Mechanism and regulation of Gene Expression in Prokaryotes (Lac operon).
3. Mutations: Chromosomal Aberrations, Gene Mutations and Transposable Elements.

UNIT-V Plant Breeding (12 hrs)

1. Introduction and objectives of Plant Breeding.
2. Methods of Crop Improvement: Procedure, Advantages and limitations of Introduction, Selection and Hybridization (Out lines only).

B.Sc – BOTANY
SEMESTER -V. THEORY MODEL PAPER

Time: 3 Hours

Max. Marks: 70

SECTION-A

Answer any FOUR of the following question

4x5=20M.

(Draw diagrams wherever necessary)

1. Nucleosome
2. Griffith experiment.
3. t RNA
4. Back cross and test cross.
5. Transcription.
6. Three point test cross.
7. Hybridization.
8. Crossing over.

SECTION-B

Answer any FIVE of the following questions.

5 x 10 = 50M.

(Draw diagrams wherever necessary)

9. Describe the Ultra structure and functions of cell membrane.
10. What is cell theory? Write about eukaryotic cell components.
11. Write about structure and replication of DNA.
12. DNA as a genetic material proof with suitable experiments.
13. Explain the Mendel's law of inheritance.
14. Define linkage. Describe the different types of Linkage.
15. Write an essay on mechanism and Regulation of gene Expression in Prokaryotes.
16. Discuss about methods of Crop improvement.

1. In Section A: Unit I, III, V must carry one question from each unit. Unit II must carry 2 questions and Unit IV must carry three questions.
2. In section-B: Set minimum Two questions from Unit I, II & III
3. See the following table and Model paper.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	1		2		25
	5		20		
Unit – II	2		2		30
	10		20		
Unit –III	1		2		25
	5		20		
Unit-IV	3		1		25
	15		10		
Unit-V	1		1		15
	5		10		
Max .Q & marks	8 (x 5) =40		8 (x 10) = 80		(Total questions =16) Marks 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		70
	(4 x 5) = 20		(5 x 10) = 50		

INTERNAL EXAMS - 30Marks
(20 marks for unit tests, 5marks for Attendance 5 marks for seminars)

III B.SC-BOTANY Practical paper
Cell Biology, Genetics and Plant Breeding

SEMESTER-V

BOT-501-P

Time: 3hr

Total hours of teaching 30hrs @ 2 hrs per week

Max.marks:50

1. Study of the structure of cell organelles through photomicrographs.
2. Study of plant cell through temporary mounts.
3. Study of various stages of mitosis using cytological preparation of Onion root tips.
4. Study of DNA packing by micrographs.
5. Numerical problems solving Mendal's Laws of inheritance.
6. Chromosome mapping using 3 point test cross data.
7. Hybridization techniques –emasculation. Bagging (for demonstration only).
8. Field visit to a plant breeding research station.

III B.SC-SEMESTER-V, BOTANY PRACTICAL MODEL PAPER

PAPER –V: CELL BIOLOGY GENETICS AND PLANT BREEDING

1. Perform the Experiment A Squash technique.....12M
2. Give the experimental protocol of the experiments. B.....04M
3. Solving numerical problems on Mendelian inheritance....C, D..... $2 \times 7 \frac{1}{2} = 15M$
4. Record.....05M
- Viva.....04M
- Internal Practical Exam.....10M

III B.SC-BOTANY Syllabus SEMESTER-V

Practical paper – V: Cell Biology, Genetics and Plant Breeding

Total hours of teaching 30hrs @ 2 hrs per week

1. Perform the Experiment A.

Squash technique4M

Procedure.....4M

diagram2M =10

2. Give the experimental protocol of the experiments. B.....4M

3. Genetic problem C, D

Salvation of problem..... 5M

Reasoning.....2¹/₂M

2X7¹/₂=15M

Viva4M

Internal:

a) Record.....5 M.

b)Internal Practical Exam.....10M

Books for Reference:

1. Old, R.W. and Primrose S.B. 1994, Principles of Gene Manipulation Blackwell Science, 19 London
2. Grierson, D. and Convey S.N. 1989, Plant Molecular Biology, Blackie Publishers, New York.
2. Lea, P.J. and Leegood R.C. 1999, Plant Biochemistry and Molecular Biology, John Wiley and Sons, London.
3. Power C.B., 1984, Cell Biology, Himalaya Publishing Co. Mumbai
4. De. Robertis and De Robertis, 1998, Cell and Molecular Biology, K.M. Verghese and Company .

A.G & S.G. Siddhartha Degree College of Arts & Science
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BOTANY	BOT-502	2021-22	B.Sc. (BZC)
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SEMESTER-V (2021-22)

PAPER – VI

PLANT ECOLOGY & PHYTOGEOGRAPHY

Credits-03

Total Hours of teaching 60 hrs @ 6 hrs for Week

UNIT-I.ELEMENTS OF ECOLOGY

(12 hrs)

1. Ecology: Definition, branches and significance of ecology.
2. Climatic factors: Light, Temperature.
3. Edaphic factor: Origin, formation, composition and soil profile.
4. Biotic factor, Ecological adaptations of Plants.

Unit– II. Ecosystem Ecology

(12 hrs)

1. Ecosystem: concept and components, energy flow, food chain, food web, Ecological Pyramids.
2. Productivity of ecosystem-Primary, Secondary and Net productivity.
3. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

Unit – III Population & Community ecology.

(12 hrs)

1. Population- definition, characteristics and importance (Density, Natality, Mortality, Growth Curves) outlines- ecotypes.
2. Plant communities- characters of a community, outlines – Frequency, density, cover, life forms, Biological Spectrum.
3. Ecological Succession: Hydrosere and Xerosere.

Unit-IV Phytogeography

(12 hrs)

1. Principles of Phytogeography, Distribution (Wides, Endemic, Discontinuous species.
2. Phytogeography regions of India.
3. Endemism – types and Causes.

Unit-V Plant Biodiversity and its Importance

(12 hrs)

1. Definition, Levels of Biodiversity – genetic, species and ecosystem.
2. Biodiversity and Hot-spots of India: North Eastern, Himalayas and Western Ghats.
3. Loss of Biodiversity-causes and Conservation (In-situ and Ex-Situ Methods).

B.Sc – BOTANY

SEMESTER –VI THEORY MODEL PAPER

PLANT ECOLOGY & PHYTOGEOGRAPHY

Time: 3 Hours

Max. Marks: 70

SECTION-A

Answer any FOUR of the following question.

4 x 5= 20M.

(Draw diagrams wherever necessary)

1. Soil profile.
2. Biotic factor.
3. Food web.
4. Energy Flow in Ecosystem.
5. Natality.
6. Biological Spectrum
7. Endemism.
8. Red-Data book.

SECTION-B

Answer any Five of the following questions.

5 x 10 = 50M.

(Draw diagrams wherever necessary)

9. Discusses the importance of Temperature Factor on Plant Growth.
10. Briefly Discuss the Ecological Adaptations of Xerophytes.
11. What are Ecological Pyramids? Describe the Pyramids of numbers, Biomass and Energy.
12. What are biogeochemical cycles? Give an account of Nitrogen cycle?
13. What is Plant Succession? Describe Hydrosere?
14. What are the Characters of Plant Communities?
15. What are Principles of Plant Phytogeography?
16. What is Biodiversity? Explain the Levels of Biodiversity.

Guide lines for paper setter: (for Paper V-BOT-501) W.e.f. 2021-22

1. In Section A: Unit I, II, III, must carry Two question from each unit. Unit IV, V must carry one question.
2. In section-B: Set minimum two questions from Unit I, II & III and Set One Question from IV, V.
3. See the following table and Model paper.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section – A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	2		2		
	10		20		30
Unit – II	2		2		
	10		20		30
Unit – III	2		2		
	10		20		30
Unit-IV	1		1		
	5		10		15
Unit-V	1		1		
	5		10		15
Max. Q & marks	8 (x 5) = 40		8 (x 10) = 80		(Total questions = 16) Marks 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Mark s	Max. marks
	4		5		
	(4 x 5) = 20		(5 x 10) = 50		70

INTERNAL EXAMS – 30 Marks

(20 marks for unit tests, 5 marks for assignments and remaining 5 marks for seminar etc.)

**BOTANY PRACTICAL
PLANT ECOLOGY & PHYTOGEOGRAPHY**

SEMESTER- V

BOT-502-P

Total hours of teaching 30 hrs @ 3 hrs per week

1. Study of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, psychrometer, rain gauge, and lux meter.
2. Permeability (percolation; total capacity as well as rate of movement) of different soil samples.
3. Determination of soil pH
4. Study of morphological and anatomical adaptations of hydrophytes and xerophytes. (4each)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method.
6. Study of Phytoplankton and macrophytes from water bodies.
7. Study of species diversity index of vegetation.
8. Estimation of Primary Productivity of an ecosystem.
9. To study field vegetation with respect to stratification, canopy cover and composition.
10. Study of plants included in agro forestry and social forestry.
11. To locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.
12. The following practical should be conducted in the Field/lab with the help of Photographs, herbarium, Floras, Red data book- Study of endangered plants species, critically endangered plants species, vulnerable plant species and monotypic endemic genera of India.

**BOTANY PRACTICAL
PLANT ECOLOGY & PHYTOGEOGRAPHY**

SEMESTER- V

BOT-502-P

Total hours of teaching 30 hrs @ 3 hrs per week

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1. Study Project under supervision.....12 Marks
2. Experiment A 07Marks
3. Anatomical adaptations of **B** (Section cutting)..... 07Marks
4. Spotters **C&D**(2x2 1/2) = 5 Marks
5. Record.....05Marks
6. Viva-Voc.....04Mrks
7. Internal practical exam.....10Marks

Total = 50 Marks

**BOTANY PRACTICAL
PLANT ECOLOGY & PHYTOGEOGRAPHY**

SEMESTER- V

BOT-502-P

Scheme of Valuation

1. Study Project under supervision
To study Honey Bees and Plants Yielding Honey 12 Marks
2. Experiment A -determination of soil porosity/PH..... 07Marks
3. Anatomical adaptations of **B** (Section cutting)
Xerophytes / Hydrophytes07Marks
4. Spotters **C&D** anemometer/rain gauze/lux meter (2x2 1/2) = 5 Marks
5. Viva-Voc.....04Mrks
6. Record..... 05Marks
7. Internal practical exam..... 10Marks

Total = 50 Marks

Books for Reference:

1. Daubenmire, R.F. (): Plants & Environment (2nd Edn.) John Wiley & Sons.,
New York22
2. Puri, .G.S. (1960): Indian Forest Ecology (Vol.I & II) Oxford Book Co., New Delhi
&Calcutta.
3. Billings, W.B. (1965): Plants and the Ecosystem Wadsworth Publishing Co., Inc.,
Belmont.
4. Misra, R. (1968): The Ecology work Book Oxford & INH Publishing Co., Calcutta

