

**B.Sc. BOTANY
SYLLABUS**
(Common Core Syllabus under CBCS)

**with effect from the academic year 2025-2026 and
onwards**



Accredited with 'A+' by NAAC

**DEPARTMENT OF BOTANY
KAKATIYA UNIVERSITY
WARANGAL -506 009, TELANGANA**

KAKATIYA UNIVERSITY
WARANGAL-506009, TELANGANA
 (COMMON CORE SYLLABUS UNDER CBCS FOR)

B. Sc BOTANY

CODE	PAPER/TITLE	Course Type	HPW	Credits
FIRST YEAR SEMSTER-I				
BS104	PAPER-I: Microbial Diversity and Early Land Plants	DSC-1A	4T+2P=6	4+1=5
FIRST YEAR SEMSTER-II				
BS204	PAPER-II: Gymnosperms, Anatomy and Embryology of Angiosperms	DSC-1B	4T+2P=6	4+1=5
SECOND YEAR SEMSTER-III			4T+2P=6	
BS302	PAPER-III: Plant Taxonomy, Ecology and Medicinal Botany	DSC-1C	4T+2P=6	4+1=5
SECOND YEAR SEMSTER-IV			4T+2P=6	
BS402	PAPER-IV: Cell Biology, Genetics & Plant Physiology	DSC-1D	4T+2P=6	4+1=5
THIRD YEAR SEMESTER-V				
BS501	SEC:1-	SEC-1	2	2
BS502	SEC:2-	SEC-2-	2	2
BS503	VAC-1:	VAC-1	3	3
BS504	Multi-Disciplinary Course (MDC)	MDC	4T	4
BS505	DSE-1A: Biodiversity & Conservation DSE-1B: Tissue Culture and Biotechnology DSE-1C: Economic Botany	DSE-1A/ DSE-1B/ DSE-1C	4T+2P=6	4+1=5
THIRD YEAR SEMESTER-VI				
BS601	SEC:3	SEC:3-	2	2
BS602	SEC:4	SEC:4-	2	2
BS603	VAC-2	VAC-2	3	3
BS604	DSE-2A: Plant Molecular Biology DSE-2B: Seed Technology DSE-2C: Analytical Techniques in Plant Sciences	DSE-2A/ DSE-2B/ DSE-2C	4T+2P=6	4+1=5
	PROJECT			4

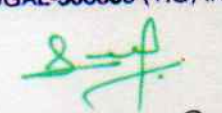
SEC: Skill Enhancement Course, VAC: Value added Course, MDC: Multi-Disciplinary Course
 DSC: Discipline Specific Core, DSE: Discipline Specific Elective.


Dr. P. KARUNAKAR RAO
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B. Lalitha Kumari
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Dr. M. Mahamatha, Ph.D
 Professor in Forest Botany
 Basic & Social Sciences Department
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B. Lalitha Kumari

B.Sc. BOTANY
I Year: I-Semester
Paper-I: Microbial Diversity and Early Land Plants

DSC-1A

(4hrs./week)

Credits-4

Theory Syllabus

(60hours)

UNIT-I

(15hours)

- 1) Brief account of Archaeobacteria, Actinomycetes and Mycoplasma with reference to Little leaf of Brinjal and Papaya leaf curl.
- 2) **Viruses:** Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro.
- 3) **Bacteria:** Structure, nutrition and reproduction. Plant diseases caused by bacteria and their control with reference to Angular leaf spot of Cotton and Bacterial blight of Rice.

UNIT-II

(15hours)

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

UNIT-III

(15hours)

- 7) General characters and classification of fungi (Ainsworth).
- 8) Structure, reproduction and life cycle of the following:
(a) Mastigomycotina - *Albugo*
(b) Zygomycotina - *Mucor*
(c) Ascomycotina - *Penicillium*.
(d) Basidiomycotina - *Puccinia*
(e) Deuteromycotina - *Cercospora*.
- 9) Economic importance of Lichens

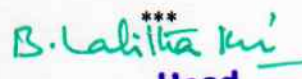
UNIT-IV

(15hours)

- 10) **Bryophytes:** Structure, reproduction, life cycle and systematic position of *Marchantia*, and *Polytrichum*, Evolution of Sporophyte in Bryophytes.
- 11) **Pteridophytes:** Structure, reproduction, life cycle and systematic position of *Rhynia*, *Equisetum* and *Marsilea*.
- 12) Stellar evolution, heterospory and seed habit in Pteridophytes.


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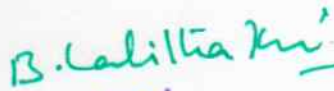


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Suggested Readings:

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


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B.Sc.BOTANY
I Year: I-Semester
Paper-I: Microbial Diversity and Early Land Plants
DSC-1A Credits-1

Practical Syllabus

(45hours)

1. Study of viruses and bacteria using electron micrographs(photographs).
2. Gram staining of Bacteria.
3. Study of symptoms of plant diseases caused by viruses, bacteria, Mycoplasma and fungi: **Viruses:** Tobacco mosaic and Rice tungro; **Bacteria:** Angular leaf spot of Cotton and Bacterial blight of Rice; **Mycoplasma:** Little leaf of Brinjal and Leaf curl of Papaya; **Fungi:** White rust on Crucifers, Rust on Wheat & Tikka disease of Groundnut.
4. Vegetative and reproductive structures of the following taxa:
Algae: *Oscillatoria*, *Nostoc*, *Volvox*, *Chara*, *Ectocarpus* and *Polysiphonia*.
Fungi: *Albugo*, *Mucor*, *Penicillium*, *Puccinia* and *Cercospora*
5. Section cutting of diseased material infected by Fungi and identification of pathogens as per theory syllabus. (White rust of Crucifers, Rust on Wheat & Tikka disease of Groundnut).
6. Study of vegetative, reproductive structures and anatomy of **Bryophytes:** *Marchantia*, and *Polytrichum*.
7. Study of vegetative, reproductive structures and anatomy of **Pteridophytes:** *Equisetum* and *Marsilea*.
8. Study of Anatomical features of *Equisetum* stem and *Marsilea* Petiole & Rhizome by preparing temporary mounts.
9. Field visits to places for algal / microbial / fungal interest(e.g. Mushroom cultivation, algal collection and infected plant materials).

Practical Model Paper

Max.Marks:25

Time: 2hrs

- I. Identify the given components 'A' & 'B' in the algal mixture.
Describe with neat labeled diagrams & give reasons for the classifications. 2X2=4M
- II. Classify the given bacterial culture 'C' using Gram s staining technique. 3M
- III. Take a thin transverse section of given diseased plant material / Pteridophyte material 'D'.
Identify & describe the symptoms caused by the pathogen / describe with neat labeled diagram. 4M
- IV. Identify the given diseased plant material specimens 'E', 'F' & 'G' by giving reasons.
(Fungal-1, Bacteria-1 & Viral/Mycoplasma-1) 3X1=3M
- V. Comment on the given slides 'H' & 'I' (Algae-1, Fungi-1) 2X2=4M
- VI. Identify the given specimen / slide 'J' & 'K' (Bryophytes -1 & Pteridophytes -1) 2X2=4M
- VII. Record & Viva 3M


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Dr. M. RAMATHRA, Ph.D
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A. Subba Rao

B.Sc., BOTANY
I Year, II-Semester
Paper-II. Gymnosperms, Anatomy and Embryology of Angiosperms

DSC-1B (4hrs./week) Credits-4

Theory Syllabus (60hours)

UNIT-I (15hours)

1. Gymnosperms: Distribution, General characters, structure, reproduction and classification (Sporne, 1965)
Economic importance of Gymnosperms.
2. Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus* and *Gnetum*.
3. Introduction to Palaeobotany, Types of fossils and fossilization, Importance of fossils.

UNIT-II (15h)

4. Meristems: Types, histological organization of shoot and root apices and theories.
5. Tissues and Tissue systems: Simple, complex and special tissues.
6. Leaf: Internal structure of dicot and monocot leaf. Stomata structure and types. Epidermal out growths.

UNIT-III (15h)

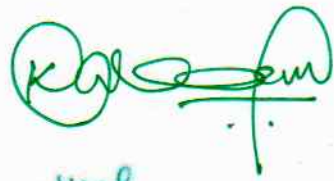
7. Secondary Growth: Vascular cambium – structure and function, Secondary growth in root and stem, Wood (heartwood and sapwood).
8. Anomalous secondary growth of Stem - *Achyranthes*, *Boerhaavia*, *Dracaena*; Root – *Beta*
9. Wood structure: General account. Study of local timbers – Teak (*Tectona grandis*), Red sanders (*Pterocarpus santalinus*) and Neem (*Azadirachta indica*).

UNIT-IV (15h)

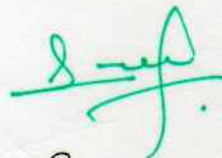
10. Structure of Anther, Microsporogenesis and development of male gametophyte.
11. Ovule structure and types; Megasporogenesis and development of female gametophyte.
12. Pollination mechanisms, Pollen-pistil interaction; Double fertilization
13. Types of Endosperm. Embryo structure – Dicot and Monocot. Polyembryony and Apomixis –an outline.


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3. Sporne, K.R. 1965. Morphology of Gymnosperms. Hutchinson Co., Ltd., London.
4. Vashishta, P.C., A.K. Sinha and Anil Kumar. 2006. Botany-Pteridophyta (Vascular Cryptogams). S. Chand & Company Ltd, New Delhi.
5. Pandey, B.P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant
6. Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.
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11. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
12. Pandey, B.P. 2007. Botany for Degree Students: Diversity of Seed plants and their Systematics, Structure, Development and Reproduction in Flowering Plants. S. Chand & Company Ltd, New Delhi.
13. Bhattacharya et al. 2007. A text book of Palynology, Central, New Delhi.
14. Bhojwani, S.S. and S.P. Bhatnagar. 2000. The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, Delhi.
15. M.R. Saxena - A text book of Palynology. 4. Vashista - A text book of Anatomy.
16. P.K.K. Nair - A text book of Palynology
17. Evert, R.F. (2006) Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc.
18. Esau, K. 1971. Anatomy of Seed Plants. John Wiley and Son, USA.
19. Johri, B.M. 1984. Embryology of Angiosperms. Springer-Verlag, Berlin.
20. Kapil, R.P. 1986. Pollination Biology. Inter India Publishers, New Delhi.
21. Maheswari, P. 1971. An Introduction to Embryology of Angiosperms. McGraw Hill Book Co., London.
22. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
23. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House, Delhi. 5th edition
24. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
25. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands. 4. Johri, B.M. (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.

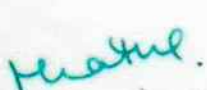

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A. Subha Rani

B.Sc.,BOTANY
I Year,II-Semester
Paper-II.Gymnosperms,Anatomy and Embryology of Angiosperms

DSC-1B

Credit1

Practical Syllabus

(45hours)

1. Study of vegetative and reproductive structures of the following taxa:
 Gymnosperms - *Pinus* and *Gnetum*.
2. Demonstration of double staining technique.
3. Study of Anatomical features of *Pinus* needle and *Gnetum* Stem by preparing double stained permanent mounts.
4. Fossil forms using permanent slides / photographs: Cycadeoidea.
5. Tissue organization in root and shoot apices using permanent slides.
6. Study of different tissue systems-Simple, complex and special tissues
7. Preparation of double stained Permanent slides of Anomalous secondary structure:
 Stem - *Achyranthes*, *Boerhaavia*, *Dracaena*; Root-*Beta*
8. Stomatal types using epidermal peels.
9. Structure of anther and microsporogenesis using permanent slides.
10. Structure of pollen grains using whole mounts-*Hibiscus*, *Acacia* and *Grass*
11. Pollen viability test using Evans Blue
12. Study of ovule types and developmental stages of embryo sac.
13. Structure of endosperm (nuclear and cellular).
14. Developmental stages of dicot and monocot embryos using permanent slides.
15. Isolation and mounting of embryo (using *Cyamopsis*/*Crotalaria*)

Practical Model Paper

Time: 2hrs

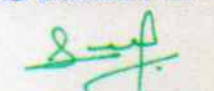
Max.Marks:25

1. Prepare a double stained permanent mount of the given material "A" (Gymnosperms) 5M
 Draw diagram & give reasons for identification.
2. Identify the given material "B" (Anomalous secondary growth). 4M
 Prepare a double stained permanent mount of transverse section.
3. Prepare a temporary mount of epidermal peel of the given leaf material "C" and 3M
 Identify the stomatal type.
4. Conduct the pollen viability test (OR) Isolate the embryo from the given material "D" 3M
 Identify and describe the specimens / slides with well labeled diagrams
 (a) Gymnosperms-E (b) Anatomy-F (c) Embryology- G (3X2)=6M
5. Record and Viva 4M


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 A. S. R. Rao


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Annexure – I (Credits)
Proposed CBCS Structure from 2025-26 for Under Graduate Courses

Courses		Papers	Total Credits	Credits for each paper / Semester						Credits for each paper / Semester						Credits for each paper / Semester					
				BA						B.Com.						B.Sc.					
				I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Core Courses DSC	Major-1	6	30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Major -2	6	30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Minor-1	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
MIL/AEC (First Language)	English	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Second Language (Telugu, Hindi, Urdu, etc.)		4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Multi- Disciplinary Course	MDC 1	1	4	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4	-
Sec 1, 2		2	4					2	2					2	2					2	2
Sec 3, 4		2	4					2	2					2	2					2	2
Value added course (VAC)	VAC 1, 2	2	6	-	-	-	-	3	3	-	-	-	-	3	3	-	-	-	-	3	3
Internships	Internship / Project	1	4	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4
Total Credits in each semester			142	25	25	25	25	21	21	25	25	25	25	21	21	25	25	25	25	21	21
Total Credits in UG				142						142						142					
Credits under Non-CGPA (Community engagement and service)		NSS /NCC /sports / Extra curricular	6	Upto 6 (2 in each year)						Upto 6 (2 in each year)						Upto 6 (2 in each year)					
		IKS	4	Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)					

