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 UNIVERISTY
WARANGAL -506 009, TELANGANA

KAKATIYA UNIVERSITY

WARANGAL-506009, TELANGANA

(COMMON CORE SYLLABUS UNDER CBCS FOR)

B. Sc BOTANY

CODE	PAPERTITTLE	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	PAPAR-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-DisciplinaryCourse(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-5E	4T+2P=6	4+1=5
	PROJECT			4

SEC:Skill Enhancement Course,**VAC**:ValueaddedCourse;**MDC**:Multi-DisciplinaryCourse
DSC:DisciplineSpecificCore,**DSE**:DisciplineSpecificElective.

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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 Archaebacteria, 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) Mastigimycotina -*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) Stelar evolution, heterospory and seed habit in Pteridophytes.

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Suggested Readings:

1) Alexopolous,J.and W.M.Charles.1988.Introduction to Mycology. Wiley Eastern, New Delhi.
2) Mckane,L.andK.Judy.1996. Microbiology–Essentials and Applications. Mc Graw Hill, NewYork.
3) Pandey,B.P.2001.College Botany,Vol.I:Algae, Fungi,Lichens,Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta.S.Chand&CompanyLtd,NewDelhi.
4) Pandey,B.P.2007.Botany for Degree Students: Diversity of Microbes, Cryptogams,CellBiology 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.andS.K.Bassi.2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.
9) Vashishta,B.R.,A.K.SinhaandV.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) DuttaA.C.2016.Botany for DegreeStudents.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,NewDelhi.
14) Vashishta,P.C.,A.K.SinhaandAnilKumar.2006.Botany-Pteridophyta(Vascular Cryptogams). . Chand & Company Ltd, New Delhi.
15) Pandey,B.P.2001.CollegeBotany,Vol.I:Algae,Fungi,Lichens,Bacteria,Viruses,Plant Pathology,IndustrialMicrobiologyandBryophyta.S.Chand&CompanyLtd,NewDelhi.
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.andS.K.Bassi.2008.ATextbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.
18) Vashishta,B.R.,A.K.Sinhaand Adarsha Kumar.2008. Botany for Degree Students: Bryophyta. S. Chand & Company Ltd, New Delhi.

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A. Lalitha Rani

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 d*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 *Marsile*a 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. Identifythegivendiseased plant material specimens'**E**','**F**'&'**G**'bygivingreasons.
(Fungal-1, Bacteria-1&Viral/Mycoplasma-1) 3X1=3M
V. Commentonthegivenslides'**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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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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1. Watson,E.V.1974. The structure and life of Bryophytes, B.I.Publications, NewDelhi.
2. Pandey,B.P.2006.College Botany,Vol.II: Pteridophyta,Gymnosperms and Paleobotany. S.Chand&CompanyLtd, NewDelhi.
3. Sporne,K.R.1965.Morphology of Gymnosperms.Hutchinson Co.,Ltd.,London.
4. Vashishta,P.C.,A.K.SinhaandAnilKumar.2006.Botany-Pteridophyta(Vascular Cryptogams). . Chand & Company Ltd, New Delhi.
5. Pandey,B.P.2001.CollegeBotany,Vol.I:Algae,Fungi,Lichens,Bacteria,Viruses,Plant
6. Pathology,I ndustrial Microbiology and Bryophyta.S.Chand & CompanyLtd,NewDelhi.
7. Pandey,B.P.2007.Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd, New Delhi.
8. Thakur,A.K.andS.K.Bassi.2008.AText book of Botany: Diversity of Microbesand Cryptogams. S. Chand & Company Ltd, New Delhi.
9. Vashishta,B.R.,A.K.SinhaandAdarshaKumar.2008.BotanyforDegreeStudents: Bryophyta. S. Chand & Company Ltd, New Delhi.
10. Vashishta,P.C.,A.K.SinhaandAnilKumar.2006.BotanyforDegreeStudents: Gymnosperms. Chand & Company Ltd, New Delhi.
11. DuttaA.C.2016.Botany for Degree Students. Oxford University Press.
12. Pandey,B.P.2007.Botany for Degree Students: Diversity of Seed lants and their Systematics, Structure, Development and Reproduction in Flowering Plants. S. Chand & Company Ltd, NewDelhi.
13. Bhattacharyaet.al.2007.AtextbookofPalynology,Central, NewDelhi.
14. Bhojwani,S.S.andS.P.Bhatnagar.2000. The Embryology of Angiosperms(4thEd.),Vikas Publishing House, Delhi.
15. M.R.Saxena-AtextbookofPalynology.4.Vashista-AtextbookofAnatomy.
16. P.K.K.Nair-Atext book of Palynology
17. Evert,R.F.(2006)Esau'sPlantAnatomy:Meristems,Cells,andTissuesofthePlantBody:TheirStructure, Function and Development. John Wiley and Sons, Inc.
18. Esau,K.1971.Anatomy of Seed Plants.JohnWileyandSon,USA.
19. Johri,B.M.1984 .Embryology of Angiosperms.Springer-Verleg,Berlin.
20. Kapil,R.P.1986.Pollination Biology. Inter India Publishers,NewDelhi.
21. Maheswari,P.1971. An Introduction to EmbryologyofAngiosperms.McGrawHillBookCo.,London.
22. DuttaA.C.2016.BotanyforDegreeStudents.OxfordUniversityPress.
23. Bhojwani,S.S.and Bhatnagar,S.P.(2011).TheEmbryologyofAngiosperms,VikasPublishingHouse.Delhi. 5th edition
24. Shivanna,K.R.(2003).PollenBiologyandBiotechnology.OxfordandIBHPublishingCo.Pvt.Ltd.Delhi.
25. Raghavan,V.(2000).DevelopmentalBiologyofFloweringplants,Springer,Netherlands.4.Johri,B.M.l (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.

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B.Sc.,BOTANY
IYear,II-Semester
Paper-II.Gymnosperms,Anatomy and EmbryologyofAngiosperms

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 epidermalpeel 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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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)					