Department of Botany
Mahatma Gandhi University
Nalgonda, Telangana

B.Sc.Revised Syllabus

For The Affiliated Colleges of Mahatma Gandhi University,NLG

With effect from 2025 – 2026

TELANGANA STATE COUNCIL OF HIGHER EDUCATION
PROPOSED CBCS COMMON CORE SCHEME FOR B.SC. COURSE
BOTANY

CODE	PAPER TITTLE	Course Type	HPW	Credits
	FIRSTYEAR SEMSTER - I			
BS 104	PAPER-I : Microbial Diversity and Early Land Plants	DSC-1A	4T+2P=6	4+1=5
	FIRST YEAR SEMSTER – II			
BS 204	PAPER-II: Gymnosperms, Anatomy and Embryology of Angiosperms	DSC-1B	4T+2P=6	4+1=5
	SECONDYEAR SEMSTER – III			
BS 302	PAPAR-III: Plant Taxonomy, Ecology and Medicinal Botany	DSC-1C	4T+2P=6	4+1=5
	SECOND YEAR SEMSTER – IV			
BS 402	PAPER-IV : Cell Biology, Genetics & Plant Physiology	DSC-1D	4T+2P=6	4+1=5
	THIRD YEAR SEMESTER - V			
BS 501	SEC: 1-	SEC-1	2	2
BS 502	SEC: 2-	SEC- 2-	2	2
BS 503	VAC-1:	VAC-1	3	3
BS 504	Multi-Disciplinary Course (MDC)	MDC	4T	4
BS 505	DSE -1A: Biodiversity & Conservation DSE -1B: Tissue Culture and Biotechnology DSE -1C.Economic Botany	DSE-1A / DSE-1B / DSE-1C	4 +2	4+1=5
	THIRD YEAR SEMESTER – VI			
BS 601	SEC: 3	SEC: 3-	2	2
BS 602	SEC: 4	SEC: 4-	2	2
BS 603	VAC-2	VAC-2	3	3
BS 604	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: Value added Course; MDC: Multi-Disciplinary Course
DSC: Discipline Specific Core, DSE: Discipline Specific Elective.

Dr. K. MADHURI
Assistant Professor
Dept. of Biotechnology
University College of Science
Mahatma Gandhi University, Nalgonda. (T.S.)

B.Sc. BOTANY

I Year: I -Semester

Paper-I: Microbial Diversity and Early Land Plants

DSC - 1A **(4 hrs./week)** **Credits- 4**

Theory Syllabus **(60 hours)**

UNIT – I **(15 hours)**

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 **(15 hours)**

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 **(15 hours)**

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 **(15 hours)**

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, NewDelhi.
2) Mckane, L. and K. Judy. 1996. Microbiology – Essentials and Applications. McGraw 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, 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 Textbook of Algae. I. K. International Pvt. Ltd., NewDelhi.
7) Sharma, O. P. 1992. Textbook of Thallophyta. McGraw Hill Publishing Co., New Delhi.
8) Thakur A. K. and S. K. Bassi. 2008. A Textbook of Botany: Diversity of Microbes andCryptogams. 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, NewDelhi.
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). . 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 **(45 hours)**

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; Bacteria: Angular leaf spot of cotton and Rice tungro.
   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. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies).
7. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Bryophytes: *Marchantia, and Polytrichum.*
8. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Pteridophytes, *Equisetum and Marsilea.*
9. Study of Anatomical features of *Equisetum* stem and *Marsilea* petiole & rhizome by preparing double stained permanent mounts.

Practical Model Paper **Max. Marks: 50**

Time : 3 hrs

1. Identify the given components 'A'&'B'in the algal mixture .
   Describe with neat labeled diagrams & give reasons for the classifications. **2 X 4 = 8M**
2. Classify the given bacterial culture 'D' using Gram – staining technique. **6M**
3. Take a thin transverse section of given diseased material 'E'.
   Identify & describe the symptoms caused by the pathogen. **8M**
4. Identify the given specimens 'F', 'G' & 'H' by giving reasons .
   (Fungal-1, Bacteria-1 & Viral-1) **3 X 2 = 6M**
5. Comment on the given slides 'I' & 'J'(Algae-1, Fungi-1) **2 X 4 = 8M**
6. Identify the given specimen'K'&slide 'L' (Bryophytes& Pteridophytes) **2 X 4 = 8M**
7. Record& Viva 6M

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

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

Theory Syllabus **(60 hours)**

UNIT-I **(15 hours)**

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 outgrowths.

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 **(15 h)**

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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Suggested Readings:

1. Watson, E. V. 1974. The structure and life of Bryophytes, B. I. Publications, New Delhi.
2. Pandey, B. P. 2006. College Botany, Vol. II: Pteridophyta, Gymnosperms and Palaeobotany. S. Chand & Company Ltd, New Delhi.
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). . 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.
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. and S. K. Bassi. 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.
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10. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany for Degree Students: Gymnosperms. Chand & Company Ltd, New Delhi.
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 textbook 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 textbook of Palynology. 4. Vashista- A textbook of Anatomy.
16. P.K.K.Nair- A textbook 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-Verleg, Berlin.
20. Kapil, R. P. 1986. Pollination Biology. Inter India Publishers, New Delhi.
21. Maheshwari, 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. I (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.

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

DSC-1B Credit1

Practical Syllabus **(45 hours)**

1. Study of Morphology (vegetative and reproductive structures) of the following taxa: Gymnosperms - *Pinus and Gnetum.*
2. Study of Anatomical features of *Pinus* needle and *Gnetum* stem by preparing double stainedpermanent mounts
3. Fossil forms using permanent slides / photographs: Cycadeoidea.
4. Demonstration of double staining technique.
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 Primary structure: Root - *Cicer, Canna*; Stem – *Tridax, Sorgum.*
8. Secondary structure: Root – *Tridax* sp.; Stem –*Pongamia*
9. Anomalous secondary structure: Examples as given in theory syllabus.
10. Stomatal types using epidermal peels.
11. Structure of anther and microsporogenesis using permanent slides.
12. Structure of pollen grains using whole mounts - *Hibiscus, Acacia* and *Grass)*
13. Pollen viability test using Evans Blue
14. Study of ovule types and developmental stages of embryo sac.
15. Structure of endosperm (nuclear and cellular);
16. Developmental stages of dicot and monocot embryos using permanent slides.

Practical Model Paper

Time : 3 hrs **Max. Marks: 50**

1. Prepare a double stained permanent mount of the given material ' **A**' (Gymnosperms) **10M**
Draw diagram & give reasons for identification.
2. Identify the given material"B" (Anomalous secondary growth/ Wood anatomy). **8 M**
Prepare a double stained permanent mount of transverse section .
3. Prepare a temporary mount of epidermal peel of the given leaf material " C " and 05M
identify the stomatal type .
4. Conduct the pollen viability test "D" (OR) Isolate the embryo from the given material. **05M**
4 Identify and describe the specimens / slides with well labeled diagrams
(a) Gymnosperms -E (b) Anatomy- F (c). Embryology –G **(3X 3) = 12M**
5 Record and Viva **10M**

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