



**GOVERNMENT DEGREE COLLEGE, LUXETTIPET**

**DEPARTMENT OF BOTANY**

**SYLLABUS**

J.K. ojb  
**Principal**  
Govt. Degree College  
Luxettipet-504 215

**B.Sc (CBCS) Botany- I year**  
**Semester-I - Paper-I**  
**Microbial Diversity of Lower Plants**

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

**Theory Syllabus**

**Credits- 4**  
**(60 hours)**

**UNIT - I**

1. Brief account of Archaeobacteria, Actinomycetes. (4h)
2. Cyanobacteria: General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to *Oscillatoria*, *Nostoc* and *Anabaena*. (6h)
3. Lichens: Structure and reproduction; ecological and economic importance. (5h)

**UNIT- II**

4. Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro. (7h)
5. Bacteria: Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice. (8h)
6. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl

**UNIT-III**

7. General characters, structure, reproduction and classification of algae (Fritsch) and thallus organization in algae. (3h)
8. Structure and reproduction of the following:  
Chlorophyceae- *Volvox*, *Oedogonium* and *Chara*. (5h)  
Phaeophyceae- *Ectocarpus* (2h)  
Rhodophyceae- *Polysiphonia*. (3h)
9. Economic importance of algae in Agriculture and Industry. (2h)

**UNIT-IV**

10. General characters and classification of fungi (Ainsworth). (3h)
11. Structure and reproduction of the following:  
(a) Mastigomycotina- *Albugo*  
(b) Zygomycotina- *Mucor*  
(c) Ascomycotina- *Saccharomyces* and *Penicillium*.  
(d) Basidiomycotina- *Puccinia*  
(e) Deuteromycotina- *Cercospora*. (10h)
12. Economic importance of fungi in relation to mycorrhizae and mushrooms. General account of mushroom cultivation (2h)

*Soyus*  
*A. C. C.*

*M. C.*  
*L. M. D.*

## References:

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. 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, 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 Textbook of Algae. I. K. International Pvt. Ltd., New Delhi.
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 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.

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*A. C. Dutta*

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**B.Sc (CBCS) Botany-I year  
Semester-I - Paper-I  
Microbial Diversity of Lower Plants**

**Theory Model Question Paper**

**Time : 2 hrs**

**Max. Marks: 40**

Draw well-labeled diagrams wherever necessary.

**1. Write short notes on any FOUR of the following: -**

**4 X 2 = 8M**

- a. Heterocyst.
- b. Citrus Canker.
- c. Nucule
- d. Cleistothecium.
- e. Mycoplasma
- f. *Mucor*

**II. Essay Questions:**

**4 X 8 = 32M**

1. a. Briefly describe the structure and reproduction of *Oscillatoria*.  
( OR )  
b. Describe the cyanophycean cell structure.
2. a. Describe the structure and modes of transmission of plant viruses.  
( OR )  
b. Write an essay on economic importance of Bacteria.
3. a. Describe the life cycle of *Oedogonium* with the help of well- labelled diagram .  
( OR )  
b. Give an account on thallus organization in algae.
4. a. Describe the life cycle of *Albugo* with the help of well-labelled diagram  
( OR )  
b. Give a brief account on Mushroom cultivation.

*Handwritten notes:*  
Fungi  
Algae  
B2  
L(m m)

**B.Sc (CBCS) Botany-I year  
Semester-I - Paper-I  
Microbial Diversity of Lower Plants**

**Practical Syllabus**

**(45 hours)**

1. Study of viruses and bacteria using electron micrographs (photographs). (3h)
2. Gram staining of Bacteria. (3h)
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 (3h)  
Fungi: White rust on Crucifers, Rust on wheat & Tikka disease of Groundnut. (6h)
4. Vegetative and reproductive structures of the following taxa:  
Algae: *Oscillatoria*, *Nostoc*, *Volvox*, *Oedogonium*, *Chara*, *Ectocarpus*  
and *Polysiphonia*. (6 h)  
Fungi: *Albugo*, *Mucor*, *Saccharomyces*, *Penicillium*, *Puccinia* and *Cercospora* (6h)
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. (9h)
6. Lichens: Different types of thalli and their external morphology (3 h).
7. Examination of important microbial, fungal and algal products:  
Biofertilizers, protein capsules, antibiotics, mushrooms, Agar-agar etc. (3h)
8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies). (3h)

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**B.Sc (CBCS) Botany- I year  
Semester-I - Paper-I  
Microbial Diversity of Lower Plants**

**Practical Model Paper**

**Time : 2 1/2 hrs**

**Max. Marks: 25**

1. Identify the given components 'A', 'B' & 'C' in the algal mixture .  
Describe with neat labeled diagrams & give reasons for the classifications. **3 X 3 = 9M**
2. Classify the given bacterial culture 'D' using Gram – staining technique. **4M**
3. Take a thin transverse section of given diseased material 'E'.  
Identify & describe the symptoms caused by the pathogen. **5M**
4. Identify the given specimens 'F', 'G' & 'H' by giving reasons .  
(Fungal-1, Bacteria-1 & Viral-1 ) **3 X 1 = 3M**
5. Comment on the given slides 'I' & 'J' .  
( Algae-1 , Fungi-1 ) **2 X 1 = 2M**
6. Record **2M**

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U.G. I year Semester-II - (B.Sc/B.A./B.Com) CBCS

Environmental Studies

AECC-2 (2 hrs./week)

Credits – 2

(30 hours)

UNIT - I : Ecosystem, Biodiversity & Natural Resources

(15 hrs.)

1. Definition, Scope & Importance of Environmental Studies.
2. Structure of Ecosystem – Abiotic & Biotic components Producers, Consumers, Decomposers, Food chains, Food webs, Ecological pyramids)
3. Function of an Ecosystem :Energy flow in the Ecosystem ( Single channel energy flow model )
4. Definition of Biodiversity , Genetic, Species & Ecosystem diversity , Hot-spots of Biodiversity, Threats to Biodiversity , Conservation of Biodiversity ( Insitu & Exsitu )
5. Renewable & Non – renewable resources, Brief account of Forest , Mineral & Energy (Solar Energy & Geothermal Energy) resources
6. Water Conservation , Rain water harvesting & Watershed management.

UNIT – II: Environmental Pollution , Global Issues & Legislation

(15 hrs.)

1. Causes, Effects & Control measures of Air Pollution, Water Pollution
2. Solid Waste Management
3. Global Warming & Ozone layer depletion.
4. Ill – effects of Fire- works
5. Disaster management – floods, earthquakes & cyclones
6. Environmental legislation :-  
(a) Wild life Protection Act (b) Forest Act (c) Water Act (d) Air Act
7. Human Rights
8. Women and Child welfare
9. Role of Information technology in environment and human health

❖ Field Study:

(5 hours)

- Pond Ecosystem
- Forest Ecosystem

REFERENCES:

- Environmental Studies - from crisis to cure – by R. Rajagopalan (Third edition) Oxford University Press.
- Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
- A text book of Environmental Studies by Dr.D.K.Asthana and Dr. Meera Asthana

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*A. A.*      *BB*      *Lenal*

AECC-2

**Environmental Studies**

Credits – 2

THEORY MODEL PAPER

TIME: 1 ½ HOURS

MAX MARKS: 15

**SECTION-A**

**Answer the following in short:**

**3x1=3marks**

1. Food chains
2. Genetic Diversity
3. Ill – effects of Fire- works

**SECTION-B**

**Answer the following essays:**

**2x6=12marks**

1 (a) Define Environmental Studies & write an essay on scope & importance of Environmental Studies

OR

(b) Write in detail about Energy resources.

2 (a) Write the Causes, Effects & Control measures of Air Pollution

OR

(b) Describe the role of Information technology in environment and human health

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*(in ml)*



**B.Sc (CBCS) Botany- I year  
Semester-II - Paper-II  
Bryophytes, Pteridophytes, Gymnosperms and Paleobotany**

<b>DSC-1B</b>	<b>(4 hrs./week)</b>	<b>Theory Syllabus</b>	<b>Credits- 4 (60 hours)</b>
<b>UNIT-I</b>			
		1. Bryophytes: General characters and classification.	(3h)
		2. Structure, reproduction, life cycle and systematic position of <i>Marchantia</i> , <i>Anthoceros</i> and <i>Polytrichum</i> . (Development stages are not required).	(10h)
		3. Evolution of Sporophyte in Bryophytes.	(2h)
<b>UNIT-II</b>			
		4. Pteridophytes: General characters and classification (Sporne's)	(3h)
		5. Structure, reproduction, life cycle and systematic position of <i>Rhynia</i> , <i>Lycopodium</i> , <i>Equisetum</i> and <i>Marsilea</i> .	(10h)
		6. Stelar evolution, heterospory and seed habit in Pteridophytes.	(2h)
<b>UNIT-III</b>			
		7. Gymnosperms: General characters, structure, reproduction and classification (Sporne's).	(4h)
		8. Distribution and economic importance of Gymnosperms.	(3h)
		9. Morphology of vegetative and reproductive parts, systematic position and life cycle of <i>Pinus</i> and <i>Gnetum</i> .	(8 h)
<b>UNIT-IV.</b>			
		10. Palaeobotany: Introduction, Fossils and fossilization ; Importance of fossils.	(8 h)
		11. Geological time scale;	(4 h)
		12. Bennettitales: General account.	(3 h)

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*1/11/2020*

**References:**

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 Paleobotany. 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 Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.
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9. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany for Degree Students: Gymnosperms. Chand & Company Ltd, New Delhi.
10. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

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A. C.      BS      (in m)

**B.Sc (CBCS) Botany- I year**  
**Semester-II - Paper-II**  
**Bryophytes, Pteridophytes, Gymnosperms and Paleobotany**

**Theory Model Question Paper**

**Time : 2 hrs**

**Max. Marks: 40**

Draw well-labeled diagrams wherever necessary.

**1 . Write short notes on any FOUR of the following: -**

**4 X 2 = 8M**

- a. Gemma cup.
- b. Protostele .
- c. *Pinus* pollen grain.
- d. *Ptilophyllum*.
- e. *Anthoceros* thallus
- f. Fossilization

**II . Essay Questions:**

**4 X 8 = 32M**

1. a. Write about the structure & evolution of sporophyte in *Anthoceros* .  
( OR )  
b. Describe the gametophores of *Marchantia* .
2. a. Describe the anatomy of *Equisetum* stem & add a note on its ecological adaptations .  
( OR )  
b. Discuss in detail the internal structure of the sporocarp of *Marsilea* .
3. a. Describe the anatomy of *Pinus* needle with a well labeled diagram.  
( OR )  
b. Give an account of general characters of Gymnosperms.
4. a. Describe the general characters of Bennettitales .  
( OR )  
b. Write about economic importance of Gymnosperms.

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**B.Sc (CBCS) Botany- I year  
Semester-II - Paper-II  
Bryophytes, Pteridophytes, Gymnosperms and Paleobotany**

(45 hours)

**Practical Syllabus – 2016**

1. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Bryophytes: *Marchantia*, *Anthoceros* and *Polytrichum*. (9 h)
2. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Pteridophytes: *Lycopodium*, *Equisetum* and *Marsilea*. (9 h)
3. Study of Anatomical features of *Lycopodium* stem, *Equisetum* stem and *Marsilea* petiole & rhizome by preparing double stained permanent mounts. (12h)
4. Study of Morphology (vegetative and reproductive structures) of the following taxa:  
Gymnosperms: *Pinus* and *Gnetum*. (6 h)
5. Study of Anatomical features of *Pinus* needle and *Gnetum* stem by preparing double stained permanent mounts. (6h)
6. Fossil forms using permanent slides / photographs: *Rhynia* and *Cycadeoidea*. (3h)

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**B.Sc (CBCS) Botany- I year**  
**Semester-II - Paper-II**  
**Bryophytes, Pteridophytes, Gymnosperms and Paleobotany**

**Practical Model Paper**

**Time : 2 1/2 hrs**

**Max. Marks: 25**

1 . Prepare a double stained permanent mount of the given material ' A ' ( Pteridophyte )

Draw diagram & give reasons for identification.

**7M**

2 . Prepare a double stained permanent mount of the given material ' B ' ( Gymnosperms )

Draw diagram & give reasons for identification.

**8M**

3 . Identify the given specimens C , D , E & F ( Bryophyte – 2 , Pteridophyte – 1 & Gymnosperm – 1 )

**4 X 1 =4M**

4 . Identify the given slides G , H , I & J ( Bryophyte – 2 , Pteridophyte – 1

& Gymnosperm – 1 )

**4 X 1 =4M**

5 . Record

**2M**

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**B.Sc (CBCS) BOTANY- II YEAR**  
**Semester-III - Paper-III**  
**Taxonomy of Angiosperms and Medicinal Botany**

**DSC-1C (4 hrs./week)**

**Theory syllabus**

**Credits-4**  
**(60 hours)**

**UNIT - I**

1. Introduction: Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler & Prantle. An introduction to Angiosperm Phylogeny Group (APG). (7h)
- 2.. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. (4 h)
- 3.. Nomenclature and Taxonomic resources: An introduction to ICBN, Vienna code - a brief account. Herbarium: Concept, techniques and applications. (4 h)

**UNIT-II**

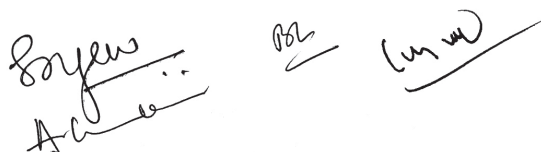
- 4.. Systematic study and economic importance of plants belonging to the following families:  
Polypetalae : Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae
5. Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae
6. Monochalmydeae: Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae. (15h)

**UNIT - III**

- 7.. Ethnomedicine: Scope, interdisciplinary nature, distinction of Ethnomedicine from Folklore medicine. (3h)
8. Outlines of Ayurveda, Sidda, Unani and Homeopathic systems of traditional medicine. Role of AYUSH, NMPB, CIMAP and CDRI. (5 h)
- 9.. Plants in primary health care: Common medicinal plants – Tippateega (*Tinospora cordifolia*), tulasi (*Ocimum sanctum*), pippallu (*Piper longum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*), Turmeric (*Curcuma longa*). Evaluation of crude drugs. (7h)

**UNIT-IV**

10. Traditional medicine vs Modern medicine: Study of selected plant examples used in traditional medicine as resource (active principles, structure, usage and pharmacological action of modern medicine: Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Nela usiri (*Phyllanthus amarus*), Amla (*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*). (8h)
11. Pharmacognosy: Introduction and scope. Adulteration of plant crude drugs and methods of identification - some examples. Indian Pharmacopoeia. (4h)
12. Plant crude drugs: Types, methods of collection, processing and storage practices. (3h)



## References:

1. 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.
2. Rastogi, R. R. and B. N. Mehrotra. 1993. Compendium of Indian Medicinal Plants. Vol. I & Vol. II. CSIR, Publication and Information Directorate, New Delhi.
3. Sivarajan, V. V. and I. Balasubramanian. 1994. Ayurvedic Drugs and their Plant Sources. Oxford and IBH, New Delhi.
4. Stace, C. A. 1989. Plant Taxonomy and Biostatistics (2nd Ed.). Edward Arnold, London.
5. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, New Delhi.
6. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
7. Davis, P. H. and V. H. Heywood. 1963. Principles of Angiosperm Taxonomy. Oliver and Boyd, London.
8. Heywood, V. H. 1965. Plant Taxonomy. ELBS, London.
9. Heywood, V. H. and D. M. Moore (Eds). 1984. Current Concepts in Plant Taxonomy. Academic Press, London.
10. Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun.
11. Jeffrey, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge.
12. London.
13. Joshi, S. G. 2000. Medicinal Plants. Oxford and IBH, New Delhi.
14. Kokate, C. and Gokeale- Pharmacognacy- Nirali Prakashan, New Delhi.
15. Lad, V. 1984. Ayurveda – The Science of Self-healing. Motilal Banarasidass, New Delhi.
16. Lewis, W. H. and M. P. F. Elwin Lewis. 1976. Medical Botany. Plants Affecting Man's Health. A Wiley Inter science Publication. John Wiley and Sons, New York.
- 17.

Boyer  
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**B.Sc (CBCS) BOTANY- II YEAR**  
**Semester-III - Paper-III**  
**Taxonomy of Angiosperms and Medicinal Botany**

**Theory Model Question Paper**

**Time: 2 hrs**

**Max. Marks: 40**

Draw well-labeled diagrams wherever necessary.

**1. Write short notes on any FOUR of the following: -**

**4 X 2 = 8M**

- a. Artificial system of classification.
- b. Floral structure of Cucurbitaceae .
- c. Role of AYUSH and CIMAP.
- d. Active principles of *Phyllanthus niruri*.
- e. Herbarium
- f. *Aloe vera*

**II. Essay Questions:**

**4 X 8 = 32M**

- 1 a. Discuss in detail the Bentham and Hooker's system of classification and add a note on its merits and de-merits .  
( OR )  
b. Write an account on Chemotaxonomy.
- 2 a. Write salient features of the sub-family Fabaceae with a note on its economic importance .  
( OR )  
b. Discuss in detail the important characters of Asteraceae family with a note on its advanced characters.
- 3 a. Discuss the outline of Ayurvedic system of medicine.  
( OR )  
b. Write in detail organoleptic evaluation of *Ocimum sanctum* and its medicinal importance .
- 4 a. Discuss the morphological aspects of *Rauwolfia serpentina* and Discuss its medicinal importance .  
( OR )  
b. Write an account on methods of collection, processing and storage practices associated with Crude drugs.

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**B.Sc (CBCS) BOTANY- II YEAR**  
**Semester-III - Paper-III**  
**Taxonomy of Angiosperms and Medicinal Botany**

**Practical syllabus**

**(45 hours)**

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus  
(Minimum of one plant representative for each family) (24h)
2. Demonstration of herbarium techniques. (3 h)
3. Identification, medicinal value & active principle present in the following plants : Tulasi (*Ocimum sanctum* ), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*). (6 h)
4. Ethnomedicinal value/practice of the following plants :  
Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Amla (*Phyllanthus emblica*) and  
Brahmi (*Bacopa monnieri*). (6h)
5. Pharmacognosy:  
Powder analysis : Pippalu (*Piper longam*), Nela usiri (*Phyllanthus niruri*),  
Study of Organoleptic (sectional study) of the following:  
Tippateega (*Tinospora cordifolia*) and Turmeric (*Curcuma longa*). (6h)
6. Candidate have to submit at least 30 herbarium sheets

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**B.Sc (CBCS) BOTANY- II YEAR**  
**Semester-III - Paper-III**  
**Taxonomy of Angiosperms and Medicinal Botany**

**Practical Model Paper**

**Time: 2 1/2 hrs**

**Max. Marks: 25**

- |   |    |
|---|----|
| 1. Technical description of the given plant twig ' A '                        | 9M |
| 2. Identify the given material ' B ' & write its medicinal properties         | 3M |
| 3. Identify the specimen ' C ' & write organoleptic evaluation                | 3M |
| 4. Identify the given material D ' & discuss the ethno medicinal value of it. | 3M |
| 5. Identify the given material ' E ' . Write the active principle and uses    | 3M |
| 6. Herbarium  | 2M |
| 7. Record   | 2M |

*Sageer*  
*Arshad*

*BS*

*Len M*

**B.SC (CBCS) BOTANY- II YEAR**  
**Semester-IV- Paper IV**  
**Plant Anatomy, Embryology and Palynology**

<b>DSC-1D</b>	<b>(4 hrs./week)</b>	<b>Theory syllabus</b>	<b>Credits-4</b> <b>(60 hours)</b>
<b>UNIT - I:</b>			
1.	Meristems: Types, histological organization of shoot and root apices and theories.		(3h)
2.	Tissues and Tissue Systems: Simple, complex and special tissues.		(6 h)
3.	Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths.		(6 h)
<b>UNIT-II</b>			
4.	Stem and root anatomy: Vascular cambium - Formation and function.		(3h)
5.	Anomalous secondary growth of Stem - <i>Achyranthes</i> , <i>Boerhaavia</i> , <i>Bignonia</i> , <i>Dracaena</i> ; Root- <i>Beta vulgaris</i>		(5h)
6.	Wood structure: General account. Study of local timbers – Teak ( <i>Tectona grandis</i> ), Rosewood, ( <i>Dalbergia latefolia</i> ), Red sanders, ( <i>Pterocarpus santalinus</i> ) Nallamaddi ( <i>Terminalia tomentosa</i> ) and Neem ( <i>Azadirachta indica</i> ).		(7h)
<b>UNIT - III</b>			
7.	Introduction: History and importance of Embryology.		(2h)
8.	Anther structure, Microsporogenesis and development of male gametophyte.		(6h)
9.	Ovule structure and types; Megasporogenesis; types and development of female gametophyte.		(7h)
<b>UNIT-IV</b>			
10.	Pollination - Types; Pollen - pistil interaction. Fertilization.		(4h)
11.	Endosperm - Development and types. Embryo - development and types; Polyembryony and Apomixis - an outline.		(5h)
12.	Palynology- Pollen morphology, NPC system and application of Palynology.		(6h)

*Soyles*  
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**References:**

1. Bhattacharya et. al. 2007. A textbook of Palynology, Central, New Delhi.
2. Bhojwani, S. S. and S. P. Bhatnagar. 2000. The Embryology of Angiosperms (4<sup>th</sup> Ed.), Vikas Publishing House, Delhi.
3. M.R.Saxena- A textbook of Palynology.
4. Vashista- A textbook of Anatomy.
5. P.K.K.Nair- A textbook of Palynology.
6. Esau, K. 1971. Anatomy of Seed Plants. John Wiley and Son, USA.
7. Johri, B. M. 1984. Embryology of Angiosperms. Springer-Verleg, Berlin.
8. Kapil, R. P. 1986. Pollination Biology. Inter India Publishers, New Delhi.
9. Maheswari, P. 1971. An Introduction to Embryology of Angiosperms. McGraw Hill Book Co., London.
10. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

Saxena  
Ahuja

102

(10/11)

**B.SC (CBCS) BOTANY- II YEAR**  
**Semester-IV- Paper IV**  
**Plant Anatomy, Embryology and Palynology**

**Theory Model Question Paper**

**Time: 2 hrs**

**Max. Marks: 40**

Draw well labeled diagrams wherever necessary.

**I. Write short notes on any FOUR of the following: -**

**4 X 2 = 8M**

- a. Types of Stomata.
- b. parenchyma.
- c. Different types of Ovules.
- d. Exine stratification.
- e. Rose Wood
- f. Polyembryony

**II. Essay Questions:**

**4 X 8 = 32M**

- 1 a. Classify Meristems ? Discuss in detail the various types of meristems.  
( OR )  
b. Theories associated with root apices.
- 2 a. Primary and secondary structure of *Boerhaavia diffusa* stem.  
( OR )  
b. Describe in detail the wood structure of *Pterocarpus santalinus*.
- 3 a. Discuss different Embryo sacs studied by you.  
( OR )  
b. Describe the development of Male Gametophyte.
- 4 a. Describe in detail various steps in Fertilization.  
( OR )  
b. Discuss in detail the various applications of Palynology.

*Engus*  
*Ashu*

*OR*

*(in use)*

**B.SC (CBCS) BOTANY- II YEAR**  
**Semester-IV- Paper IV**  
**Plant Anatomy, Embryology and Palynology**

**Practical syllabus**

**(45 hours)**

**Suggested Laboratory Exercises:**

1. Demonstration of double staining technique. (3 h)
2. Tissue organization in root and shoot apices using permanent slides (3 h)
3. Preparation of double stained Permanent slides  
Primary structure: Root - *Cicer, Canna*; Stem - *Tridax, Sorghum* (6 h)  
Secondary structure: Root - *Tridax* sp.; Stem - *Pongamia*
- Anomalous secondary structure: Examples as given in theory syllabus. (6 h)
4. Stomatal types using epidermal peels. (3 h)
5. Microscopic study of wood in T.S., T.L.S. and R.L.S. (6 h)
6. Structure of anther and microsporogenesis using permanent slides. (3 h)
7. Structure of pollen grains using whole mounts - *Hibiscus, Acacia* and Grass). (3 h)
8. Pollen viability test using Evans Blue - *Hibiscus* (3 h)
9. Study of ovule types and developmental stages of embryosac. (3 h)
10. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot embryos using permanent slides. (3 h)
11. Isolation and mounting of embryo (using *Cymopsis / Senna / Crotalaria*) (3 h)

*Praveen*  
*A. K. S.*

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*(L. M. M.)*

**B.SC (CBCS) BOTANY- II YEAR**  
**Semester-IV- Paper IV**  
**Plant Anatomy, Embryology and Palynology**

**Practical Model Paper**

**Time: 2 1/2 hrs**

**Max. marks : 25**

1. Prepare a double stained permanent mount of transverse section of  
given material " A " . 9M
  
2. Prepare a temporary mount of epidermal peel of the given leaf  
material " B " and identify the stomatal type . 4M
  
3. Conduct the pollen viability test " C " ( OR ) Isolate the embryo from  
the given material . 4M
  
4. Identify and describe the specimens / slides with well labelled diagrams  
(a) Embryology – D (b) Palynology – E (c) Anatomy – F 3 X 2 = 6M
  
5. Record 2M

*Pragya*  
*Ashwini*

*BS*

*Uma*

**KAKATIYA UNIVERSITY**  
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**SEMESTER – V**  
**(SEC-3) Skill Enhancement Course-III**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

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**VERBAL REASONING FOR APTITUDE TEST**

**Credits: 2**

**Theory: 2 hours/week**

**Marks - 50**

**Unit – I NUMBERS AND DIAGRAMS**

**1.1 Series Completion:** Number series, Alphabet Series

**1.2 Series Completion:** Alpha Numeric Series, Continuous Pattern Series

**1.3 Logical Venn Diagrams**

**1.4 Mathematical Operations:** Problem solving by substitution, Interchange of signs and numbers

**Unit – II ARITHMETICAL REASONING**

**2.1 Mathematical Operations:** Deriving the appropriate conclusions

**2.2 Arithmetical Reasoning:** Calculation based problems, Data based problems

**2.3 Arithmetical Reasoning:** Problems on ages, Venn diagram based problems

**2.4 Cause and Effect Reasoning**

**Text Book:** A Modern Approach to Verbal & Non-Verbal Reasoning by  
Dr. R.S.Aggarwal



**KAKATIYA UNIVERSITY**  
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**SEMESTER – V**  
**(GE-1) GENERIC ELECTIVE-I**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

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**PUBLIC HEALTH AND HYGIENE**

**Credits: 2**

**Theory :2 hours/week**

**Marks:50**

**UNIT – I : NUTRITION AND ENVIRONMENT**

1.1 Balanced diet and Malnutrition.

1.2 Nutritional deficiencies and disorders- Carbohydrates, proteins, lipids, vitamins and minerals.

1.3 Occupational, Industrial, agricultural and urban Health-Exposure at work place, urban areas, industrial workers, farmers and agricultural labourers, Health workers and health disorders and diseases.

1.4 Environmental pollution and associated Health hazards, Water borne diseases and Air borne diseases.

**UNIT-II : DISEASES AND HEALTH CARE**

2.1 Causes, Symptoms, Diagnosis, Treatment and Prevention - Malaria, Filariasis, Measles, Polio, Chicken pox, Rabies, Plague, Leprosy,.

2.2 Causes, Symptoms, Diagnosis, Treatment and Prevention of non communicable diseases - Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

2.3 Health care legislation in India – Termination of pregnancy act, Maternity benefit act, Biomedical waste act, ESI act.

2.4 First Aid and Health awareness, personal health care record maintenance.

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U.G. Botany (Under CBCS)

B.Sc. Final Year (DSC-1E)

SEMESTER – V

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## Cell Biology and Genetics

DSC-1E (3 hrs./week)

### Unit - I:

1. Plant cell envelopes: Ultra structure of cell wall, molecular organization of cell membranes.(4h)
2. Nucleus: Ultra structure, Nucleic acids - Structure of DNA, types and functions of RNA. (4 h)
3. Chromosomes: Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. DNA Replication. Special types of chromosomes: Lampbrush Polytene and B - chromosomes. (7h)

### Unit - II:

4. Extra nuclear genome: Mitochondrial and plastid DNA, plasmids. (3 h)
5. Cell division: Cell and its regulation; mitosis, meiosis and their significance (3h)
6. Mutations: Chromosomal aberrations - structural and numerical changes; Gene mutations, Transposable elements. (3 h)

### Unit - III:

7. Mendelism: Laws of inheritance. Genetic interactions - Epistasis, Complementary, Supplementary and inhibitory genes. (5h)
8. Linkage: A brief account and theories of Linkage. Crossing over: Mechanism and theories of crossing over. (4 h)
9. Genetic maps: Construction of genetic maps with Two point and Three point test cross data. (3h)

### Unit - IV:

10. Gene Organization- Structure of gene, Genetic code, Method of Replication of DNA in Eukaryotes & Prokaryotes (3h)
11. Mechanism of transcription in Prokaryotes and Eukaryotes, translation (4h)
12. Regulation of gene expression in prokaryotes (Lac and Trp. Operons ). (2h)

### References:

1. Sharma, A. K. and A. Sharma. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harward Academic Publishers, Australia.
2. Shukla, R. S. and P. S. Chandel. 2007. Cytogenetics, Evolution, Biostatistics and Plant Breeding. S.Chand & Company Ltd., New Delhi.
3. Singh, H. R. 2005. Environmental Biology. S. Chand & Company Ltd., New Delhi.
4. Snustad, D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons, Inc., U S A.
5. Strickberger, M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company.
6. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.

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**B.Sc. Final Year (DSC-1E)**  
**SEMESTER – V**

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**Cell Biology and Genetics Practical**

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies. (6 h)
2. Study of various stages of mitosis using cytological preparation of Onion root tips. (6 h)
3. Study of various stages of meiosis using cytological preparation of Onion flower buds. (3 h)
5. Solving genetic problems related to monohybrid, dihybrid ratio incomplete dominance and interaction of genes (minimum of six problems in each topic). (12h)
6. Construction of linkage maps; two and three point test cross. (6 h)
7. Study of ultra structure of cell organelles using photographers. (6h)
8. Study of Special types of Chromosomes (6h)

# KAKATIYA UNIVERSITY

U.G. Botany (Under CBCS)

B.Sc. Final Year (DSE-1E)

SEMESTER – V

Elective

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## A) Ecology & Biodiversity

DSE-1E (3 hrs./week) Theory Syllabus

### Unit – I

1. Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids, Biogeochemical cycles - Carbon Cycle (4h)
2. Definition of Environment: Atmosphere (Troposphere, Stratosphere, Mesosphere, Ionosphere), Hydrosphere, Lithosphere & Biosphere. (3h)
3. Plants and environment: Ecological factors - Climatic (Light and Temperature), and biotic. Ecological adaptations of plants. (5h)

### Unit – II

4. Edaphic Factors: Soil- Formation- Weathering, mode of formation-residual; Transported: Colluvial, Alluvial, Glacial & Eolian. Soil erosion & Conservation. (4h)
5. Population ecology: Natalivity, Mortality, Growth curves, Ecotypes & Ecads. (4h)
6. Community ecology: Frequency, density cover, Life forms & Biological spectrum. (4h)

### Unit – III

7. Community Dynamics: Succession - Serial stages, Modification of physical environment, Climax formation with reference to Hydrosere and Xerosere. (4h)
8. Production ecology: Concepts of productivity - Primary and Secondary Productivity. (4h)
9. Biodiversity: Concepts, Convention of Biodiversity - Earth Summit (Copenhagen). (4h)

### Unit – IV

10. Biodiversity – Levels, threats and value (3h)
11. Hot spots of India - North Eastern Himalayas, Western Ghats; Endemism. (3h)  
IUCN categories, RED data book
12. Principles of conservation – *In situ* and *Ex situ*. Role of organizations in the conservation of Biodiversity - WWF and NBPGR. (3h)

**References:**

1. Bharucha, E. 2005. Textbook of Environmental Studies for Undergraduate Courses. Universities Press (India) Private Limited, Hyderabad.
2. Khitoliya, R. K. 2007. Environmental Pollution – Management and Control for Sustainable Development. S. Chand & Company Ltd., New Delhi.
3. Michael, S. 1996. Ecology. Oxford University Press, London.
4. Mishra. D. D. 2008. Fundamental Concepts in Environmental Studies. S. Chand & Company Ltd., New Delhi.
5. Odum, E. P. 1983. Basics of Ecology. Saunder's International Students Edition, Philadelphia.
6. Sharma, P. D. 1989. Elements of Ecology. Rastogi Publications, Meerut.
7. Verma, P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi

# KAKATIYA UNIVERSITY

U.G. Botany (Under CBCS)

B.Sc. Final Year (DSE-1E)

SEMESTER – V

Elective

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## A) Ecology & Biodiversity

### Practical Syllabus

1. Study of plant communities by Quadrat Method (9h)
2. Estimation of carbonates and bicarbonates in the given water sample. (6h)
3. Determination of soil texture (composition of clay, sand silt etc.) and pH. (6h)
4. Study of morphological and anatomical characteristics of plant communities using locally available plant species: Hydrophytes (*Eichhornia*, *Hydrilla*, *Pistia*, *Nymphaea*, *Vallisneria*), Xerophytes: (*Asparagus*, *Opuntia*, *Euphorbia spp*), Halophytes (*Rhizophora*, *Avicennia*) . (12h)
5. Value of biodiversity
  - a) Medicinal value: *Catharanthus*, *Tinospora* and *Emblica* (12h)
  - b) Timber Value: *Acacia*, *Tectona* and *Azardirachta*
  - c) Aesthetic Value: *Mangifera*, *Ficus*, *Ocimum*

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B.Sc. Final Year (DSE-1E)

SEMESTER – V

Elective

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## B) Horticulture

DSE-1E (3 hrs./week)

### Theory Syllabus

#### Unit – I

1. Definition, branches, scope and economic importance of horticultural crops (4h)
2. Classification of horticultural crops based on -Climatic requirements, Season of growth (6h)
3. Manures: Definition, importance of manures FYM (compost), oil cakes, green manure (3h)

#### Unit – II

4. Organic manures and vermi-compost (2h)
5. Natural Propagation: By seeds, Vegetative Structures like Bulbs, Tubers, Corms, Rhizomes, Root stock, runners, Offsets and suckers (4h)
6. Artificial Propagation: Cutting, Layering, Grafting and Budding (4h)

#### Unit – III

7. Application of the following plant growth regulators in horticulture – Auxins, Gibberellins, Cytokinins, Ethylene and Brassinosteroids. (4h)
8. Green house technology- definition, types, layout, construction, irrigation systems, care and attention, hardening of plants. (3h)
9. Soil and climatic requirements of horticultural crops, Selection of site, planning, training (3h)

#### Unit – IV

10. Pruning and Cropping system; Garden implements and their uses (2h)
11. Management: Orchard management, Nutrition management, Water management and Weed Management. (4h)
12. Organic Farming; Bonsai techniques. (6h)



## References:

1. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology. Pointer publishers. Jaipur
2. Chadha, K.L. 2001, Handbook of Horticulture, ICAR, New Delhi.
3. Chandra, R. and M. Mishra. 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.
4. Chattopadhyaya, P.K.2001. A text book on Pomology (Fundamentals of fruit growing) Kalyani Publication, New Delhi
5. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi
6. Edmond, J.B. T.L.Senn, F.S. Andrews and P.G.Halfacre, 1975. Fundamentals of Horticulture, Tata MC. Graw Hill Publishing Co.New Delhi
7. George Acquaah, 2002, Horticulture-principles and practices. Prentice-Hall of India pvt. Ltd., New Delhi.
8. Hartman, H.T. and Kester, D.E. 1986. Plant propagation – Principles and Practices – Prentice Hall of India Ltd., New Delhi.
9. Jacob John. P. 2008. A hand book of post harvest management of fruits and vegetables. Daya publishers.
10. Jitendra Singh. 2006. Basic Horticulture. Kalyani Publishers, New Delhi.
11. Rajan, S. and B.L. Markose. 2007. Propagation of horticultural crops. New India Publishing, New Delhi.
12. Shanmugavelu, K.G., N. Kumar and K.V. Peter. 2005. Production technology of spices and plantation crops. Agrobios, Jodhpur.
13. Singh, D.K. 2008. Hi-tech horticulture. Agrotech publishers, Udaipur
14. Singh, N.P. 2005. Basic concepts of fruit science. International Book Distributing Co., Lucknow.
15. Surendra Prasad and U. Kumar. 1999. Principles of horticulture, Agro-botanica, Bikaner, India.
16. Sureshkumar, P. Sagar and Manish Kanwat. 2009. Post harvest physiology and quality management of fruits and vegetables. Agrotech publishers, Udaipur
17. Utpal Banerjee. 2008. Horticulture. Mangal Deep publishers
18. Vijaikumar UmRao. 2008. Horticulture terms – Definitions and Terminology. IBD publishers, Dehradun
19. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth –Heinemam, Oxford University Press.
20. Bansil. P.C. 2008. Horticulture in India. CBS Publishers and Distributors, New Delhi.
21. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.

# KAKATIYA UNIVERSITY

U.G. Botany (Under CBCS)

B.Sc. Final Year (DSE-1E)

SEMESTER – V

Elective

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## B) Horticulture

### Practical Syllabus

- Garden tools and implements. (3h)
1. Identification and description of any two varieties/hybrids of tropical and subtropical vegetable, fruit, flower and ornamental crops. (3h)
  2. Propagation practices by seed, Vegetative propagation (Rhizome, bulb, corm), cutting, layering, budding, grafting with two examples. (9h)
  3. Seed propagation- seed treatments, sowing and seedling production. (6h)
  4. Nursery practices, transplanting, field preparation, sowing/planting, use of herbicides, top dressing of fertilizers and use of growth regulators. (6h)
  5. Nursery containers, media, potting and repotting of plants, hardening of plants in nursery, shade regulation in nursery, plant protection in nursery plants (Demonstration) (6h)
  6. Packing nursery plants for local and long distance markets. (Demonstration) (3h)
  7. Making of organic-compost. (9h)

# KAKATIYA UNIVERSITY

U.G. Botany (Under CBCS)

B.Sc. Final Year (DSE-1E)

SEMESTER – V

Elective

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## C) Microbiology and Plant Pathology

DSE-1E (3 hrs./week) Theory Syllabus

### Unit – I

1. Discovery of microorganisms; systematic position of microorganisms in biological world; classification of microorganisms (2h)
2. Sterilization methods; culture media; pure culture methods; growth determination (2h)
3. Prokaryotic microorganisms; fine structure of prokaryotic cell; bacteriophage T4; general account of mycoplasma and actinomycetes (3h)

### Unit – II

4. Genetic recombination in prokaryotes: conjugation, transformation and transduction (3h)
5. Role of microorganisms in biogeochemical cycling of nitrogen and carbon; biological N<sub>2</sub> fixation (3h)
6. Industrial application of microorganisms: organic acids, alcohol, food processing, milk products, antibiotics, biopesticides (8h)

### Unit – III

7. General account of plant pathogens: historical developments; general account of diseases caused by plant pathogens (2h)
8. Plant disease epidemiology: transmission and spread of plant pathogens; disease cycles; epidemics; modeling and diseases forecasting (6h)
9. Plant disease management: chemical; biological; development of transgenics; biopesticides (6h)

### Unit – IV

10. Genetics of resistance and susceptibility: genes for virulence and avirulence, their application in resistance and susceptibility; induced resistance (immunization) (4h)
11. Molecular plant pathology: molecular diagnosis; identification of genes and specific molecules in disease development; molecular manipulation of resistance (4h)
12. Application of information technology in plant pathology: General account (2h)

**References:**

1. Agrios, G.N. 1997. Plant Pathology. Academic Press, London.
2. Albajes, R., Gullino, M.L., Van Lanteren, J.C. & Elad, Y. 2000. Integrated Pest and Disease Management in Greenhouse Crops. Kluwer Academic Publishers.
3. Bridge, P. et.al. 1998. Molecular Variability of Fungal Pathogens. CAB International, UK.
4. Bridge, P. et.al. 1999. Application of PCR in Mycology. CAB International, UK.
5. Persley, G.J. 1996. Biotechnologies and Integrated Pest Management, CAB International, UK.
6. Skerritt, J.H. and Apples, R. 1995. New Diagnostics in Crop Sciences. CAB International, UK.

# KAKATIYA UNIVERSITY

U.G. Botany (Under CBCS)

B.Sc. Final Year (DSE-1E)

SEMESTER – V

Elective

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## C) Microbiology and Plant Pathology

### Practical Syllabus

1. Cultivation media for autotrophic and heterotrophic microorganisms (3h)
2. Cleaning of glassware, mineral media, complex media, solid media, sterilization (9h)
3. Isolation of microorganisms: streaking on agar plates / pour plate method, isolation of clones (3h)
4. Preservation (3h)
5. Preparation of Winogradsky column using pond bottom mud, observations on temporal sequence of appearance of microbes (visual appearance) (6h)
6. Observation on Virus infected plants (symptoms) (6h)
7. Study of important plant pathogens (symptoms and host parasite relationship) (6h)
8. Isolation of pectolytic enzymes from diseased plants (6h)
9. Demonstration of biopesticides (essential oils, neem, turmeric and garlic) against some pathogens (3h)

**KAKATIYA UNIVERSITY**  
**U.G. Skill Enhancement Course - IV**  
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**B.Sc. Final Year**  
**SEMESTER - VI**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

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**QUANTITATIVE APTITUDE TEST**

**Credits: 2**

**Theory: 2 hours/week**

**Marks - 40**

**Unit – I ARITHMETICAL ABILITY**

**1.1 Arithmetical Ability:** Ratio & Proportion

**1.2 Arithmetical Ability:** Time & Work, Time & Distance

**1.3 Arithmetical Ability:** Simple Interest, Compound Interest

**1.4 Arithmetical Ability:** Stocks & Shares

**Unit – II DATA INTERPRETATION**

**2.1 Data Interpretation:** Tabulation

**2.2 Data Interpretation:** Bar Graphs

**2.3 Data Interpretation:** Pie Charts

**2.4 Data Interpretation:** Line Graphs

**Text Book:** Quantitative Aptitude by Dr. R.S.Aggarwal

**KAKATIYA UNIVERSITY**  
**U.G. B.Sc. Final Year (Under CBCS)**  
**Semester – VI: Generic Elective Paper-II**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

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**WATER RESOURCES MANAGEMENT**

**UNIT-I**

1. Importance of Natural Resources – Different Types Resources
2. Significance of Water Resources and their uses
3. Conservation of water and recycling of the water – Global distribution of water
4. Water shed programmes and their management
5. Storing the rain water in tanks and recharging ground water.

**Unit-II**

6. Rain water harvesting in rural areas (chekdam, trenches etc.,)
7. Over use of surface and ground water and control measures.
8. Aims, objectives and implementation of Mission Bhagiratha (Telangana Government Drinking water programme )
9. Aims, objectives and implementation of Mission Kakatiya (Telangana Government minor irrigation programme)
10. Issues and challenges in Water Resources Management

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**B.Sc. Final Year (DSC-1F)**  
**SEMESTER – VI**

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**Plant Physiology**

**DSC-1F (3hrs./week)**

**Theory Syllabus**

**Credits-3**  
**(45 hours)**

**Unit – I**

1. Water Relations: Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis; water, osmotic and pressure potentials; absorption, transport of water, ascent of sap; transpiration; Stomatal structure and movements. (7h)
2. Mineral Nutrition: Essential macro and micro mineral nutrients and their role; symptoms of mineral deficiency. (3h)
3. Translocation of organic substances: Mechanism of phloem transport; source-sink relationships. (2h)

**Unit – II**

4. Enzymes: Nomenclature, characteristics, mechanism and regulation of enzyme action, enzyme kinetics, factors regulating enzyme action. (4h)
5. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect; concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; Factors effecting Photosynthesis, photophosphorylation (4h)
6. Carbon assimilation pathways: C<sub>3</sub>, C<sub>4</sub> and CAM. (4h)

**Unit – III**

7. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway. (6h)
8. Nitrogen Metabolism: Biological nitrogen fixation, nitrate reduction, ammonia assimilation, (GS-GOGAT, transamination) (4h)
9. Lipid Metabolism: Structure and function of lipids. (3h)

**Unit – IV**

10. Growth and Development: Physiological effects of phytohormones–Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids (3h)
11. Physiology of flowering and photoperiodism. Role of Phytochrome in flowering. (3h)



12. Stress physiology: concept and plant responses to water, salt and temperature stresses (2h)

**References:**

1. Hopkins, W. G. 1995. Introduction to Plant Physiology. John Wiley & Sons Inc., New York, USA
2. Jain, J.L., S. Jain and Nitin Jain. 2008. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
3. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
4. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA.
5. Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
6. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

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**B.Sc. Final Year (DSC-1F)**  
**SEMESTER – VI**

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**Plant Physiology**  
**Practical Syllabus**

**(45 hours)**

1. Determination of osmotic potential of vacuolar sap by Plasmolytic method using leaves of *Rheodiscolor / Tradescantia*. (6h)
2. Determination of rate of transpiration using Cobalt chloride method (3h)
3. Determination of stomatal frequency using leaf epidermal peelings / impressions (6h)
4. Determination of catalase activity using potato tubers by titration method (6h)
5. Separation of chloroplast pigments using paper chromatography technique (12h)
6. Estimation of protein by Biurette method (6h)
7. Mineral deficiency- Detail study of Micronutrients and Macro nutrients (3h)
8. Identification of C<sub>3</sub>, C<sub>4</sub> and CAM plants (3h)

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**U.G. BOTANY (Under CBCS)**  
**B.Sc. Final Year (DSE-1F)**  
**SEMESTER – VI**

**Elective I**

---

**A) Tissue Culture and Biotechnology**

<b>DSE-1F</b>	<b>(3 hrs./week)</b>	<b>Theory Syllabus</b>	<b>Credits-3</b> <b>(45 hours)</b>
<b>Unit – I</b>			
1.	Tissue culture: Introduction, sterilization procedures, explants, culture media – composition and preparation; Micropropagation.		(5h)
2.	Organ culture: Vegetative Organs-Root, Shoot, Leaf culture Reproductive Organs-Anther, Ovary, Ovule, Embryo culture		(6h)
3.	Callus culture, Cell and Protoplast culture		(4h)
<b>Unit – II</b>			
4.	Somatic hybrids and Cybrids.		(4h)
5.	Applications of tissue culture: Production of pathogen free plants and somaclonal variants, production of stress resistance plants, secondary metabolites and synthetic seeds.		(6h)
6.	Production of hairy roots and its applications in production of secondary metabolites.		(2h)
<b>Unit – III</b>			
7.	Biotechnology: Introduction, history, scope and applications.		(3h)
8.	rDNA technology: Basic aspect of of gene cloning, Enzymes used in gene cloning – Restriction enzymes, Ligases, Polymerases.		(4h)
9.	Gene cloning-Vectors – cloning vehicles (Plasmid , Cosmids, Bacteriophages, & Phasmids) application of r DNA technology.		(5h)
<b>Unit – IV</b>			
10.	Gene Libraries: Genomic Libraries, cDNA Libraries, Polymerase chain reaction and its applications.		(4h)
11.	Method of gene transfer in plants ( <i>Agrobacterium</i> and Microprojectile)		(4h)
12.	Production of transgenic plants, Bt –application in cotton and brinjal. Application of Transgenic in crop improvement.		(3h)

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2. Biotechnology. Universities Press (India) Private Limited, Hyderabad.
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**SEMESTER – VI**

**Elective I**

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**A) Tissue Culture and Biotechnology**  
**Practical Syllabus**

1. Estimation of plant DNA. (Tomato) (6h)
2. Production of synthetic seeds /Encapsulation of embryo (3 h)
3. Preparation of plant tissue culture medium. (6h)
4. Callus Micropropagation (3h)
5. Demonstration of Micropropagation/ multiple shoots (6h)
6. Anther culture (3 h)
7. PCR –Demonstration (3h)
8. Study of biotechnology products: Samples of antibiotics and vaccines (6h)
9. Photographs of transgenic plants – Bt Cotton, Bt –Brinjal. (3h)
10. Instruments used in Biotechnology lab- Autoclave, Laminar air flow, Hot air oven and Incubator. (6h)

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**Elective**

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**B) Seed Technology**

**DSE-1F (3 hrs./week)**

**Theory Syllabus**

**Credits-3**  
**(45 hours)**

**Unit – I**

1. Seed: Structure and types. Seed dormancy: causes and methods of breaking dormancy. (4h)
2. Seed storage: Long term and short term storage. Orthodox and recalcitrant seeds.  
Packing of seeds – Principles, practices, bagging and labeling. (3h)
3. Physico and Bio-chemical changes during seed storage. (2h)

**Unit – II**

4. Seed viability, factors affecting seed viability and genetic erosion. (3h)
5. Cultural practices and harvesting of Seed: Isolation, Sowing, Cultural practices, harvesting and threshing of the following crops: (a) Rice, (b) Cotton, (c) Sunflower (9h)
6. Seed Treatment to control seed borne disease –General account (3h)

**Unit – III**

7. Structure of pollen and ovule-Types of ovules, Collection and storage of pollen (3h)
8. Principles of hybrid seed production-Cross pollination, Emasculation, Self pollination, role of pollinators and their management. (5h)
9. Seed development in cultivated plants, seed quality concept, importance of genetic purity of seed. Hybrid seed production and Heterosis. (4h)

**Unit – IV**

10. Seed production technology; seed testing- Procedures of seed testing, seed testing laboratories and importance of seed testing. (3h)
11. Seed certification- History, Seed certification agency, Indian minimum, general and specific seed certification standard. (3h)
12. Seed banks- National, International and Millennium seed banks. (3h)

## References:

1. Agrawal, P. K. 1993. Hand Book of Seed Technology. Dept. of Agriculture and Cooperation. National Seed Corporation Ltd., New Delhi
2. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004. Biotechnology. Universities Press (India) Private Limited, Hyderabad.
3. Bedell, Y. E. Seed Science and Technology. Indian Forest Species. Allied Publishers Limited, New Delhi.
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**B) Seed Technology Practical syllabus**

**(45 hours)**

1. Testing of seed viability using 2, 3, 5-triphenyl tetrazolium chloride (TTC). (3h)
2. Estimation of amylase activity of germinating seeds (Qualitatively). (3h)
3. Demonstration of seed dressing using fungicides to control plant diseases. (3h)
4. Demonstration of seed dressing using Biofertilizers (BGA) to enrich nutrient supply. (3h)
5. Emasculation, bagging of flower for hybrid seed production. (6h)
6. Dissection of Dicot embryo (bean) and Monocot embryo (maize). (6h)
7. Pollen viability test using Evan's blue staining. (*Hibiscus*). (3h)
8. Harvesting and Importance of following seeds:  
Rice,  
Maize,  
Cotton,  
Groundnut and  
Sunflower. (6h)
9. Types of ovules: Orthotropous, Anatropous and Campylotropous. (3h)
10. Structure of pollen grains: *Hibiscus* and grass. (3h)
11. Study visits to research institutes, seed tests and certification laboratories and places seed banks. (6h)



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**C) Bio-Control of Plant Diseases and Pests**

**DSE-1F (3 hrs./week)**

**Theory Syllabus**

**Credits-3**  
**(45 hours)**

**Unit – I**

1. Introduction to various approaches to the control of Pests and Diseases of Plants (4h)
2. Biological Control of Fungal Diseases (3h)
3. Biological Control of Bacterial and Viral Diseases of Plants (4h)

**Unit – II**

4. Pheromones and Semi-chemicals (4h)
5. Botanical Insecticides (3h)
6. Plant Parasitic Nematodes: Introduction, Susceptible response of Plants to Nematodes and Control of Nematodes (4h)

**Unit – III**

7. Progress towards commercialization of Baculovirus Insecticides (4h)
8. Biology of Bacteria and Fungi used for control of Weeds (4h)
9. Genetic Engineering approaches for Weed Resistance (4h)

**Unit – IV**

10. Integrated Pest management Strategies (4h)
11. Insect Growth Regulators (3h)
12. Regulatory aspects of Biological Control Agents (4h)

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- 1) Campbell R. 1989. Biological Control of Microbial Plant Pathogens. Cambridge Univ. Press, Cambridge.
- 2) Cook RJ & Baker KF. 1983. Nature and Practice of Biological Control of Plant Pathogens. APS, St. Paul, Minnesota.
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**SEMESTER – VI**

**Elective**

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**C) Bio-Control of Plant Diseases and Pests**  
**Practical Syllabus**

**(45 hours)**

1. Extraction of Biopesticide from *Neem/Annona*. (6h)
2. Extraction of Biopesticide from *Tagetes/Chrysanthemum*. (6h)
3. Formulation of Biopesticide from fungal organism (*Trichoderma* spp.). (6h)
4. Formulation of Biopesticide from Bacteria (*Bacillus thuringiensis/Pseudomonas* spp.)(9h)
5. Improved technique and staining of plant tissues for detection of plant nematodes.(6h)
6. Identification of disease based on the histo-pathogenesis. (6h)
7. Formulation of viral Biopesticide (*Nuclear Polyhedrosis Virus*) (6h)