

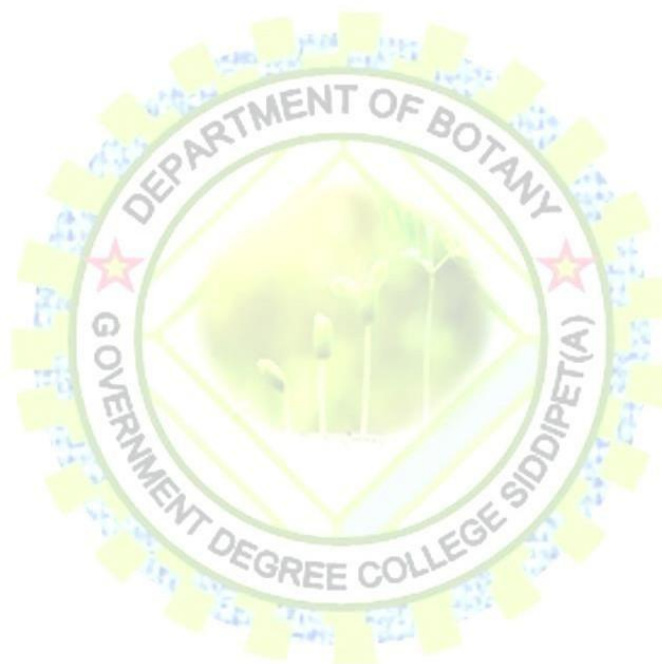
**GOVERNMENT DEGREE COLLEGE, SIDDIPET (AUTONOMOUS)**  
**RE-ACCREDITED WITH 'A' GRADE BY NAAC**  
**PROPOSED CBCS COMMON CORE SCHEME FOR B.SC. COURSE**  
**OPTIONAL -1: BOTANY**

CODE	CODE PAPER TITLE	Course Type	HPW	Credits
<b>FIRST YEAR SEMESTER – I</b>				
BS 104	PAPER – I : Microbial Diversity and Lower Plants	DSC – 1A	4T + 2P=6	4+1=5
<b>FIRST YEAR SEMESTER – II</b>				
BS 204	PAPER – II : Gymnosperms, Taxonomy of Angiosperms and Ecology	DSC – 1B	4T + 2P=6	4+1=5
<b>SECOND YEAR SEMESTER – III</b>				
BS 301	SEC-1:	SEC – 1	2	2
BS 302	SEC-2:	SEC – 2	2	2
BS 304	PAPER – III: Plant Anatomy and Embryology	DSC-1C	4T + 2P=6	4+1=5
<b>SECOND YEAR SEMESTER – IV</b>				
BS 401	SEC-3:	SEC-3	2	2
BS 402	SEC-4:	SEC-4	2	2
BS404	PAPER- IV: Cell Biology, Genetics & Plant Physiology	DSC – 1D	4T + 2P=6	4+1=5
<b>THIRD YEAR SEMESTER – V</b>				
BS 501	GE-1: Industrial Microbiology/Plant Ecology and Taxonomy	GE - 1	4T	4
BS 502	DSE-1A: Biodiversity & Conservation/ Economic Botany	DSE-1A/ DSE-1B/ DSE-1C	4T + 2P=6	4+1=5
<b>THIRD YEAR SEMESTER – VI</b>				
BS 601	DSE-3: Project	PROJECT	4	4
BS 602	DSE: Tissue Culture and Biotechnology/ Plant Molecular Biology	DSE-2A / DSE-2B/ DSE-5E	4T + 2P=6	4+1=5
<b>TOTAL</b>			<b>52</b>	<b>46</b>

**AECC:** Ability Enhancement Compulsory Course, **SEC:** Skill Enhancement Course, **GE:** Generic Elective, **DSC:** Discipline Specific Core, **DSE:** Discipline Specific Elective.

## Proposed New Grading System

SGPA (SEMESTER GRADE POINT AVERAGE)			
S. No.	Grade Point	Range of marks	Grade Letter
1	10	Equal to and above 90 Marks	A+
2	9	More than or equal to 80 and less than 90 Marks	A
3	8	More than or equal to 70 and less than 80 Marks	B+
4	7	More than or equal to 60 and less than 70 Marks	B
5	6	More than or equal to 55 and less than 60 Marks	C+
6	5	More than or equal to 50 and less than 55 Marks	C
7	4	More than or equal to 40 and less than 50 Marks	D
8	0	Below 40 Marks	F



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FACULTY OF SCIENCES

B.Sc., II&III YEAR, SEMESTER – III, IV,V&VI (2020-21)  
DEPARTMENT OF BOTANY

**SUBJECT: BOTANY**  
**SCHEME OF EVALUATION – PAPER –I,II, III,IV,V&VI**  
**SEMESTER WISE EXAMINATIONS**

A. **THEORY:** **MAX. MARKS: 100**

SPLIT:

1. SEMESTER END EXAMINATION : 70 MARKS

2. INTERNAL PERIODICAL EXAMINATION – 1 : -----

3. INTERNAL PERIODICAL EXAMINATION - 2 : -----

**\*(Best of the two Internal Exams of 20 Marks each)\*** : 20 MARKS

4. CO-CURRICULAR ACTIVITIES : 10 MARKS

(Assignment – 05 M, Seminar/ Project Work – 05 M)

**TOTAL: 100 MARKS**

B. **PRACTICALS:** **SEMESTER WISE EXAMS** **MAX. MARKS: 50**

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**FACULTY OF SCIENCES**

**B.Sc., I YEAR, SEMESTER – I (w.e.f 2019-20)**

**DEPARTMENT OF BOTANY**

**SUBJECT: BOTANY**

**Microbial Diversity and Lower Plants – Paper - I**

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

**Credits- 4**

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**Theory Syllabus**

**(60 hours)**

**UNIT – I**

**(15 hours)**

- 1) **Bacteria:** Structure, nutrition, reproduction and economic importance. 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) 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.

**UNIT-II**

**(15 hours)**

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

**UNIT-III**

**(15 hours )**

- 1) General characters and classification of fungi (Ainsworth).
- 2) Structure and reproduction of the following:
  - (a) Mastigimycotina- Albugo
  - (b) Zygomycotina- Mucor
  - (c) Ascomycotina- Saccharomyces and Penicillium.
  - (d) Basidiomycotina- Puccinia
  - (e) Deuteromycotina- Cercospora.
- 3) Economic importance of lichens

## UNIT-IV

(15 hours )

- 1) **Bryophytes:** Structure, reproduction, life cycle and systematic position of Marchantia, Anthoceros and Polytrichum, Evolution of Sporophyte in Bryophytes.
- 2) **Pteridophytes:** Structure, reproduction, life cycle and systematic position of Rhynia, Lycopodium, Equisetum and Marsilea.
- 3) Stellar evolution, heterospory and seed habit in Pteridophytes.

### 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.
- 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.
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- 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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**FACULTY OF SCIENCES**

**B.Sc., I YEAR, SEMESTER – I (w.e.f 2019-20)**

**DEPARTMENT OF BOTANY**

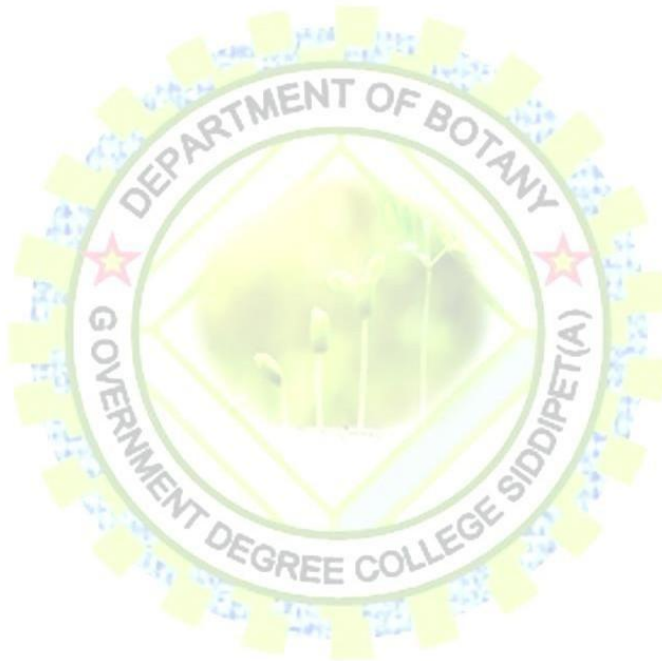
**SUBJECT: BOTANY**

**Practical Syllabus - Paper – I (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, Rice tungro  
Bacteria: Angular leaf spot of cotton and Paddy blight.  
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, Oedogonium, Chara  
Ectocarpus and Polysiphonia.  
Fungi: Albugo, Mucor, Saccharomyces, 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. Lichens: Different types of thalli and their external morphology
7. Examination of important microbial, fungal and algal products: Biofertilizers, protein capsules, antibiotics, mushrooms, Agar- agar etc.
8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies).
9. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Bryophytes: Marchantia, Anthoceros and Polytrichum.
10. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Pteridophytes: Lycopodium, Equisetum and Marsilea.

11. Study of Anator  
Marsilea petiole & rh

and  
s.



**Max. Marks: 50**

**Time : 3 hrs**

1. Identify the gi

Describe with  
classifications

2X4=8M

2. Classify the g

nique.

6M

3. Take a thin tra

Identify & describe the symptoms caused by the pathogen.

8M

4. Identify the given specimens 'E', 'F' & 'G' by giving reasons .

(Fungal-1, Bacteria-1 & Viral-1)

3X2=6M

5. Comment on the given slides 'H' & 'I' (Algae-1, Fungi-1)

2X4=8M

6. Identify the given specimen 'J' & slide 'K' (Bryophytes & Pteridophytes )

2X4=8M

7. Record & Viva

6M

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**B.Sc., I YEAR, SEMESTER – II (w.e.f 2019-20)**  
**DEPARTMENT OF BOTANY**  
**SUBJECT: BOTANY**

**Paper-II**

**Gymnosperms, Taxonomy of Angiosperms and Ecology**

<b>DSC-1B</b>	<b>Credits-4</b>
<b>Theory Syllabus</b>	<b>(60 hours)</b>
<b>UNIT-I</b>	<b>(15 hours )</b>
1) Gymnosperms: General characters, structure, reproduction and classification (Sporne's). Distribution and economic importance of Gymnosperms.	
2) Morphology of vegetative and reproductive parts, systematic position and life cycle of Pinus and Gnetum,	
3) Geological time scale Introduction to Palaeobotany, Types of fossils and fossilization, Importance of fossils.	
<b>UNIT-II</b>	<b>(15 hours )</b>
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 & Prantl classification systems. An introduction to Angiosperm Phylogeny Group (APG).	
2) Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy.	
3) Nomenclature and Taxonomic resources: An introduction to ICN, Shenzhen code – a brief account of Herbarium: Concept, techniques and applications.	
<b>UNIT-III</b>	<b>(15 hours )</b>
1) Systematic study and economic importance of plants belonging to the following families: Polypetalae Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/Papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae	
2) Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae, Monochlamydeae: Amaranthaceae, Euphorbiaceae	
3) Monocotyledons: Orchidaceae, Poaceae and Zingiberaceae.	



#### UNIT-IV

(15 hours )

1. Component of eco system, energy flow, food chain and food webs.
2. Plants and environment, ecological adaptations of plants, Hydrophytes, Xerophytes and Mesophytes
3. Plant Succession serial stages, modification of environment, climax formation with reference to Hydrosere and Xerosere.

#### 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.
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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.



11. 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
12. Stace, C. A. 1989. Plant Taxonomy and Biostatistics (2nd Ed.). Edward Arnold, London.
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19. Michael, S. 1996, Ecology, Oxford University Press, London
20. Odum, E.P. 1983. Basics of Ecology, Saunder's International Students Edition, Philadelphia.
21. Sharma P.D. 1989. Elements of Ecology, Rastogi Publications, Meerut



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**B.Sc., I YEAR, SEMESTER – II (w.e.f 2019-20)**  
**DEPARTMENT OF BOTANY**  
**SUBJECT: BOTANY**

**Paper - II**

**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 stained permanent mounts.
3. Fossil forms using permanent slides / photographs: Cycadeoidea.  
  
Systematic study of locally available plants belonging to the families prescribed in theory Syllabus (Minimum of one plant representative for each family)
4. Study of morphological and anatomical characteristics of locally available plant species (Eichhorinia, Hydrilla, Pistia, Nymphaea, Asparagus, Opuntia, Euphorbia melii)
5. Demonstration of herbarium techniques.
6. Candidate has to submit at least 30 herbarium sheets.

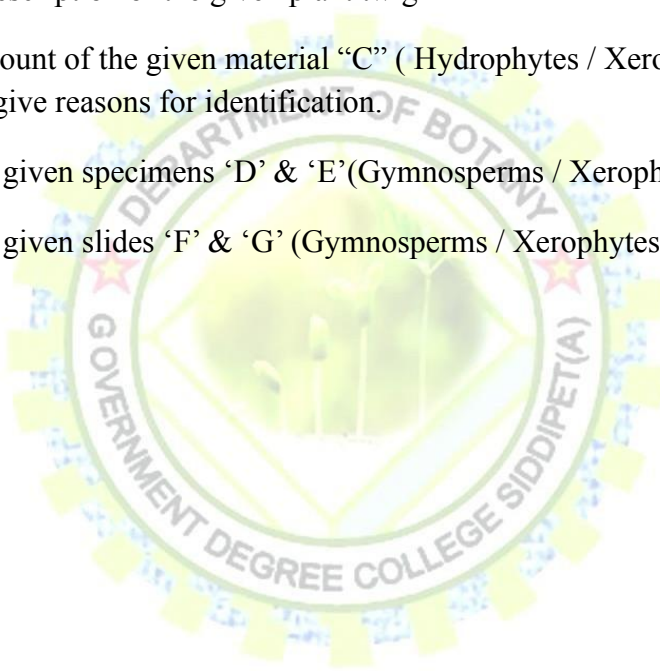
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**DEPARTMENT OF BOTANY**  
**SUBJECT: BOTANY**

**Paper - II**  
**Model Paper for Practicals**

Time : 3 hrs

Max. Marks : 50

1. Prepare a double stained permanent mount of given material "A" (Gymnosperms).  
Draw diagram & give reasons for identification 10 M
2. Technical description of the given plant twig "B" 10 M
3. Prepare a mount of the given material "C" ( Hydrophytes / Xerophytes). Draw  
diagram & give reasons for identification. 08 M
4. Identify the given specimens 'D' & 'E'(Gymnosperms / Xerophytes) 2x4=08 M
5. Identify the given slides 'F' & 'G' (Gymnosperms / Xerophytes) 2x4=08 M
6. Herbarium 03 M
7. Record 03 M



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**B.Sc., II YEAR, SEMESTER – III (2020-21)**  
**DEPARTMENT OF BOTANY SUBJECT:**  
**BOTANY**

**Plant Anatomy and Embryology Theory**  
**Syllabus**

**DSC - 1C**

**Credits- 4**

(60 hours)

**UNIT – I**

(18h)

1. Meristems: Types, histological organization of shoot and root apices and theories.
2. Tissues and Tissue Systems: Simple, complex and special tissues.
3. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths.
4. General account of adaptations in xerophytes and hydrophytes.

**UNIT-II**

(16h)

5. Stem and root anatomy: Vascular cambium – Formation and function.
6. Anomalous secondary growth of Stem – Achyranthes, Boerhaavia, Bignonia, Dracaena; Root– Beta vulgaris
7. Wood structure: General account. Study of local timbers – Teak (*Tectona grandis*), Rosewood (*Dalbergia latifolia*), Redсандers (*Pterocarpus santalinus*), Nallamaddi (*Terminalia tomentosa*) and Neem (*Azadirachta indica*).

**UNIT – III**

(10h)

8. History and importance of Embryology.
9. Anther structure, Microsporogenesis and development of male gametophyte.
10. Ovule structure and types; Megasporogenesis; types and development of female gametophyte.

**UNIT-IV**

(16h)

11. Pollen morphology, pollination and fertilization, Pollination Types, Pollen – pistil interaction, Double fertilization.
12. Seed – structure appendages and dispersal mechanisms

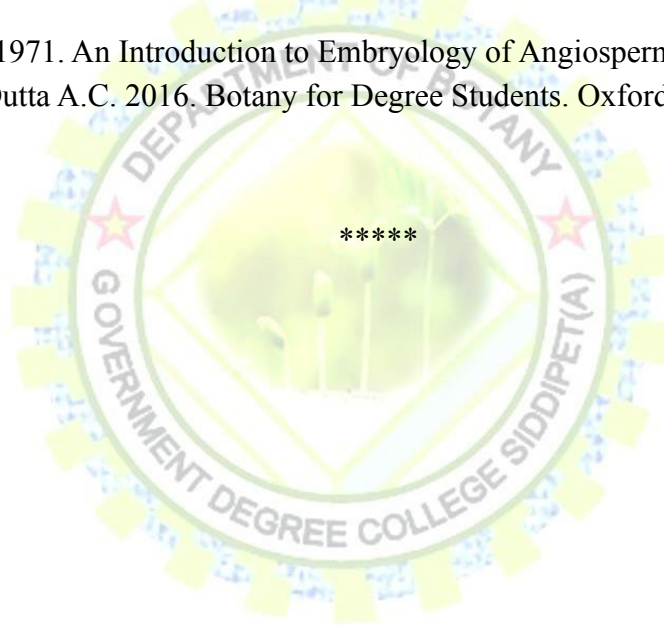
13. Endosperm – Development and types. Embryo development and types; Polyembryony and Apomixis – an outline.

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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



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**DEPARTMENT OF BOTANY SUBJECT:**  
**BOTANY**  
**Plant Anatomy and Embryology**  
**Practical syllabus**

DSC - 1C

Credits- 1

(45 hours)

1. Demonstration of double staining technique.
2. Tissue organization in root and shoot apices using permanent slides
3. Preparation of double stained Permanent slides Primary structure: Root - *Cicer*, *Canna*; Stem – *Tridax*, *Sorghum* Secondary structure: Root – *Tridax* sp.; Stem – *Pongamia*  
Anomalous secondary structure: Examples as given in theory syllabus.
4. Anatomy of Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
5. Stomatal types using epidermal peels.
6. Structure of anther and microsporogenesis using permanent slides.
7. Structure of pollen grains using whole mounts - *Hibiscus*, *Acacia* and Grass).
8. Pollen viability test using Evans Blue – *Hibiscus*
9. Study of ovule types and developmental stages of embryo sac.
10. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot embryos using permanent slides.

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**DEPARTMENT OF BOTANY SUBJECT:**  
**BOTANY**  
**Plant Anatomy and Embryology**  
**Practical Model Paper**

Time: 3 hrs

Max. marks: 50

1. Identify the given material "A", Prepare a double stained permanent mount of transverse section of given the given material. 15M
2. Prepare a temporary mount of epidermal peel of the given leaf material " B " and identify the stomata type . 7M
3. Conduct the pollen viability test "C". 6M
4. Identify and describe the specimens / slides with well labelled diagrams 3 X 4 = 12M
  - (a) Embryology – D
  - (b) Palynology – E
  - (c) Anatomy – F
5. Record 5M
6. Viva 5M

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**SUBJECT: BOTANY**

**Cell Biology, Genetics and Plant Physiology – PAPER IV**  
**Theory Syllabus**

DSC-1D

Credits-4

(60 hours)

**UNIT- I**

(15h)

1. Plant cell envelops: Ultra structure of cell wall, Models of membrane structure, structure and functions of Semi permeable Plasma membrane.
2. Cell Organelles: Structure and semiautonomous nature of Mitochondria and Chloroplast.
3. Nucleus: Ultra structure, types and functions of DNA & RNA. Mitochondrial DNA & Plastid DNA and Plasmids.
4. Chromosomes: Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes: Lampbrush and Polytene chromosomes.
5. Cell division: Cell and its regulation; mitosis, meiosis and their significance

**UNIT – II:**

(15 hours)

6. Mendelism: History, Principles of inheritance, Chromosome theory of inheritance, Autosomes and sex chromosomes, Incomplete dominance and Co-dominance. Multiple alleles, Lethal alleles, Epistasis, Recessive and Dominant traits, Polygenic inheritance.
7. Linkage and crossing over, Recombination frequency, two factor and three factor crosses; Interference and co-incidence. Numericals based on gene mapping; Sex Linkage.
8. Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy
9. Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens-physical and chemical (Base analogs, deaminating, alkylating and intercalating agents);

**Unit-III**

(15h)

10. Plant -water Relations: Water potential, osmosis, osmotic and pressure potential, absorption and transport of water.
11. Mineral Nutrition: Essential micro & macro nutrients and symptoms of mineral deficiency.

12. Transpiration: Stomatal structure and movement.

13. Mechanism of phloem transport.

14. Enzymes: Nomenclature, properties, Classification and factors regulating enzyme activity.

## UNIT- IV

(15h)

15. Photosynthesis: Photosynthetic pigments, Cyclic and Non-cyclic Photophosphorylation. Carbon assimilation pathways: C3, C4 and CAM.
16. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle and oxidative phosphorylation.
17. Nitrogen Metabolism: Biological nitrogen fixation.
18. Physiological role of Phytohormones: Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids

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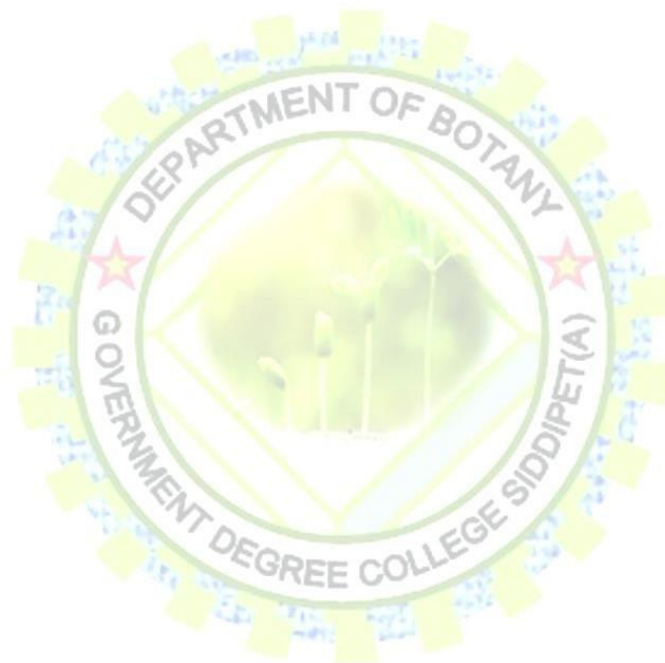
### Reference:

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. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
1. Hopkins, W. G. 1995.
4. Introduction to Plant Physiology. John Wiley & Sons Inc., New York, USA
5. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons, India. 8th edition.
6. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition.
7. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. Benjamin Cummings, U.S.A. 10th edition.
8. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.
9. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
10. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc., U.S.A. 5th edition.
11. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings. U.S.A. 9th edition.
12. Russell, P. J. (2010). iGenetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.
13. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.
14. Jain, J.L., S. Jain and Nitin Jain. 2008. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
15. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
16. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition),

Wordsworth, Thomson Learning Inc.,USA.

17. Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA. 18. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

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**GOVERNMENT DEGREE COLLEGE, SIDDIPET (AUTONOMOUS)**  
**RE-ACCREDITED WITH 'A' GRADE BY NAAC**  
**FACULTY OF SCIENCES**  
**B.Sc., II YEAR, SEMESTER – IV (w.e.f.2020-21)**  
**DEPARTMENT OF BOTANY**  
**SUBJECT: BOTANY**

**Cell Biology, Genetics and Plant Physiology – PAPER IV**

DSC-1D

Credits-1

**Practical Syllabus**

(60 hours)

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparation of Onion root tips.
3. Study of ultra-structure of cell organelles using photographs. Chloroplast, Mitochondria, Nucleus,
4. Study of Special types of Chromosomes (Polytene chromosome and Lampbrush chromosomes- Permanent slide)
5. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square analysis.
6. Chromosome mapping using test cross data.
7. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)
8. Determination of osmotic potential of vascular sap by Plasmolytic method using leaves of Rheodiscolor / Tradescantia.
9. Determination of rate of transpiration using Cobalt chloride method
10. Determination of stomatal frequency using leaf epidermal peelings / impressions
11. Determination of amylase activity using potato tubers by titration method
12. Separation of chloroplast pigments using paper chromatography technique
13. Estimation of protein by Biurette method
14. Mineral deficiency symptoms of Micro and Macro nutrients

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**FACULTY OF SCIENCES**  
**B.Sc., II YEAR, SEMESTER – IV (2020-21)**  
**DEPARTMENT OF BOTANY SUBJECT:**  
**BOTANY**

**Cell Biology, Genetics and Plant Physiology – PAPER IV**

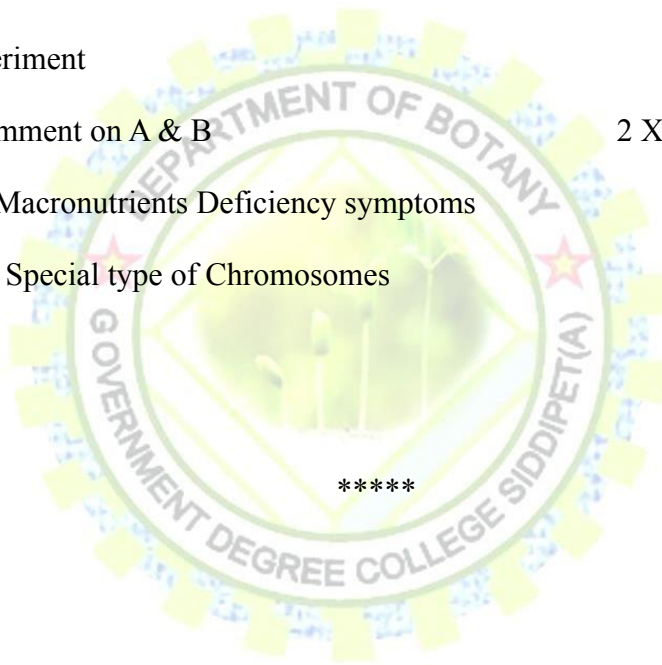
**Practical Model Question Paper**

Time: 3 hrs

Max. marks: 50

1. Prepare a cytological slide of given material and identify & describe any two stages with well labelled diagrams. 12M
2. Genetics problem 10M
3. Physiology Experiment 12M
4. Identify and Comment on A & B 2 X 3 = 6M
  - A. Micronutrient / Macronutrients Deficiency symptoms
  - B. Cell organelles / Special type of Chromosomes
5. Record 5M
6. Viva 5M

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**FACULTY OF SCIENCES B.Sc.,**  
**II YEAR (2020-21)**  
**DEPARTMENT OF BOTANY**  
**Skill Enhancement Course**

SEC-1

(Credits - 2)

**Nursery and Gardening** Lectures: 30

**Unit-I**

(15h)

1. Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.
2. Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification.
3. Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house.

**Unit-II**

(15h)

4. Gardening: definition, objectives and scope - different types of gardening -landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.
5. Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures.
6. Features of a garden: Garden wall, Fencing, biofencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India. Cultivation of Important cut flowers: Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Liliun, Orchids. \* Field trip is essential.

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**Suggested Readings**

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.

6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

**GOVERNMENT DEGREE COLLEGE, SIDDIPET (AUTONOMOUS)**

**RE-ACCREDITED WITH 'A' GRADE BY NAAC**

**FACULTY OF SCIENCES**

**B.Sc., II YEAR (w.e.f.2020-21)**

**DEPARTMENT OF BOTANY**

**Skill Enhancement Course**

SEC-2

(Credits - 2)

**Bio fertilizers and**

(30h)

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1. Manures and Biofertilizers: Types of fertilizers, manures. Manure composition. Manures for crop productivity.
2. Differences between fertilizers and biofertilizers: pH changes and water contamination.
3. Bacterial Biofertilizers: General account on the microbes used as biofertilizer.
4. Algal Biofertilizers: Associative effect of different microorganisms. Azolla and Anabaena- azollae association, nitrogen fixation, factors affecting growth, Azolla in rice cultivation.

**UNIT - II**

(15h)

5. Fungal Biofertilizers: Mycorrhizal association, types of mycorrhizal association, occurrence and distribution, phosphorus nutrition, growth and yield, colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

6. Organic Farming: Green manuring and organic fertilizers, Recycling of bio-degradable municipal, agricultural and industrial wastes, Biocompost making- types, method of vermicomposting, Panchakgavya. Biological pest control (neem).

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**Suggested Readings:**

1. Dubey R.C. 2005. A Text book of Biotechnology.S.Chand& Co. New Delhi.
2. Kumaresan V. 2005. Biotechnology.Saras Publications. New Delhi.
3. John JothiPrakash E. 2004. Outlines of Plant Biotechnology.Emkay Publication. New Delhi.
4. Sathe T.V. 2004. Vermiculture and Organic Farming.Daya Publishers. New Delhi.
5. SubhaRao N.S. 2000. Soil Microbiology, Oxford & IBH Publishers. New Delhi.
6. Vayas S.C, Vayas S. and Modi H.A. 1998.Bio-fertilizers and organic Farming AktaPrakashan. Nadiad.

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**FACULTY OF SCIENCES B.Sc.,**  
**II YEAR (w.e.f.2020-21)**  
**DEPARTMENT OF BOTANY**  
**Skill Enhancement Course**

SEC-3	Credits-2
Greenhouse Technology	(30h)
UNIT – I	(15h)

1. Introduction; scope – classification of greenhouses – construction of greenhouse- heating unit – cooling unit – environmental control (light and temperature).
2. Net- poly houses- low cost green houses. Root media for greenhouses
3. Fertilizers: Organic and inorganic, liquid fertilizers, application of fertilizers.
4. Water in the Greenhouses: Irrigation system in green houses–misting, Drip irrigation- micro irrigation, water quality, water sanitation.

UNIT – II

(15h)

5. Plant Protection in Greenhouses: Diseases of greenhouse plants (bacterial, fungal, nematodes and viral diseases)
6. Management of pest and diseases – integrated pest management.
7. Applications of Greenhouse Technology: Importance of greenhouse technology. Micropropagation and greenhouse planting of tissue culture transplants
8. Advantages and disadvantages of greenhouse technology. Seed production, cut flower gardening.

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**Suggested Readings:**

1. Dubey R.C. 2006. A text book of Biotechnology. S.Chand and Company. New Delhi.
2. Sheela V.L. 2011. Horticulture. MJP Publishers. Chennai,
3. Prasad S., Kumar U. 2012. Green House Management for Horticultural Crops. Agrobios India.

4. Pant V. and Nelson. 1991. Green House Operation and Management. Bali Publication. New Delhi.



5. Introduction to soil science:

<http://www.agrimoon.com/wpcontent/uploads/Introduction- tosoil- science.pdf>

6. Greenhouse applications:

[http://www.lindegas.com/en/products\\_and\\_supply/fumigants/carbon\\_dioxide\\_in\\_agriculture/greenhouse\\_applications/index.html](http://www.lindegas.com/en/products_and_supply/fumigants/carbon_dioxide_in_agriculture/greenhouse_applications/index.html)

7. Role of greenhouse technology in agricultural engineering:

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**II YEAR (w.e.f.2020-21)**  
**DEPARTMENT OF BOTANY**  
**Skill Enhancement Course**

SEC-4

(Credits 2)

**Mushroom Culture Technology**

Lectures: 30

**UNIT-I**

(15h)

1. Introduction & history. Medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotus citrinopileatus, Agaricus bisporus.
2. Cultivation Technology: Infrastructure; substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.
3. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves.
4. Factors affecting the mushroom bed preparation - Low cost technology, composting technology in mushroom production.

**UNIT-II**

(15h)

5. Storage: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions.
6. Nutritional value of Mushrooms: Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.
7. Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

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**Suggested Readings:**

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

3. Tewari, PankajKapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

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**RE-ACCREDITED WITH 'A' GRADE BY NAAC**  
**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – V (w.e.f 2021-22)**  
**Biodiversity & Conservation**

**DSE-1A** **Credits-4**

**Theory syllabus** **(60 hours)**

**Unit-I** **(15 hours)**

1. Plant diversity and its scope: Genetic diversity, species diversity, plant diversity at the ecosystem level, Agro biodiversity and cultivated plant taxa, wild taxa.
2. Values and uses of biodiversity: Ethical and aesthetic values, Precautionary principle, methodologies for , Uses of plants, Uses of microbes.

**Unit-II** **(15 hours)**

3. Loss of biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projected scenario for biodiversity loss.
4. Management of plant Biodiversity organisations associated with biodiversity management- methodology for execution-IUCN,UNEP,UNESCO,WWF, NBPGR.
5. Biodiversity legislation and conservation, Biodiversity information management and communication.

**Unit-III** **(15 hours)**

6. Conservation of biodiversity, Conservation of genetic diversity, species diversity and Ecosystem diversity.
7. Principles of conservation-*In situ* and *Ex situ* conservation, sacred grove, Botanical garden, Biosphere reserves, Sanctuaries, National parks( *In situ*) and Tissue culture, Gene/ seed/ Pollen banks and cryopreservation (*Exsitu*).

**Unit-IV** **(15 hours)**

8. Role of plants in relation to Human welfare; Importance of forestry their utilization and commercial aspects, Avenue trees, Ornamental plants of India.
9. Alcoholic beverages through ages fruits and nuts, important fruit crops and their commercial aspects importance. Wood and its uses

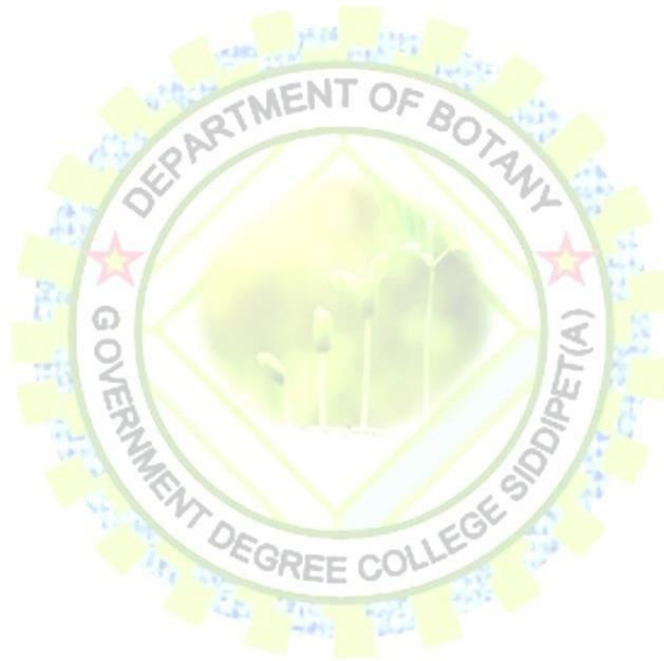
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**References:**

1. Krishnamurthy, K.V. (2004). An Advanced Textbook of Biodiversity – Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Bharucha, E. 2005. Textbook of Environmental Studies for Undergraduate Courses. Universities Press (India) Private Limited, Hyderabad.
3. Odum, E. P. 1983. Basics of Ecology. Saunder's International Students Edition, Philadelphia.
4. Sharma, P. D. 1989. Elements of Ecology. Rastogi Publications, Meerut.

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**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – V (w.e.f 2021-22)**  
**Biodiversity & Conservation**

**DSE-1A**

**Credits-1**

**Practical Syllabus**

(30 hours)

1. Study and local biodiversity Herbs, shrubs and trees, seasonal, annual, biennial and perennial plants.
2. Study of morphological characteristics of plant communities hydrophytes, (Eichhornia, hydrilla, Pistia, Nymphaea, Vallisneria.) Xerophytes: (Asparagus, Opuntia, Euphorbia milii, Casuarina, Calotropis).
3. Assessment of biodiversity
  - i. Avenue trees Pongamia pinnata, Butea monosperma, Spathodea sp., Delonix regia, Jacaranda mimosifolia, Cassia fistula, Mimosa elengi, Acacia leucophloea and Albizia lebbek.
  - ii. Ornamental plants: any 5 locally available ornamental plants
  - iii. Timber value: Acacia nilotica, Tectona grandis and Azadirachta indica
  - iv. Fruits: Mangifera indica (Mango), Ziziphus mauritiana, Psidium guajava (Guava), Annona squamosa
  - v. Nuts: Anacardium occidentale (Cashew), Terminalia catappa (Badam)
  - vi. Beverages: Madhuca indica, Camellia sinensis (Tea), Coffea Arabica (Coffee), Borassus flabellifer (Toddy palm) and Caryota urens
  - vii. Medicinal value: Catharanthus roseus, Tinospora cardifolia and Phyllanthus emblica Ocimum species and Azadirachta indica
4. Field trip: Collection of plants from the field, identification and preparation of Herbarium.

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**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – V (w.e.f 2021-22)**  
**Biodiversity & Conservation**  
**PRACTICAL MODEL QUESTION PAPER**

3 Hours

50 Marks

1. Identify and describe Biodiversity value of  
A) Medicinal B) Timber C)Fruit. 3X4=12M
2. Any two available ornamental plants and their uses 2X3=06M
3. Comment on the specimens D, E & F 3X3=09M
4. Identify and describe Biodiversity Value of the given slides G & H  
(Hydrophytes & Xerophytes) 2X4=08M
5. Field trip Herbarium 05M
6. Record 05M
7. Viva 05M

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**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – V (2021-22)**  
**DEPARTMENT OF BOTANY**

**GE-I**

**(Credits-4)**

**INDUSTRIAL MICROBIOLOGY**

60Hrs

**Unit-I**

(15hour)

1. Basic introduction of Microbiology and scope.
2. Importance of industrial microbiology.
3. Fermentation: Fermentation introduction, types of fermentations.
4. Screening-screening Primary and secondary, Strain improvement. (15hour)

**Unit-II**

5. Microbial production of industrial products microorganisms involved medium fermentation conditions, downstream processing and uses.
6. Filtration centrifugation cell disruption solvent extraction precipitation and ultra-filtration lyophilization spray drying.
7. Fermenters: Design of fermenters, types of fermenters

**Unit-III**

(15hour)

8. Microbial enzymes of industrial interest and enzyme immobilization.
9. Industrial products derived from microbes: vitamins: B12: Vaccines: recombinant vaccines. production of beverages (beer and wine).
10. Biofuels (biogas and methane). Enzymes(amylase). Antibiotics (penicillin). amino acids (glutamic acid), organic acid (citric acid).
11. Methods of immobilization advantages and applications of immobilization large scale applications of immobilized enzymes (glucose isomerase and penicillin acetylase).
12. Microbes and quality of environment. Distribution of microbes in air I solution of microorganisms from soil, air and water.

**Unit-IV**

(15hour)

13. Microbial flora of water, water pollution role of microbes in sewage and domestic wastewater treatment systems.
14. Determination of BOD, COD, TDS and TOC of water samples, microorganisms as

indicators of water quality e cheque coli form and fecal coliform in water samples.

15. Microbes in agriculture and remediation of contaminated soils.

16. Biological fixation mycorrhiza bioremediation of contaminated soils. Isolation of root nodule eating bacteria arbuscular mycorrhizal colonization in plant roots.

### **Suggested Readings:**

1. Pelzar, M.J.Jr, Chen E.C S., Krieg N.R. (2010). Microbiology: An application based approach. Tata McGraw Hill Education Pvt Ltd. Delhi.

2. Tortora, G.J., Funke, B.R., Case. C.L (2007). Microbiology. Person Benjamin Cummings, San Francisco, U.S.A. 9<sup>th</sup> edition.

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**RE-ACCREDITED WITH 'A' GRADE BY NAAC**  
**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – VI (w.e.f 2021-22)**  
**Department of Botany**

**PROJECT WORK/ DISSERTATION WORK (Credits : 4)**

Project work / Dissertation Work is considered as a special course involving application of knowledge in solving/ analyzing / exploring a real life situation / difficult problem. The project work / Dissertation work will be of 4 credits. Studied subject specific project work can be handled, with a view to develop creative thinking, team spirit and skill.

The project work at preliminary level should be assigned to students in groups.

Project report in the form of dissertation prepared and submitted by the students. It will be evaluated by the External and Internal Examiners. Head of the department will chair the evaluation panel and proceedings of viva voce. It carries maximum of 100 marks.

**PROJECT GUIDELINES:**

1. Understand the subject broadly.
2. Choose a topic of interest.
3. Refer to the books & interact with subject specific experts.
4. Try to understand basic principle of living organisms followed by plants, with the help of Physics, Chemistry and Statistics.
5. Select the topic applicable locally to know the importance of the subject in daily life. Preferably choose, vegetation around the institution, around home, agricultural crops, vegetable markets and nearby relevant industries.
6. Put together latest technology and methods, basic knowledge on selected theme, importance / need, locally applicable.
7. Summarize three years knowledge on the subject, go through skill enhancement course, correlate to real life and choose the project.
8. Laboratory facilities, books to refer and faculty with research experience are essential to handle the project.
9. Analyze your data and draw conclusion.
10. Communicate the results.
11. Work division among the group members should be followed.
12. Maximum number of students should not be exceed 5.

**PROJECT EXAMINATION**

**Max.Marks : 100**

1. Project Report : 75
2. Seminar presentation: 25

**GOVERNMENT DEGREE COLLEGE, SIDDIKET (AUTONOMOUS)**  
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**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – VI (w.e.f 2021-22)**  
**Tissue Culture and Biotechnology**

DSE – 2B

Credits – 4

**Theory Syllabus**

(60 hours)

**Unit –I**

(15hours)

1. Tissue Culture: Introduction, Sterilization Procedures, Explants, Culture Media-Composition and preparation; Nutrient and hormone requirements, Micropropagation.
2. Organ Culture: Totipotency, Vegetative Organs – Root, Shoot, Leaf Culture. Reproductive Organs- Anther, Ovule, Embryo Culture.
3. Callus Culture and isolation and fusion of Protoplast Culture. 4. Organogenesis, (Somatic and zygotic).

**Unit –II**

(15 hours)

5. Applications of Tissue Culture: Production of Pathogen Free Plants and resistant plants, Somaclonal Variants and synthetic seeds.
6. Induction of Hairy Roots and Its Applications in Production of Secondary Metabolites.
7. Haploidy and triploids, cryopreservation and Germplasm Conservation.
8. Somatic Hybrids and Cybrids.

**Unit –III**

(15 hours)

9. Biotechnology: Introduction, History, Scope and Applications.
10. rDNA Technology : Basic Aspect of Gene Cloning, Enzymes used In Gene Cloning- Restriction Enzymes, Ligases, Polymerases.
11. Gene Cloning -Vectors –Recombinant DNA, Bacterial Transformation and selection recombinant clones, vectors-Cloning Vehicles ( Plasmid, Cosmids, Bacteriophages & Phasmids ); Eukaryotic Vectors (YAC) Gene construct; Applications rDNA technology.

**Unit –IV**

(15 hours)

12. Gene Libraries: Construction of Genomic Libraries and cDNA Libraries, colony hybridization; Probes- oligonucleotide, Polymerase Chain Reactions (PCR) and Its Applications
13. Method of Gene Transfer - Agrobacterium mediated, Direct gene transfer by Electroporation- Microinjection, Microprojectile bombardment; Selection of transgenic – selectable marker and reporter genes.
14. Application of Transgenic in Improvement of Crop productivity and quality traits. Pest resistant transgenic crops (Bt Cotton & Brinjal); herbicide resistant plants (Roundup Ready soybean); crops with quality traits ( Flavr Savr tomato, Golden rice).

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## References:

1. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004.
2. Biotechnology. Universities Press (India) Private Limited, Hyderabad.
3. Channarayappa. 2007. Molecular Biotechnology – Principles and Practices. Universities Press (India) Private Limited, Hyderabad.
4. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.
5. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi
6. Edmond, J. B., T. L. Senn, F. S. Adrews and R. J. Halfacre. 1977..
7. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India) Private Limited, Hyderabad..
8. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.
9. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA.
10. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
11. Glick, B.R., Pasternak, J.J. (2011). Molecular Biotechnology - Principles and Applications of recombinant DNA. ASM press, Washington.
12. Bhojwani, S.S. and Bhatnagar, S.P (2011) The Embryology of Angiosperms. Vikas Publication House Pvt.Ltd, New Delhi. 5<sup>th</sup> edition.
13. Snustand, D.P. and Simmons, M.J (2010). Principles of Genetics. John Wiley and Sons, U.K. 5<sup>th</sup> edition.
14. Stewart, C.N. Jr. (2008). Plant biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.

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**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – VI (w.e.f 2021-22)**  
**Tissue Culture and Biotechnology**

DSE – 2B

Credits – 1

**Practical Syllabus**

30 Hours

- I. Major Experiments
1. Isolation of plant DNA. (Tomato)
  2. Production of synthetic seeds /Encapsulation of embryo
  3. Preparation of plant tissue culture medium.
  4. Isolation of protoplasts.
- II. Minor Experiments
5. Callus induction
  6. Demonstration of Micropropagation/ multiple shoots
  7. Anther culture
  8. PCR –Demonstration
  9. Study of biotechnology products: Samples of antibiotics and vaccines
  10. Photographs of Gene transfer methods.
  11. Instruments used in Biotechnology lab- Autoclave, Laminar air flow, Hot air oven and Incubator.
  12. Demonstration of In-vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc.
- III. Spotting
13. Study of anther, embryo and endosperm culture, micropropagation, somatic Embryogenesis & Artificial seeds through photographs.
  14. Study of methods of gene transfer through photographs: Agrobacterium-Mediated, direct gene transfer by electroporation, Microinjection, micro projectile bombardment.
  15. Study of steps of genetic engineering for production of Bt.Cotton, Golden rice Flavr savr Tomato through photographs.
  16. Restriction digestion and gel electrophoresis of plasmid DNA.

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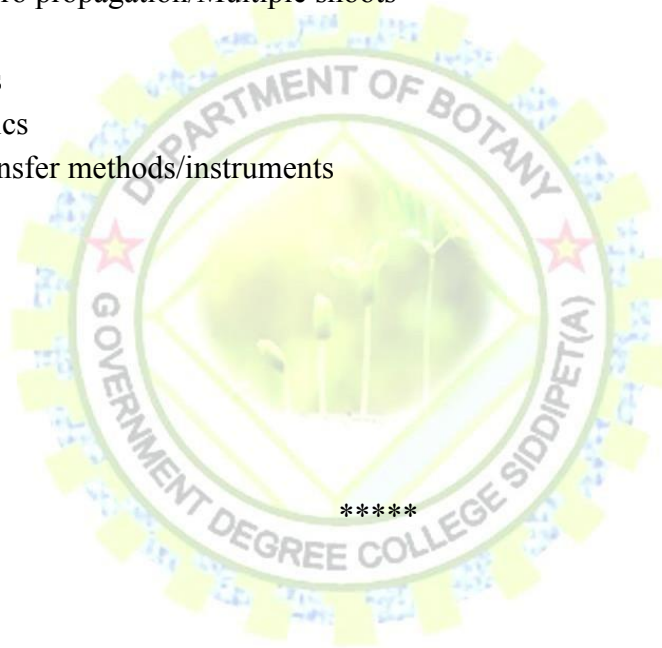
**GOVERNMENT DEGREE COLLEGE, SIDDIPET (AUTONOMOUS)**  
**RE-ACCREDITED WITH 'A' GRADE BY NAAC**  
**FACULTY OF SCIENCES**  
**B.Sc., III YEAR, SEMESTER – VI (w.e.f 2021-22)**  
**Tissue Culture and Biotechnology**

Time: 3hrs

Max. Marks: 50

**Practical Model Paper**

1. Major Experiment (18marks)  
Isolation of DNA  
(OR)  
Production of synthetic seeds /Encapsulation of embryo
2. Minor Experiment (10 marks)  
Callus/ Micro propagation/Multiple shoots
3. Spotters (3x4=12marks)
  - A. Vaccines
  - B. Antibiotics
  - C. Gene transfer methods/instruments
4. Record (5marks)
5. Viva (5 Marks)





**GOVERNMENT DEGREE COLLEGE, SIDDIPET (AUTONOMOUS)**  
**RE-ACCREDITED WITH 'A' GRADE BY NAAC**  
**FACULTY OF SCIENCES**  
**SUBJECT: BOTANY**  
**INTERNAL EXAMINATION MODEL PAPER**  
**For All Semesters (w.e.f. 2021-2022)**

**Time: 30 Minutes**

**Max. Marks: 20**

- I. Multiple choice questions: (5 questions) @ 1 mark** **5 Marks**
- |    |    |    |    |        |
|----|----|----|----|--------|
| 1) |    |    |    | (    ) |
| a) | b) | c) | d) |        |
| 2) |    |    |    | (    ) |
| a) | b) | c) | d) |        |
| 3) |    |    |    | (    ) |
| a) | b) | c) | d) |        |
| 4) |    |    |    | (    ) |
| a) | b) | c) | d) |        |
| 5) |    |    |    | (    ) |
| a) | b) | c) | d) |        |

- II. Fill in the blanks: (10 questions) @ 1 mark** **10 Marks**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

- III. Short answer questions: (05 questions) @ 1 mark** **5 Marks**

- 1.
- 2.
- 3.
- 4.
- 5.

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**FACULTY OF SCIENCES**  
**GOVERNMENT DEGREE COLLEGE, SIDDIPET (AUTONOMOUS)**  
**SUBJECT: BOTANY**  
**SEMESTER END THEORY EXAM - MODEL QUESTION PAPER**  
**For All Semesters (w.e.f. 2021-2022)**

**Max. Time: 2:30 Hrs**

**Max. Marks: 70**

**Note: Draw neat and labeled diagrams wherever necessary.**

**SECTION – A**

**Answer all the questions:**

**5 X 2 = 10Marks 1.**

- 2.
- 3.
- 4.
- 5.

**SECTION – B**

**Answer any four (4) questions from the following:**

**4 X 5 = 20Marks 6.**

- 7.
- 8.
- 9.
- 10.
- 11.

**SECTION – C**

**Answer all the questions.**

**4 X 10 = 40Marks**

12 a)

**OR**

b)

13

a)

**OR**

b)

14

a)

**OR**

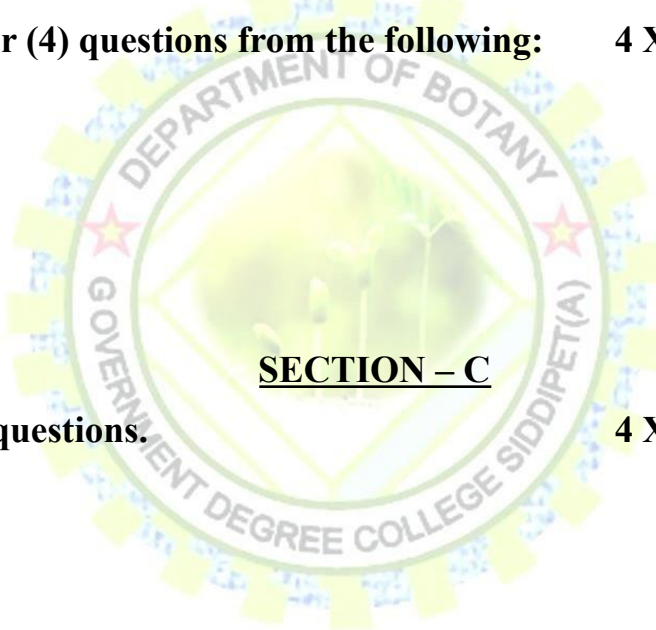
b)

15

a)

**OR**

b)



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**GOVERNMENT DEGREE & PG COLLEGE, SIDDIPET(Autonomous).**

Re-Accredited with "A" Grade by NAAC

DEPARTMENT OF BOTANY

**SEMESTER- III & IV ( w.e.f. 2020-2021)**

**Skill Enhancement Course**

**Internal Examination – Model Question  
Paper**

Name of the Student:

Class :

Name of the SEC:

H.T.No:

Sign.of the Invigilator:

Time: 30Min.

Max.Marks:10

**I. Choose the correct answer**

**5×1=5Marks**

1. Mushrooms are belongs to [ ]  
a) Ascomycotina b) Basidiomycotina c) Zygomycotina d) a and b
2. Most popular edible mushrooms [ ]  
] a) A.bispours b) A.compestris c) A.arvensis d) all are above
3. The seed material of mushroom fungi is called [ ]  
a) Spawn b) Casing c) Crop d) All are above
4. Which is the richest vitamin in Mushrooms [ ]  
a) D b) E c) C d) K
5. Milky white mushroom [ ]  
a) Morchella esculenta b) Pleurotus velutips c) Calocybe indica d) None of these

**II. Fill in the Blanks**

**5×1=5Marks**

6. Mushroom means.....
7. Mushrooms are harvested when they are in.....
8. An example of poisonous mushroom.....
9. Oyester mushrooms are .....
10. Puff balls are belonging to.....

**Government Degree College, Autonomous-Siddipet**  
**Faculty of Science**  
**Department of Botany**  
**Certificate Course**  
**Roof Garden Techniques**

*Theory syllabus*

Theory Hours-20

HPW-2

**UNIT-I**

**Introduction of Roof garden**

**10hrs**

1. Roof garden –need for roof garden, Limitations-Types of roof garden, Private and cooperative.
2. Planning, designing, maintenance of roof garden
3. Roof Gardening Growing of plants on the roof of a house in pots, containers constructed beds.
4. Gardening Techniques-Soil preparation, preparation of compost with kitchen waste and vermin compost. Irrigation systems-Drip, Sprinkler and Micro irrigation systems.
5. Study of tools, Shade net for roof gardening.
6. Fertilizers, Diseases symptoms and controlling measures in roof garden plants.

**UNIT-II**

**Horticulture techniques**

**10hrs**

7. Horticulture techniques-Introduction, cultivation of Ornamental plants- Chrysanthemum, Rose, Marigold.
8. Vegetable - Tomato, Brinjal. Chilli, Bottle gourd, Snake gourd, Bitter gourd and Ash gourd,  
Root tubers: Sweet Potato. Root crops: Carrot, Radish.
9. Cole Crops: Cabbage, Cauliflower. Leafy vegetables: Amaranthus, Palak, Gogu.

10. Propagation methods: cuttings, layering, grafting.

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## Reference Books:

Denisen, E. L. 1957. Principles of Horticulture. Macmillan Publishing Co, New York

Edmond, J.B., Senn, T. L., Andrews, F. S and Halfacre, R. G. 1963. Fundamentals of Horticulture. Tata Mac Graw Hill Publishing Co. ., New Delhi.

Kumar, N. 1990. Introduction to Horticulture. Rajyalakshmi Publications Nagarcoil, Tamilnadu.

Jitendra Singh, 2002. Basic Horticulture. Kalyani Publishers, Hyderabad.

Introduction to Horticulture, Kumar, N. 1990. Rajyalakshmi Publications, Nagarcoil, Tamilnadu.

Basic Horticulture, Jitendra Sing, 2002. Kalyani Publishers, Hyderabad.

Fundamentals of Fruit Production, Garner V R, Bradford F C and Hooker Jr. H D, 1957. McGraw Hill Book Co., New York.

Plant Propagation. Principles and Practices, Hartman, HT and Kester, D.E. 1976, Prentice Hall of India Pvt. Ltd. Bombay.

Plant Propagation. Sadhu, M.K. 1996. New Age International Publishers, New Delhi.

Propagation of Horticultural Crops: Principles and Practices, Sarma, R.R. 2002. Kalyani Publishers, New Delhi.

**Government Degree College, Siddipet (Autonomous)**

**Faculty of Science**

**Department of Botany**

**Certificate Course**

**Roof Garden Techniques**

***Practical syllabus***

**Hours-10**

1. Study of tools and implements in horticulture
2. Preparation of fertilizer mixtures and field application.
3. Study and practicing of different propagation methods by cutting, layering, grafting division.
4. Preparation of nursery beds for sowing of vegetable seeds.
5. Preparation of compost with kitchen waste.
6. Visit to a commercial nursery in the locality and adjoining areas.

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**Government Degree College, Siddipet (Autonomous)**

**Faculty of Science**

**Department of Botany**

**Certificate Course**

**Roof Garden Techniques**

***Theory Model Question Paper***

Time: 30Min

Max Marks: 20

Section-A

I.

Multiple choice questions.

10X1=10M Section-B

II. Fill in the blank questions.

10X1=10M

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Scheme of Examination

1. Theory Examination

20Marks

2. Internal assignment

5Marks

= 0 =

