Anekant Education of Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

Autonomous

Course Structure for F. Y. B. Sc. BOTANY

Class	Semester	Paper	Title of Paper	Credits
F.Y.B.Sc.	I	BOT 1101	Plant Diversity	02
		BOT 1102	Applications of Botany - I	02
	II	BOT 1201	Angiosperm Morphology	02
		BOT 1202	Applications of Botany - II	02
	Annual	BOT 1203	Practical based on BOT 1101, BOT 1102, BOT 1201 and BOT 1202	04
S.Y.B.Sc.	III	BOT2301	Angiosperms Taxonomy	03
		BOT2302	Plant Physiology	03
	IV	BOT2401	Anatomy and Embryology	03
		BOT2402	Plant Ecology	03
	Annual	BOT2403	Practical based on BOT2301, BOT2302, BOT2401 and BOT2402	04
T.Y.B.Sc.	V	BOT3501	Cryptogamic Botany (Algae, Fungi, Bryophytes and Pteridophytes)	03
		BOT3502	Spermatophyta and Palaeobotany	03
		BOT3503	Cell and Molecular Biology	03
		BOT3504	Industrial Botany	03
		BOT3505	Biostatistics	03
		BOT3506	Research Methodology	03
	VI	BOT3601	Plant Physiology and Biochemistry	03
		BOT3602	Plant Biotechnology	03
		BOT3603	Genetics and Plant Breeding	03
		BOT3604	Plant Pathology	03
		BOT3605	Pharmacognosy	03
		BOT3606	Botanical Techniques	03
	Annual	BOT3607	Practical based on BOT3501 to BOT3506	04
	Annual	BOT3608	Practical based on BOT3601 to BOT3606	04
	Annual	BOT3609	Project	04

SYLLABUS (CBCS) FOR F. Y. B. Sc. BOTANY (w.e. from June, 2019)

Academic Year 2019-2020

Class : **F. Y. B. Sc. (Semester - I)**
Paper Code: **BOT 1101**
Paper : **I** Title of Paper : **Plant Diversity**
Credit : 2 No. of lectures: 36

A) Learning Objectives:

1. To create awareness of plant diversity
2. To give idea of economic importance of cryptogams and phanerogams

B) Learning Outcome:

Conservation of Biodiversity. Producing experts in identification of cryptogams and phanerogams.

Credit - I (18 L)

Unit - 1

1.1 **Introduction** : General outline, scope and importance of study of plant kingdom, Awareness and need of conservation (3L).

1.2 **Algae** : Introduction, habitat, thallus diversity, pigments, reserve food and types of reproduction, Classification with reasons according to Chapman and Chapman (1973), Life cycle patterns of *Spirogyra* and *Sargassum.* Economic importance of algae (7L).

Unit - 2

2.1 **Fungi** : General characters, thallus structure, mode of nutrition and types of reproduction, pathogenic importance of fungi, Classification with reasons according to G. C. Ainsworth (1973), Life cycle patterns of *Rhizopus* and *Puccinia*. Economic importance of fungi (6L)

2.2 **Lichens** : General characters, and Types of Lichens on the basis of thallus morphology. Economic importance of lichens. (2L)

Credit - II (18 L)

Unit - 3

3.1 **Bryophytes** : Occurrence and Salient features, Classification with reasons according to G.M. Smith (1955), Life cycle patterns of *Riccia* and *Funaria*. Economic importance of Bryophytes (4L)

3.2 **Pteridophytes** : Occurrence and Salient features, Classification with reasons according to K. R. Sporne (1975), Life cycle patterns of *Equisetum* and *Adiantum*. Economic importance of Pteridophytes (5L)

Unit - 4

4.1 **Gymnosperms** : Occurrence and Salient features, Classification with reasons according to Chamberlain (1934), Life cycle patterns of *Cycas* and *Pinus*. Economic importance of Gymnosperms (6L)

4.2 **Angiosperms** : Occurrence and General characters, means of evolutionary success of Angiosperms, comparative account of monocotyledons and dicotyledons (3L)

References :

1. Brodie J. and Lewis J. (2007) : (Ed.) Unravelling the algae: the past, present and future of algal systematics. CRC press, New York, pp 335.
2. Bellinger E.G. and Sigee D.C. (2010) : Freshwater algae: Identification and use as bioindicators, Willey-Blackwell, UK, pp. 271.
3. Cole K.M. and Sheath R.G. (1990) : Biology of the red algae. Cambridge University Press.USA. pp. 503.
4. Desikachary T.V. (1959) : Cyanophyta. ICAR, New Delhi.
5. Graham L.E. and Wilcox L.W. (2000) : Algae. Penticce-Hall,Inc, pp. 640
6. Krishnamurthy V. (2000) : Algae of India and neighboring countries I. Chlorophycota, Oxford & IBH, New Delhi.
7. Lee R.E. (2008) : Phycology. Cambridge University Press, pp.547
8. Misra J.N. (1996) : Phaeophyceae in India. ICAR, New Delhi.
9. Prescott G.W. (1969) : The algae.
10. Smith G.M. (1950) : The fresh water algae of the United States, Mc-graw Hill New York.
11. Srinivasan K.S. (1969) : Phycologia India. Vol. I & II, BSI, Calcutta.
12. Das Dutta and Gangulee. College Botany Vol I, Central Book Depot.
13. Vashista B.R, Sinha A.K and Singh V.P. (2005) : Botany for degree students –Algae, S.Chand's Publication.
14. Ainsworth, Sussman and Sparrow (1973) : The fungi. Vol IV A & IV B. Academic Press.
15. Alexopolous C.J., Minms C.W. and Blackwell M. (1999) : (4th edn) Introductory Mycology. Willey, New York, Alford R.A.
16. Deacon J.W. (2006). Fungal Biology (4th Ed.) Blackwell Publishing, ISBN. 1405130660.
17. Kendrick B. (1994). The fifth kingdom (paperback), North America, New YorkPublisher: 3rd edn, ISBN- 10: 1585100226.
18. Kirk et al. (2001) : Dictionary of fungi, 9th edn, Wallingford: CABI, ISBN: 085199377X.
19. Mehrotra R.S. and Aneja K.R. (1990) : An introduction to mycology. New Age Publishers, ISBN 8122400892.

20. Miguel U., Richard H., and Samuel A. (2000) : Illustrated dictionary of the Mycology. Elvira Aguirre Acosta, Publisher: St. Paul, Minn: APS press, ISBN 0890542570.
21. Webster J. and Rpland W. (2007) : Introduction to fungi (3rd Edn) Cambridge University Press, 978-0-521-80739-5.
22. Dube H.C. (2004) : An Introduction to fungi. Vikas Publishers.
23. Sharma O.P. (2010) : A text book of fungi. S.Chand's Publication.
24. Vashista B.R and Sinha A.K (2008) : Botany for degree students – Fungi, S.Chand's Publication.
25. Cavers F. (1976) : The interrelationships of the Bryophytes. S.R. Technic, Ashok Rajpath, Patana.
26. Chopra R.N. and Kumar P.K. (1988) : Biology of Bryophytes. John Wiley & Sons, New York, NY.
27. Kashyap S.R. (1929) : Liverworts of the Western Himalayas and the PunjabPlain. Part 1, Chronica Botanica, New Delhi.
28. Kashyap S.R. (1932) : Liverworts of the Western Himalayas and the PunjabPlain (illustrated): Part 2. Chronica Botanica, New Delhi.
29. Parihar N.S. (1980) : Bryophytes: An Introduction to Embryophyta. Vol I. Central Book Depot, Allahabad.
30. Prem Puri (1981) : Bryophytes: Morphology, Growth and Differentiation. Atma Ram and Sons, New Delhi.
31. Udar R. (1975) : Bryology in India. Chronica Botanica, New Delhi.
32. Udar R. (1970) : Introduction to Bryophytes. Shashidhar Malaviya Prakashan. Lucknow.
33. Watson E.V. (1971) : Structure and Life of Bryophytes. 3rd Edn. Hutchinson University Library, London.
34. Vashista B.R., Sinha A.K., Kumar A. (2008) : Botany for degree students – Bryophyta, S.Chands Publication.
35. Agashe S.N. (1995) : Paleobotany. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
36. Arnold A.C. (2005) : An Introduction to Paleobotany. Agrobios (India). Jodhpur.
37. Eames E.J. (1983) : Morphology of Vascular Plants. Standard University Press.
38. Rashid A. (1999) : An Introduction to Pteridophyta. Vikas Publishing House Pvt. Ltd. New Delhi.
39. Sharma O.P. (1990) : Textbook of Pteridophyta. MacMillan India Ltd. Dehi.
40. Smith G.M. (1955) : Cryptogamic Botany Vol II. McGraw Hill.
41. Sporne K.R. (1986) : The morphology of Pteridophytes. Hutchinson University Library, London.
42. Stewart W.N. and Rothwell G.W. (2005) : Paleobotany and the Evolution of Plants. 2nd Edn. Cambridge University Press.
43. Vashista B.R., Sinha A.K., Kumar A. (2008) : Botany for degree students – Pteridophyta, S.Chands Publication.
44. Gangulee and Kar (2006) : College Botany. New Central Book Agency.

45. Sundar Rajan S. (1999) : Introduction to Pteridophyta. New Age International Publishers, New Delhi.
46. Surange K.R. (1966) : Indian Fossil Pteridophytes. CSIR., New Delhi.
47. Parihar N.S. (1976) : Biology and Morphology of Pteridophytes. Central Book Depot.

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Class : **F. Y. B. Sc. (Semester - I)**
Paper Code : **BOT 1102**
Paper : **II** Title of Paper : **Applications of Botany - I**
Credit : 2 No. of lectures : 36

A) Learning Objectives:

1. To create awareness about industrial applications of Botany
2. To provide technical knowledge of floriculture and nursery industries.

B) Learning Outcome:

Development of enterprisers and inculcate business oriented culture.

Credit - I

Unit - 1 (16L)

2.1 **Introduction to Industrial Botany :** Concept of Industrial Botany. Plant resources and industries : Food, fodder, fibers, medicines, timber, dyes, gum, tannins. (Two examples of each resource and the relevant industries). **(2L)**

2.2 **Floriculture Industry :** Introduction to floriculture. Important floricultural crops, open cultivation practices, harvesting and marketing of Tuberose. Greenhouse technology : Concept, advantages and limitations. Cultivation practices (greenhouse technology), harvesting and marketing of *Gerbera.* **(6L)**

2.3 **Plant Nursery Industry :** Concept and types of nurseries : ornamentals, fruit plants, medicinal plants, vegetables, orchids, forest nursery w.r.t. infrastructure, outputs, commercial applications. Propagation methods : Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting : Stem, Layering : Air layering, Grafting : Stone grafting and Approach grafting, Budding : T-budding). **(8L)**

Credit - II

Unit - 2 (20L)

2.1 **Plant Tissue Culture Industry :** Concept, culture techniques : Types of explants, preparation of media, methods of sterilization, inoculation techniques, incubation and hardening. Commercial significance (**6L)**

2.2 **Agri Industries :** Organic Farming : Concept and need, types of organic fertilizers, advantages and limitations. Seed industries: Importance of seed industries, seed production, seed processing and seed marketing with reference to cotton. Major seed industries and corporations of India. **(8L)**

2.3 **Mushroom Industries :** Mushroom cultivation : Plant resources, cultivation practices of oyster and button mushroom, uses of mushrooms, value added products, commercial significance. **(6L)**

References:

1. Verma V. (2013) : Textbook of Economic Botany, Ane Books Pvt. Ltd.
2. Kochhar S. L. (2012) : Economic Botany in the Tropics, , Macmillan Publisher.
3. Gerald E. Wickens (2001) : Economic Botany: Principles and Practices, Springer Publication.
4. Gurcharan Singh Randhawa and Amitabha Mukhopadhyay (1986) : Floriculture in India, Allied Publishers.
5. Debashish Sengupta and Raj Kamal (2009) : Floriculture Marketing in India, , Excel Books.
6. Floriculture Hand Book, Eiri, Engineers India Research in Publication.
7. John Mason (2004) : Nursery Management, Landlinks Press Publisher.
8. Ray, P.K. (2012) : Plant Nursery Management: How to Start and Operate a Plant Nursery, Scientific Publishers.
9. Razdan M. K. (2017) : Introduction to Plant Tissue Culture (2/e), Science Publishers.
10. Vasil K. (1994) : Plant Cell and Tissue Culture, Indra, (Eds. - Indra K. Vasil, Trevor A. Thorpe), Springer Publication.
11. The Complete Book on Organic Farming and Production of Organic Compost (2008) : NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc.
12. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farming (Ann Larkin Hansen) (2010) : Storey Publications.
13. Hand Book of Mushroom Cultivation, Processing and Packaging (2007) : Engineers India Research In Publishers
14. Paul Stamets (2011) : Growing Gourmet and Medicinal Mushrooms, Ten Speed Press Publishers
15. Amarjit S. Basra (2006) : Handbook of Seed Science And Technology: Seed biology, Production, and Technology, Food Products Press publishers.

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Class : **F. Y. B. Sc. (Semester - II)**
Paper Code : **BOT 1201**
Paper : **I** Title of Paper : **Angiosperm Morphology**
Credit : 2 No. of lectures : 36

A) Learning Objectives:

1. To incarve the external and internal characteristics of flowering plants in mind of students.
2. To create awareness of local flora

B) Learning Outcome:

Development of plant taxonomists and expert in identification of local flora.

Credit - I

Unit - 1 (24L)

1.1 Types and modifications of root, stem and leaf **(5L)**

1.2 **Morphology of Inflorescence** : Types and significance of inflorescence: Racemose (raceme, spike, corymb, umbel, catkin, spadix and capitulum), Cymose (solitary, monochasial, dichasial, polychasial), Special types (Verticillaster, Cyathium, and Hypanthodium). **(5L)**

1.3 **Morphology of Flower** : Parts of typical flower, Types of flower (complete, incomplete), insertion of floral whorls. Floral whorls : Calyx, corolla, perianth, aestivation, modifications of calyx (pappus, petalloid, spurred). Forms of corolla : polypetalous (cruciform and papilionaceous) gamopetalous (infundibuliform, bilabiate), Androecium : structure of stamen, fixation, cohesion and adhesion of anthers; Gynoecium : structure of carpel. Types of placentation. **(10L)**

1.4 **Morphology of Fruit** : Types of fruits : Simple and dry: Achene, Cypsela, Legume, Follicle and Capsule, Fleshy : Drupe, berry, Hespiridium and pepo. Aggregate : Etaerio of berries and Etaerio of follicles. Multiple fruits : Syconus and Sorosis. **(4L)**

Credit - II

Unit - 2 (12L)

2.1 Introduction to internal morphology **(1L)**

2.2 **Types of tissues** : Outline with brief description **(6L)**

Meristematic tissues : Meristem, characters and types based on origin, position and plane of division, functions of meristematic tissues.

Vascular tissues : Components of xylem and phloem, types of vascular bundles, functions of vascular tissues.

Epidermal tissues : Epidermis, structure of typical stomata, trichomes, motor cells, functions of epidermal tissues.

Mechanical tissues : Collenchyma, sclerenchyma and xylem, functions of mechanical tissues.

2.3 **Anatomy** : Introduction, Definition and importance **(2L)**

2.4 **Internal morphology** : Internal morphology of root, stem and leaf of dicot and monocot **(3L)**

References :

1. Gangulee and Kar (2006) : College Botany, New Central Book Agency (P) Ltd. Kolkata
2. Naik V. N. (1994) : Taxonomy of Angiosperms, , , Tata Mc Graw Hill Publishing Comp., New Delhi
3. Dutta S. C. (1988) : Systematic Botany, Wiley Eastern Ltd., New Delhi
4. Gangulee, Das and Datta (2002) : College Botany, Vol. I., New Central Book Agency, Kolkata.
5. Singh V. and D. K. Jain (2010) : Taxonomy of Angiosperms, Rastogy Publications, Meerut.
6. B. P. Pandey (2007) : Plant Anatomy, S. Chand and Comp. Ltd. New Delhi.
7. Pandey B. P. (2009) : A Text Book of Botany- Angiosperms, S. Chand and Comp. Ltd. New Delhi
8. Eames J. and L. H & Mc. Daniels (1994) : An introduction to plant anatomy, Tata Mc Graw Hills Publ. Comp. New Delhi.
9. Fahn A. (1974) : Plant anatomy, Pergamon Press Oxford.
10. Esau K. (2006) : Anatomy of seed plants, John Wiley & Sons, New York.
11. Lawrence GHM (2012) : Taxonomy of vascular plant, Scientific Publishers, (India) Jodhpur.
12. Esau K. (1993) : Plant Anatomy, Wiley Eastern Ltd. New Delhi.
13. Eames A.J. (1961) : Morphology of the angiosperms, Mc. Graw Hill, New York.
14. Ashok Bendre & Ashok Kumar (1993) : A Text Book of Practical Botany II, Rastogi Publ., Meerut.
15. Pijush Roy (2006) : Plant Anatomy, New Central Book Agency (P) Ltd. Kolkata.
16. Chandurkar P. J. (1989) : Plant Anatomy, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
17. Dutta A. C. (2003) : Botany for Degree Students,. Oxford University Press, New Delhi.
18. Singh, V., P. C. Pande & D. K. Jain. (2011) : A text book of Botany: Angiosperms, Rastogi publications.

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Class : **F. Y. B. Sc. (Semester - II)**
Paper Code : **BOT 1202**
Paper : **II** Title of Paper : **Applications of Botany - II**
Credit : 2 No. of lectures : 36

A) Learning Objectives:

1. To give knowledge about organic farming and pharmacognosy.
2. To make students experts to setup agro-industry.

B) Learning Outcome:

Produce the agro-industrialist.

Credit - I

Unit - 1 (18L)

1.1 **Bio-fuel Industry :** Introduction and advantages. Concept of biofuel and its need. Plants used for biofuel production. Biodiesel production from Castor. Commercial significance. **(6L)**

1.2 **Bio-pesticide Industry :** Concept of bio-control; Integrated Pest Management (IPM). Importance of bio pesticides. Types of bio pesticides : Indiara, Azadiractin and *Trichoderma*. Commercial significance. **(6L)**

1.3 **Industrial Mycology :** Introduction, Important genera of fungi used in various industries and their products. Products and applications of *Penicillium*, *Aspergillus* and yeast. Commercial significance. **(6L)**

Credit - II

Unit - 2 (18L)

2.1 **Bio-Fertilizer Industry :** Bio fertilizers : concept and need. Types of bio-fertilizers: Nitrogen fixing biofertilizer: *Rhizobium*, Blue green algae. *Anabaena* associated with *Azolla*. Phosphate solubilizing Biofertilizer : Bacteria and Fungi. Commercial significance. **(6L)**

2.2 **Fruit Processing Industry :** Fruit processing: concept and need. Types of fruit preservations. Type of processed products (canned fruits, fruit pulp, squash, jam, jelly, pickle and ketchups). Packing industry. **(6L)**

2.3 **Pharmaceutical Industry :** Concept and advantages. Types of pharmaceutical products: Churna, Asava and Arishta. Drug plants with reference to botanical source, active principles and medicinal uses of *Adhatoda zeylanica*, *Tinospora cordifolia* and *Asparagus racemosus*. Manufacture of *Churna (Triphala churna)*, *Arishta* (*Ashokarishta*) and *Asava* (*Kumariasava*). Concept of nutraceuticals and cosmeceuticals. Commercial importance of Amla and *Aloe*. **(6L)**

References :

1. The Complete Book on Organic Farming and Production of Organic Compost (2008) : NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc.
2. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farming [Ann Larkin Hansen] (2010) : Storey Publications.
3. Deore and Laware (2011) : Liquid Organic Fertilizer: An Approach towards Organic Vegetable Production. LAP LAMBERT Academic Publishing .
4. Kar A, (2008) : Pharmacognosy and Pharmacobiotechnology, New Age international (P) Limited, Publishers (formerly Wiley Eastern Limited).
5. Kokate C.K. (2014) : Practical Pharmacognosy, Vallabh Prakashan, New Delhi.
6. Kokate C.K. Purohit A.P. and Gokhale S.B. (2002) : Pharmacognosy, Nirali Prakashan, Pune.
7. Trease G.E. and Evans. W.C. (1983) : Pharmacognosy, ELBS Twelfth Edition
8. Tyler V.E. Brady L.R. and Robbers J.E. (1976) : Pharmacognosy Lea and Febiger. Philadelphia.8th edition KM Varghese and Co. Mumbai.
9. Vaidya S.S. and Dole V.A. (2001) : Bhaishyajakalpana, Anmol Prakashan, Pune
10. Wallis T.E. (2005) : Text books of pharmacognosy CBS publishers and distributors New Delhi (Latest Edition).
11. Pathak, Khatri, Pathak (2003) : Fundamentals of plant pathology, Agrbios.
12. Mehrotra, R.S. (1991) : Plant Pathology, Tata Mc-Graw Hill Co. Delhi.
13. Chattergee, P. B. (1997) : Plant Protection Techniques, Bharati Bhawan, Publ. Patana
14. Agrios, G.N. (2006) : Plant Pathology, Elsevier Academic Press.
15. Pandey, B.P. (2009) : Plant Pathology, S. Chand Co.
16. Gupta, G.P. (2004) : Text book of plant diseases, Discovery Publ. House, New, Delhi
17. Singh, R.S. (2004) : Plant Diseases, Oxford & IBH Publishing Co. Pvt. Ltd., Delhi.
18. Zhiqiang A. N. (2004) : Handbook of Industrial Mycology. CRC Press
19. Gary Leatham (1993) : Frontiers in Industrial Mycology. Springer
20. Sueli Rodrigues; Fabiano Andre Narciso Fernandes (2012) : Advances in Fruit Processing Technologies. CRC Press
21. Hui. Y. H. (3008) : Handbook of Fruits and Fruit Processing John Wiley & Sons, 04-Aug-2008.
22. A.C. Gaur (2010) : (Biofertilizers in Sustainable Agriculture. IARI, New Delhi
23. The Complete Technology Book on Biofertilizer and Organic Farming. (2013) : NIIR Board.

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Class : **F. Y. B. Sc. (Annual)**
Paper Code : **BOT 1203**
Paper : - Title of Paper : **Practical Course**
Credit : 4 No. of Practicals : 22

A) Learning Objectives :

1. To give knowledge of handling of microscope and identification of lower and higher plants.
2. To give hands-on training of production of agroproducts.

B) Learning Outcome:

Creation of expert technologist and biodiversity conservator

1. Study of *Spirogyra* 1P
2. Study of *Rhizopus* 1P
3. Study of Lichen diversity 1P
4. Study of *Riccia* 1P
5. Study of *Equisetum* 1P
6. Study of *Cycas* 1P
7. Modifications of root and stem 1P
8. Study of leaf (types: simple and compound; sessile and petiolate; venation: parallel and reticulate and modifications) 1P
9. Study of Inflorescence a) Racemose: Raceme, Spike, Spadix, Catkin, Umbel and Capitulum. b) Cymose: Solitary cyme, Uniparous cyme: helicoid and scorpiod, Biparous cyme and Multiparous cyme. c) Special type: Verticillaster, Hypanthodium and Cyathium 1P
10. Study of flower with respect to Calyx, Corolla and Perianth 1P
11. Study of flower with respect to Androecium and Gynoecium 1P
12. Study of fruits with suitable examples : Simple fruit: fleshy - Berry and Drupe; Dry: Achene, Cypsella and Legume Agrregate fruit: Etaerio of follicles and Etaerio of Berries. Multiple fruit: Syconus and Sorosis 1P
13. Study of internal primary structure of dicotyledonous root, stem and leaf. e.g. Sunflower 1P
14. Study of internal primary structure of monocotyledonous root, stem and leaf. e.g. Maize 1P
15. Study of plant resources in industries: fodder, fiber, medicine & gum 1P
16. Study of artificial plant propagation : Stem cutting (demonstration of three subtypes), Air Layering, Approach grafting, and T- budding 1P
17. Study of plant tissue culture techniques : Demonstration of various stages 1P
18. Cultivation of Oyster mushroom and demonstration of value added mushroom products 1P
19. Preparation of Biopesticide : Azadiractin 1P
20. Study of industrially important fungi and their products : *Ganoderma*: *Ganoderma* tablets, *Aspargillus* : citric acid; *Yeast*: Bakery products; *Penicillium*: Penicillin 1P

21. Preparation of Biofertilizer - Compost and applications of microbial biofertilizers. 1P
22. Preparation of Jam, Squash and Amla Candy 1P
23. A) One botanical excursion to study plant diversity - Botanical garden or Local area

    B) Visit to one of the industries : Floriculture unit / Greenhouse / Pharmaceutical industry / Nursery / Mushroom cultivation unit. (Study / visit report is compulsory).

(Note: Visits mentioned in the practical No. 23 (A & B) are compulsory. It carries 10 marks at the time of annual practical examination.)