

**Deccan Education Society's  
FERGUSON COLLEGE, PUNE  
(AUTONOMOUS)**

**SYLLABUS UNDER AUTONOMY**

**FIRST YEAR B.Sc.  
SEMESTER – I**

**SYLLABUS FOR F.Y. B.Sc. BOTANY**

**Academic Year 2016-2017**

Deccan Education Society's  
FERGUSSON COLLEGE, PUNE  
**Scheme of Course Structure (Faculty of Science)**

**Department of Botany**

<b>Particulars</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>No. of Credits</b>
F.Y. B.Sc. Semester I	BOT1101	Plant Diversity	2
	BOT1102	Plant Resources: Management And Utilization	2
	BOT1103	Botany Practical - I	2
F.Y. B.Sc. Semester II	BOT1201	Morphology And Anatomy	2
	BOT1202	Plant Resources: Management And Utilization	2
	BOT1203	Botany Practical - II	2

PAPER CODE: **BOT1101**  
PAPER –I: **PLANT DIVERSITY**  
[Credit -2: No. of Lectures 36]

	<b>Title and Contents</b>	<b>No. of Lectures</b>
Unit -I	<b>Introduction:</b> 1.1 System of classification I. Two Kingdom classification according to Carlous Linaseus (1758) II. Three Kingdom classification according to Earnst Haeckel (1866) III. Five Kingdom classification according to Robert H. Whittaker (1969) 1.2 General outline of plant kingdom.	3
Unit -II	<b>Algae:</b> 2.1 Range of habit diversity. 2.2 Methods of reproduction. 2.3 Outline classification according to G.M. Smith (1955) up to classes with reasons. 2.4 Life cycle of <i>Spirogyra</i> .	5
Unit –III	<b>Fungi:</b> 3.1 Range of habit diversity. 3.2 Methods of reproduction. 3.3 Outline classification according to G.M. Smith (1955) up to classes with reasons. 3.4 Life cycle of <i>Cystopus (Albugo)</i> .	5
Unit –IV	<b>Lichens:</b> 4.1 Types of Lichens on the basis of thallus morphology. 4.2 Methods of reproduction. 4.3 Internal organization of thallus in <i>Parmelia</i> .	2
Unit –V	<b>Bryophytes:</b> 5.1 Range of habit diversity. 5.2 Methods of reproduction. 5.3 Outline classification according to G.M. Smith (1955) up to classes with reasons. 5.4 Life cycle of <i>Riccia</i>	5
Unit –VI	<b>Pteridophytes:</b> 6.1 Range of habit diversity. 6.2 Methods of reproduction. 6.3 Outline classification according to G.M. Smith (1955) up to classes with reasons. 6.4 Life cycle of <i>Nephrolepis</i> .	6
Unit –VII	<b>Gymnosperms:</b>	6

	7.1 Range of habit diversity. 7.2 Methods of reproduction.  7.3 Outline classification according to Chamberlain (1934) up to classes with reasons. 7.4 Life cycle of <i>Cycas</i> .	
Unit –VIII	<b>Angiosperms:</b> 8.1 Range of habit diversity. 8.2 Methods of reproduction. 8.3 Outline classification according to Bentham and Hooker (1883) up to classes with reasons. 8.3 Life cycle pattern in angiosperm.	4

**References:**

1. Brodie J. and Lewis J- Unravelling the algae: the past, present and future of algal systematics.
2. Bellinger E.G. and Sigeo D.C- Freshwater algae: Identification and use as bioindicators,
3. Cole K.M. and Sheath R.G - Biology of the red algae.
4. Desikachary T.V. - Cyanophyta.
5. Graham L.E. and Wilcox L.W- Algae.
6. Krishnamurthy V- Algae of India and neighboring countries I. Chlorophycota.
7. Lee R.E- Phycology.
8. Misra J.N - Phaeophyceae in India.
9. Prescott G.W- The algae.
10. Smith G.M -The fresh water algae of the United States.
11. Srinivasan K.S -Phycologia India. Vol. I & II .
12. Das Dutta and Gangulee -College Botany Vol I.
13. Vashista B.R, Sinha A.K and Singh V.P. Botany for degree students – Algae.
14. Ainsworth, Sussman and Sparrow -The fungi. Vol IV A & IV B.
15. Alexopolous C.J., Minms C.W. and Blackwell M - Introductory Mycology.
16. Deacon J.W - Fungal Biology .
17. Kendrick B- The fifth kingdom
18. Kirk et al.- Dictionary of fungi.
19. Mehrotra R.S. and Aneja K.R - An introduction to mycology.
20. Miguel U., Richard H., and Samuel A -Illustrated dictionary of the Mycology.
21. Webster J. and Rpland W- Introduction to fungi .
22. Dube H.C - An Introduction to fungi.
23. Sharma O.P - A text book of fungi.
24. Vashista B.R and Sinha A.K- Botany for degree students – Fungi, S.Chand's Publication.
25. Cavers F- The interrelationships of the Bryophytes.
26. Chopra R.N. and Kumar P.K - Biology of Bryophytes.
27. Kashyap S.R. - Liverworts of the Western Himalayas and the Punjab Plain. Part 1

28. Kashyap S.R.- Liverworts of the Western Himalayas and the Punjab Plain (illustrated): Part 2.
29. Parihar N. -.Bryophytes: An Introduction to Embryophyta. Vol I.
30. Prem Puri - Bryophytes: Morphology, Growth and Differentiation.
31. Udar R. Bryology in India.
32. Udar R.- Introduction to Bryophytes.
33. Watson E.V - Structure and Life of Bryophytes.
34. Vashista B.R., Sinha A.K., Kumar A -Botany for degree students – Bryophyta.
35. Agashe S.N - Paleobotany.
36. Arnold A.C - An Introduction to Paleobotany.
37. Eames E.J - Morphology of Vascular Plants.
38. Rashid A - An Introduction to Pteridophyta.
39. Sharma O.P - Textbook of Pteridophyta.
40. Smith G.M -Cryptogamic Botany Vol II.
41. Sporne K.R.- The morphology of Pteridophytes.
42. Stewart W.N. and Rothwell G.W - Paleobotany and the Evolution of Plants.
43. Vashista B.R., Sinha A.K., Kumar A- Botany for degree students – Pteridophyta.
44. Gangulee and Kar - College Botany.
45. Sundar Rajan S - Introduction to Pteridophyta.
46. Surange K.R. - Indian Fossil Pteridophytes.
47. Parihar N.S.- Biology and Morphology of Pteridophytes.
48. Pandey. B. P - Plant Anatomy.

PAPER CODE: **BOT1102**

PAPER - II: **PLANT RESOURCES: MANAGEMENT and UTILIZATION**

[Credit -2: No. of Lectures 36]

	<b>Title and Contents</b>	<b>No. of Lectures</b>
Unit -I	<b>Introduction to Plant Resources</b> 1.1 Introduction. 1.2 Plant resources and industries: Food (Wheat & Chick Pea), fodder (Alfa-alfa & Maize), fibres (Cotton & Coir), medicine ( <i>Rauwolfia</i> & <i>Vinca</i> ), timber (Teak & Sisam), dyes (Henna & <i>Bixa</i> ), gum ( <i>Acacia arabica</i> & Guar gum) and tannins ( <i>Acacia catechu</i> & <i>Terminalia chebula</i> ).	5
Unit -II	<b>Plant Nursery Management</b> 4.1 Concept, infrastructure required and types of nurseries. 4.2 Propagation methods: Seed propagation (Seed production, handling, seed collection, storage and viability testing), Vegetative propagation - natural propagation and artificial propagation (Cutting: Stem, Layering: Air layering, Grafting: Stone grafting and Approach grafting, Budding : T-budding)	4
Unit –III	<b>Plant Tissue Culture</b> 5.1 Concept of tissue culture. 5.2 Culture techniques: Types of explants, preparation of media, methods of sterilization, inoculation techniques, incubation and hardening. 5.3 Commercial significance e.g. Banana.	4
Unit –IV	<b>Greenhouse technology</b> 2.1 Introduction, advantages and limitations 2.2 Types of greenhouses 2.3 Greenhouse structure, principle- i) Site selection and orientation; ii) Structure materials; iii) Covering materials; iv) Temperature and humidity control.	6
Unit–V	<b>Floriculture Industry</b> 3.1 Introduction to floriculture. 3.2 Cultivation practices, harvesting and marketing of Rose, <i>Gerbera</i> , <i>Carnation</i> and <i>Chrysanthemum</i> .	6
Unit–VI	<b>Agri - industries</b> 6.1 Organic Farming: Concept, need of organic farming, types of organic fertilizers, advantages and limitations.	6

	6.2 Seed industries: Importance of seed industries, seed dormancy, seed storage: seed banks, factors affecting seed viability, seed testing and certification.	
Unit–VII	<b>Mushroom Cultivation</b> 7.1Mushroom cultivation: Introduction, nutritional and medicinal value of edible mushrooms. 7.2 Cultivation practices of Oyster mushroom, uses of mushrooms.	5

**References:**

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

PAPER CODE: <b>BOT1103</b> PAPER – III: <b>BOTANY PRACTICAL - I</b> [Credit -2: No. of Practical's 10]	
<b>Title of Practical</b>	
1	Study of <i>Spirogyra</i>
2	Study of <i>Cystopus (Albugo)</i>
3	Study of <i>Riccia</i>
4	Study of <i>Nephrolepis</i>
5	Study of <i>Cycas</i>
6	Study of plant resources in industries: food, fodder, fiber, medicine, timber and gum (Two example of each)
7	Study of vegetative plant propagation: tubers, bulbs, rhizomes, corms, suckers and runners.
8	Study of artificial plant propagation: stem cutting, Air Layering, Approach grafting and T- budding
9	Study of plant tissue culture technique: Demonstration of various stages.
10	Cultivation of <i>Oyster</i> mushroom: Demonstration of various stages



Deccan Education Society's  
**FERGUSSON COLLEGE, PUNE**  
**(AUTONOMOUS)**

**SYLLABUS UNDER AUTONOMY**

**FIRST YEAR B.Sc.**  
**SEMESTER – II**

**SYLLABUS FOR F.Y. B.Sc. BOTANY**  
**Academic Year 2016-2017**

**PAPER CODE: BOT1201**  
**PAPER –I: MORPHOLOGY AND ANATOMY**  
 [Credit -2: No. of Lectures 36]

	<b>Title and Contents</b>	<b>No. of Lectures</b>
Unit -I	<p><b>General Organization Of Plant Body</b></p> <p>2.1 Introduction</p> <p>2.2 Organization Of Plant Body</p> <p style="padding-left: 20px;">I. Morphology of Axis- Underground; Root System; Tap root and adventitious root system, Functions of root.</p> <p style="padding-left: 20px;">II. Morphology of Axis - Aerial; Shoot system, functions of stem.</p> <p style="padding-left: 20px;">III. Appendages-Leaf: Parts of typical leaf: petiole, lamina, leaf margins and apices. Types of leaves: Simple and Compound. Leaf venation and phyllotaxy. Functions of leaf.</p>	4
Unit –II	<p><b>Inflorescence</b></p> <p>3.1 Definition and significance</p> <p>3.2 Type</p> <p style="padding-left: 20px;">I. Racemose - raceme, spike, spadix, umbel, and capitulum.</p> <p style="padding-left: 20px;">II. Cymose - solitary, monochasial, Dichasial and polychasial.</p>	4
Unit –III	<p><b>Flower</b></p> <p>4.1 Definition, Parts and symmetry</p> <p>4.2 Thalamus forms- anthophore, androphore, gynophores, carpophores.</p> <p>4.3 Insertion of floral whorls on the thalamus- Hypogynous, Perigynous and Epigynous.</p> <p>4.4 Calyx modifications- Petaloid, Pappus and Spurred.</p> <p>4.5 Corolla forms- cruciform, papilionaceous, infundibuliform and bilabiate ; significance.</p> <p>4.6 Androecium: parts of a stamen, variations; Cohesion- adelphy, syngeny and synandry. Adhesion; epipetalous, epiphyllous and gynandrous.</p> <p>4.7 Gynoecium: parts of a carpel, types- simple and compound, apocarpous and syncarpous; sutures- dorsal and ventral; placentation- definition and types.</p>	12
Unit –IV	<p><b>Fruit :</b></p> <p>5.1 Definition, parts of a fruit.</p> <p>5.2 Classification</p> <p style="padding-left: 20px;">I. Simple- achene, cypsela, legume, follicle, capsule, drupe, berry and hesperidium.</p>	5

	II. Aggregate- : Etaerio of berries and follicles. III. Multiple fruits: Syconus and Sorosis.	
Unit –V	<b>Types of tissue systems:</b> 7.1: <b>Meristmatic tissue system:</b> - Meristem, characters and types based on position and functions. 7.2: <b>Vascular tissues:-</b> Components of xylem and phloem, types of vascular bundles, functions. 7.3: <b>Epidermal tissue system:-</b> Epidermis, structure of typical stomata, trichomes, motor cells; functions. 7.4: <b>Mechanical tissue system:-</b> Collenchyma, sclerenchyma and xylem elements , functions.	6
Unit –VI	<b>Internal Organization of Primary Plant Body:</b> 8.1: Internal structure of dicotyledon and monocotyledon root. 8.2: Internal structure of dicotyledon and monocotyledon stem. 8.3: Internal structure of dicotyledon and monocotyledon leaf.	5

#### References:

1. Gangulee and Kar - College Botany .
2. V N. Naik - Taxonomy of Angiosperms.
3. S. C. Dutta - Systematic Botany
4. Gangulee, Das and Datta - College Botany, Vol. I
5. V. Singh and D. K. Jain - Taxonomy of Angiosperms
6. B. P. Pandey - Plant Anatomy
7. B. P. Pandey - A Text Book of Botany- Angiosperms
8. J. Eames, L.H & Mc. Daniels - An introduction to plant anatomy
9. Fahn , A - Plant anatomy
10. Esau K., John Wiley & Sons- Anatomy of seed plants
11. Lawrence GHM - Taxonomy of vascular plant
12. Esau K - Plant Anatomy
13. Eames A. J - Morphology of the angiosperms
14. Ashok Bendre & Ashok Kumar - A Text Book of Practical Botany II.
15. Pijush Roy - Plant Anatomy .
16. Chandurkar, P. J - Plant Anatomy
17. A. C. Dutta - Botany for Degree Students
18. V. Singh, P. C. Pande & D. K. Jain - A text book of Botany: Angiosperms

PAPER CODE: **BOT1202**

PAPER - II: **PLANT RESOURCES: MANAGEMENT and UTILIZATION**

[Credit -2: No. of Lectures 36]

	<b>Title and Contents</b>	<b>No. of Lectures</b>
Unit -I	<b>Bio-fuel Technology</b> 1.1 Introduction and advantages. 1.2 Concept of bio-fuel and its need. 1.3 Plants used for bio-fuel production. 1.4 Biodiesel production from Castor.	6
Unit -II	<b>Bio-control</b> 2.1 Introduction, sources and advantages 2.2 Important commercial products – Source, preparation and uses of Pyrethins, Azadiractin, Trichoderma, Trichogramma	4
Unit –III	<b>Weed management</b> 3.1 Introduction and need 3.2 Invasive weeds - concept and causes of their dominance 3.3 Weed control – Physical, chemical and biological methods 3.4 Sustainable use of weeds	5
Unit –IV	<b>Industrial Mycology</b> 4.1 Introduction 4.2 Important genera of fungi used in various Industries and their products. 4.3 Products and applications of Ganoderma, Penicillium, Aspergillus and Yeast.	6
Unit –V	<b>Bio-Fertilizers</b> 5.1 Bio fertilizers : concept and need 5.2 Types of bio-fertilizers: Nitrogen fixing biofertilizer: Azotobacter, Rhizobium , Blue green algae, Nostoc, Anabaena, Azolla, Phosphorus degrading bacteria, Potash mobilising bacteria.	6
Unit –VI	<b>Plant resources used in cosmetics, aromatics and pharmaceuticals</b> 6.1 Introduction and scope 6.2 Herbal preparations: Churna, Asava, Arishta, 6.3 Methods of extraction – Maceration, digestion, decoction, aromatic waste, extracts and tinctures 6.4 i) Aloe, ii) Lemon grass, iii) Adathoda, iv) Rose, v) Turmeric, vi) Ginger, vii) Neem, viii) Holy basil, ix) Kuda, x) Amala with reference to part used, products and uses. 6.5 Success story of <i>Artemisia annua</i>	9

**References:**

1. The Complete Book on Organic Farming and Production of Organic Compost, 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 Farm, Ann Larkin Hansen, Storey Publications.
3. Deore and Laware (2011). Liquid Organic Fertilizer: An Approach towards Organic Vegetable Production. LAP LAMBERT Academic Publishing (2011)
4. A Pharmacognosy and Pharmacobiotechnology. New Age international (P) Limited, Publishers (formerly Wiley Eastern Limited)
5. Kokate C.K. Practical Pharmacognosy, Vallabh Prakashan, New Delhi,
6. Kokate C.K. Purohit A.P. and Gokhale S.B. Pharmacognosy, Nirali Prakashan Pune
7. Trease G.E. and Evans. W.C. Pharmacognosy ELBS Twelfth Edition
8. Tyler V.E. Brady L.R. and Robbers J.E. Pharmacognosy Lea and Febiger. Philadelphia. 8th edition KM Varghese and Co. Mumbai,
9. Vaidya S.S. and Dole V.A. Bhaishyajakalpana, Anmol Prakashan, pune
10. Wallis T.E. 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 (Biofertilizers in Sustainable Agriculture. IARI, New Delhi
23. The Complete Technology Book on Biofertilizer and Organic Farming. NIIR PROJECT CONSULTANCY SERVICES.

PAPER CODE: <b>BOT1203</b> PAPER –III: <b>BOTANY PRACTICAL - II</b> [Credit -2: No. of Practicals 10]	
<b>Title of Practical</b>	
1	Study of Inflorescence: Racemose: Raceme, Spike, Spadix, Umbel and Capitulum. Cymose: Solitary cyme, Uniparous cyme: Helicoid and Scorpiod, Biparous cyme and Multiparous cyme.
2	Study of flower with respect to Calyx, Corolla and Perianth.
3	Study of flower with respect to Androecium and Gynoecium.
4	Study of fruits with suitable examples Simple fruit: I. Fleshy- Berry and Drupe II. Dry: Achene, Cypsella and Legume Aggregate fruit: Etaerio of follicles and Etaerio of Berries Multiple fruit: Syconus and Sorosis.
5	Study of internal primary structure of dicotyledonous root, stem and leaf.
6	Study of internal primary structure of monocotyledonous root, stem and leaf.
7	Study of plant resources used in biopesticides: (Azadiractin & Trichoderma)
8	Observation of weeds with references to Botanical Name, Family, Morphological and Ecological peculiarities: Native- <i>Cyanadon</i> , <i>Euphorbia</i> , <i>Amaranthus</i> . Invasive- <i>Parthenium</i> , <i>Alternanthera</i> , <i>Argemone</i> .
9	Study of industrially important fungi and their products. <i>Ganoderma</i> : Ganoderma tablets, <i>Aspergillus</i> : citric acid; Yeast: Bakery products and <i>Penicillium</i> : Penicillin tablets.
10	Study of types of Bio-fertilizers: <i>Rhizobium</i> , <i>Azotobacter</i> , BGA, <i>Azolla</i> ,