

GUJARAT UNIVERSITY
Ahmedabad



B. Sc. Semester-II
BOTANY MAJOR SYLLABUS
DSC-C- BOT -121 T (4 Credits)
Based on NEP 2020 Guidelines
Effective from June - 2024

Core course (CC)	Botany Theory	Botany Practical
Paper No.	DSC-C-BOT 121 T	DSC-C- BOT -122 P (Part A/ Session-I + Part B/ Session-II)
Credit	04 Credit	04 Credit
Teaching hours/ week	04 Hours	08 Hours (Part A-04 hours + Part B-04 hours)
Examination (External + Internal)	100 Marks	100 Marks
Semester end External Examination	50 Marks	50 Marks (Part A-25 Marks + Part B-25 Marks)
Internal Exam	50 Marks [25 (Written test) 25 (Assignment, Seminar/Quiz, Attendance)]	50 Marks (Part A-25 Marks + Part B-25 Marks) [25 (Written test) 25 (Project, Attendance)]
Semester end External Examination duration	2 Hours	6Hours Part A- 3hours + Part B -3hours

Detailed Curriculum has been designed as per NEP-2020 semester system.

There shall be one theory papers having four units each and one practical paper in semester.

Each practical batch will be of 20 students.

Students must be taken on a Botanical excursion / Field Trip or visit to a Research Academic Institute, Science / Space exhibition, Participation in science based seminars to enhance the study experience.

Students must record the laboratory work done in a journal. The journal is to be certified by the Teacher in-charge and Head of the department.

Duly certified journals have to be produced while appearing at the time of university exam.

Project work should be in tune with the syllabus and the presentation will carry due weight-age.



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Unit –1 Indian Knowledge System in Botany- I:

15 hours

- Indian contribution to science and technology in the pre-independence era
- Inspiring lives of scientists: Dr. H.G. Khorana, Sir J. C. Bose, P. Maheshwari, Birbal Sahni, E. K. Janaki Ammal, M. S. Swaminathan
- Vedic classification of plants ; Parasher's classification
- Parts of a plant as per Indian knowledge system
- Plants in religious beliefs
- Food and medicinal plants in ancient India: Name, family, useful part, brief description, important chemical constituents if any, climate and cultivation (only for cereals and oil seeds) and uses of the following plants cultivated in India since ancient times: Cereals- Wheat, Rice
- Oil seeds- Ground Nut
- Medicinal plants- Guggal, Neem, Brahmi and Ashwagandha

Unit-2 Plant Morphology, Horticulture and gardening.

15 hours

Plant Morphology

- Phyllotaxy and Types of leaves
- Types of stipules and their modifications
- Bracts: Scaly, Involucral, Foliaceous, Petaloid and Spathe
- Inflorescence: Racemose – Raceme, Spike, Catkin, Spadix, Umbel, Capitulum
Cymose – Solitary: terminal and axillary, Uniparous, Biparous, Multiparous cymes.
- Types of Flowers based on position of ovary
- Aestivation and Placentation
- Study plant family: Malvaceae, Amaryllidaceae- Classification with reasons as per Bentham and Hooker, General features, Floral formula and examples of at least two important plants with scientific names

Horticulture and Gardening

- Horticulture: Definition, Scope and Branches
- Gardening: Introduction, Uses of Gardens, Types of Gardens (Kitchen, Water and Vertical Gardens)

- Garden Equipments: Sprinkler, Hoe, Scissors, Hose pipe, Watering can
- Names and flowering times of 5 ornamental flowering trees, shrubs, foliage,climbers
- Asexual plant reproduction-Cutting, Layering

UNIT –3 Bryophytes, Pteridophytes, Gymnosperms 15 hours

To acquaint students with lower and higher groups of plants (Cryptogams, Phanerogams).

- General account: Habit and habitat of Bryophytes, Pteridophytes, Gymnosperms.
- Life history of the following Bryophyte genus including morphology and reproduction excluding development: (Classification as per G. M. Smith)

Riccia

- Life history of the following Pteridophyte genus including morphology and reproduction, excluding development (Classification according to G. M. Smith)

Nephrolepis

- Life history of the following Gymnosperm genus including morphology and reproduction, excluding development (Classification according to Sporne)

Cycas

UNIT –4 Biotechnology: Principles, techniques and Applications 15 hours

- To acquaint students with Biotechnological science
- Introduction, Brief History, Scope and Types of Plant Biotechnology
- Basic Plant tissue culture technique
- Recombinant DNA technology
- Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Edible Vaccines from plants
- Cryopreservation and Germplasm storage
- Biofertilizers
- Biopesticides

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Practical Details

Session-A

- 1) Phyllotaxy- Alternate, Opposite, Verticillaster
- 2) Types of leaves
- 3) Types of Stipules & their Modifications
- 4) Types of Bracts- Foliaceous, Involucral, Spathe, Petaloid
- 5) Types of Flowers based on position of ovary-3 types
- 6) Racemose inflorescence- Raceme, Spike, Spikelet, Catkin, Umbel, Capitulum
- 7) Cymose inflorescence – Solitary – Terminal and Axillary; Monochasial- Helicoid and Scorpioid; Dichasial or Biparous and multichasial(-multiparous)
- 8) Aestivation
- 9) Placentation
- 10) and 11) Study of Plant families- *Malvaceae*, and *Amaryllidaceae* - Classification with reasons, Identifying characters, floral formula, androecium, gynoecium and TS of ovary; botanical and common names of at least two examples.
- 12) Study of cereals, oil plant, medicinal plants as per theory syllabus through specimens, charts or slides
- 13) Study of Garden tools as per theory syllabus through charts, models or slides- Scissors, Hoe, Hose, Watering can, Sprinkler
- 14) Study of five common avenue trees with local names and scientific names- Neem, Piludi, Bardi, Amaltas, Asopalav, by specimen, chart or photographs
- 15) Study of ornamental plants with local names and scientific names- Hibiscus, Ixora, Vinca, Rose, Galtoro by specimen, chart or photograph
- 16) Study of climber plants with local names and scientific names- Madhumalti, Jasmine, Jacquemontia, Tecoma, Money plant, Bougainvillia by specimen, chart or photograph
- 17) Chart of root cutting-chickoo, stem cutting-dracaena, leaf cutting-Bryophyllum, Basic or general chart of ground and air layering
- 18) Preparation of at least 3 herbarium sheets of available plants

Session-B

Study of Bryophyte classification by Rothmayer chart

- 1) Study of Riccia- Specimen
Permanent slides of Riccia- Thallus V.S., Archegonia, Antheridia, Sporophyte
- 2) Study of Pteridophytes classification by Reimer
- 3) Study of Nephrolepis- Specimen, T.S. of leaflet passing through sori, Mounting of hydathod and rementa, Permanent slides of Nephrolepis- Prothallus, Prothallus with antheridia and archegonia, T.S. of leaflet passing through sori
- 4) Study of Gymnosperms classification by Chamberlain
- 5) Study of Cycas- Plant, Leaf, Male and Female cone, Mounting of pollen grain
Permanent slides- LS of Male cone, Female cone and Ovule
- 6) Study of Layout of Plant Tissue Culture Lab
- 7) Study of PTC Instruments- Digital weighing scale, Oven, Autoclave, pH meter,
Laminar Airflow
- 8) Chart of PTC technique
- 9) Study of Chart of Transgenic plants-DNA Recombination
- 10) Chart of somatic hybridization and Protoplast culture
- 11) Chart of edible vaccine
- 12) Chart of Cryopreservation
- 13) Biopesticides
- 14) Biofertilizers

References:

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- Handbook of Ethnobotany , S.K. Jain, M/s Bishen Singh Mahendra Pal Singh Publication
- Ethnobotany Volume-I, Dr. Sureshkumar, Kojo Press
- Economic Botany – Pandey & Chaddha, Vikas Publishing House Pvt. Ltd. New Delhi.
- Economic Botany – N.S. Subramanyam & A.V.S. SambaMurty, Wiley Eastern Ltd..
- Economic Botany – B.P. Pandey, Chand & Co., New Delhi
- Economic Botany – A.F. Hill & O.P. Sharma, Tata McGraw Hill, New Delhi
- Naik, V.N. 1984. Taxonomy of Angiosperms. Tata McGraw - Hill Publishing Co. Ltd.
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- College Botany Volume-I, B.P. Pandey, S. Chand Publishing
- Systematic botany By R.N. Sutaria , Khdayata Book Depot.

- Gardens – LaeeqFutehally A New Course in Botany – Kumar, Pradhan, Sharma, Sarangdhar, Sheth Publishers, Mumbai.
- ‘Nisarg vandana’: A Handbook of 75 Cultivable trees by Alpana Shukla; published by The Gujarat Institute of Architects and Civil Engineers (GICEA); 2022
- Horticulture and Plant Breeding by V. Kumaresan, Saras Publication
- Botany for degree students, Pteridophytes, B.R. Vashishta et.al. S. Chand & Co Ltd.
- Botany for degree students, Gymnosperms, B.R.Vashishta et.al. S. Chand & Co Ltd.
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- Plant tissue culture, Applications and limitation – Bhojwani S.S.
- Plant cell culture – Collins H. A. & Edwards 1998
- Elements of Biotechnology – Rastogi Publications Molecular Biology- David Freifelder
- Fundamentals Of Molecular Biology – Veer Bala Rastogi.
- An Introduction to Plant Biotechnology – H.S.Chawla, Oxford & IBH publishing Co. Pvt. Ltd. New Delhi, 2008
- Biotechnology- U. Satyanarayana, Books and Allied (P) Ltd. Kolkata, 2008