

GUJARAT UNIVERSITY

Ahmedabad



BOTANY MAJOR SYLLABUS [THEORY AND PRACTICAL] BASED ON NEP 2020 Guidelines

Effective from June - 2024

B. Sc. - BOTANY

Semester –III

Botany Major	Botany Theory	Botany Theory	Botany Practical
Paper No.	DSC-C-231T (A+B)	DSC-C-232T	DSC-C-233 P (Part A / Session-I + Part B / Session-II)
Credit	04 credits	04 credits	4 credits
Teaching hours / week	04 hours	04 hours	08 hours (Part A -04 hours + Part B -04 hours)
Examination marks (External + Internal)	100 marks	100 marks	100 marks (Part A -50 marks + Part B -50 marks)
Semester end External Examination Marks	50 marks	50 marks	50 marks (Part A - 25 marks + Part B - 25 marks)
Internal Exam. Marks.	50 marks [30-(Written Test) 15 (Assignment, Seminar / Quiz , 5 Attendance)]	50 marks [30(Written Test) 115 (Assignment, Seminar/Quiz, 5 Attendance)]	50 marks (Part A -25 marks + Part B -25 marks)
Semester end External Examination Duration	2.5 hours	2.5 hours	10 hours Part A- 5 hours + Part B -5 hours

Core course	Paper BOT - 231 Theory	Paper BOT - 232 Theory	DSC-C-233 P
UNIT-1	Algae	Plant Anatomy	Section - A / Session - I Practicals Based on Theory Paper BOT-201
UNIT-2	Fungi, Lichens, Plant Pathology	Plant Ecology	
UNIT-3	Bryophytes	Plant Embryology	
UNIT-4	Economic Botany	Plant Cell Biology	Section - B / Session - II Practicals Based on Theory Paper BOT-202

- Detailed curriculum has been designed as per semester system.
- There shall be two theory papers having four units each and one practical paper in semester.



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B. Sc. Semester-III

NEP 2020 Syllabus: Effective from June - 2024

BOTANY DSC – C-231 T

[CRYPTOGAMES , PLANT PATHOLOGY & ECONOMIC BOTANY]

Learning Objectives:

- To understand the fundamental concepts of botany and basic knowledge of plant science.
- To study the lower groups of plants like algae as well as fungi and lichens and understand their life cycles.
- To learn economic botany with respect to plant fibres, medicines, essential oils, fruits and vegetables.
- To explore the multidisciplinary aspect of Botany by learning some fundamentals of cell biology, bio chemistry and bio physics
- To understand plant adaptations and nutrition
- To apply the theoretical knowledge in practicals
- To make the student aware of the wide scope of Botany as a Core subject as well as a multi disciplinary subject.

Learning Outcomes

By the end of the course, the students will be able to:

- Comprehend further, the basics of plant sciences and use this to further his/her career
- Remember scientific names and families of economically important plants
- Apply the knowledge of Biochemistry and bio physics and plant and soil analysis
- Logically differentiate between various ecological plant groups based on their adaptations
- learn and understand effective ways for essential oil making
- Apply the understanding of plant anatomy in various day to day exercises
- Enhance the learning of other major subjects

Credits: 04

Teaching Hours: 04 hours / Week

Total Marks : 100 (External 50 + Internal 50) Marks

- 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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SUGGESTED READING : REFERENCE BOOKS / TEXT BOOKS

Teacher may suggest revised or latest published books etc.to the students

1. Pandey, S.N., Trivedi, P.S. and Misra, S.P. 2005. *A Textbook of Botany Vol. I and II*, Vikas Publishing House Pvt. Ltd.
2. Gangulee , H.C , Das, K. S. & Dutta ,C.. *College Botany Vol. I* , New Central book Agency.
3. Gangulee H.C., and Kar, A.K. *College Botany Vol. II*, New Central book Agency.
4. Vashishta, B.R. 2005. *Algae*, S. Chand Publications, New Delhi.
5. Smith, G.M. . *Cryptogamic Botany Vol. I*, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
6. Morris, I. 1986. *An Introduction to the Algae*. Cambridge University press, U.K.
7. Round, F.E. 1986. *The biology of Algae*, Cambridge University Press, U.K.
8. Kumar, H.D. 1988. *Introductory Phycology*. Affiliated East-West Press Ltd., New Delh
9. Webster, J. 1985. *Introduction to Fungi*. Cambridge University Press, U.K.
10. Vashishta, B.R. *Botany for degree student Part II. Fungi*. S. Chand Publications, New Delhi.
11. Mehrotra, R.S. and Aneja, R.S. *An Introduction to Mycology*, New Age Intermediate Press.
12. Alexopoulos, C.J. 1962. *Introductory Mycology*. John Wiley and Sons Inc.
13. Annie and Kumaresan, 2010. *Fungi & Plant Pathology*, Saras Publication
14. Vashishta, B.R. *Botany for degree student- Bryophytes*, S. Chand Publications, New Delhi.
15. Parihar, N.S. 1991. *Bryophyta*. Central Book Depot, Allahabad, India.
16. Puri, P. 1980. *Bryophytes*. Atmaram and Sons., Delhi, India.
17. Sen, S. 1992. *Economic Botany*, New Central Book Agency, Calcutta.
18. Verma, V. 1974. *A Textbook of Economic Botany*, Emcay Publication, New Delhi.
19. Kochar, S.L. 2011. *Economic Botany in the Tropics*, McMillan Publications, New Delhi.
20. Hill, A. 1976. *Economic Botany*, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
21. Bendre, A., Kumar, A. *Economic Botany*, Rastogi Publication, New Delhi. India.
22. Sambhamurthy ,A.V.S.S & Subramanian N.S.: *A textbook of Economic botany*, Wiley eastern ltd, New Delhi



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B. Sc. Semester-III

BOTANY

NEP 2020 Syllabus : Effective from June - 2024

BOTANY DSC – C 232T

[PLANT ANATOMY, ECOLOGY, BIOPHYSICS, BIOCHEMISTRY & CELL BIOLOGY]

Credits: 04

Teaching Hours: 04 hours / Week

Total Marks: 100 (External 50 + Internal 50)

UNIT - I: PLANT ANATOMY .

- Meristems: Characteristics, classification and theories of root - shoot apical meristem.
- Simple Plant tissues: Types, Structure and functions.
- Complex tissues: Xylem and Phloem
- Primary anatomy in the following :
- Dicot stem (**Sunflower**) and Monocot stem (**Maize**)
Dicot root (**Sunflower**) and Monocot root (**Maize**).
- Normal Secondary growth in **Sunflower** stem.
- Non living contents- raphides Colocasia petiole, sphae raphides in Nerium leaf, cystoliths in Ficus leaf

UNIT - II: ECOLOGY :

- Climatic factors- effect and adaptations of light and temperature on organisms
- Remote sensing- Definition, principle, types and applications for ecosystem management.
- Ecological adaptations in Hydrophytes and Xerophytes:
External and Anatomical adaption of Following :
Hydrophytes : *Hydrilla* stem and *Eichhornia* petiole
Xerophytes : *Nerium* leaf and *Opuntia* stem
- Special modes of nutrition in plants – parasite-*Cuscuta*, Saprophytes - *Agaricus*, Symbionts- lichen and root nodules, Insectivores- *Nepenthes*, *Utricularia* and *Drosera*.

UNIT - III: BIOPHYSICS & BIOCHEMISTRY:

- General account of pH and Buffer.
- Protoplasm as a colloidal system.
- Enzymes: Definition, Nomenclature and classification of enzymes.
- Chemical nature of enzymes, Mechanism of enzyme action.
- Factors affecting enzyme activity.
- General account of Secondary metabolites.
- Alkaloids: Definition, types and their importance.

UNIT- IV: CELL BIOLOGY

- Ultrastructure and Function of the following cell organelles :
1. Cell wall 2. Endoplasmic reticulum 3. Ribosomes
4. Nucleus 5. Lysosomes 6. Dictyosomes
- Fluid-mosaic model to study the Structure of plasma membrane



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NEP 2020 Syllabus: Effective from June - 2024

BOTANY DSC – C 232 T

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SUGGESTED READING : REFERENCE BOOKS / TEXT BOOKS

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2. Gangulee , H.C , Das, K. S. & Dutta ,C.. College Botany Vol. I , New Central book Agency.
3. Gangulee , H.C., and Kar, A.K. College Botany Vol. II, New Central book Agency.
4. Esau, K. 2006. Plant Anatomy. Pub John Willey & Sons Inc.
5. Fahn , A. 1990. Plant Anatomy. Pergamon Press, University of Michigan
6. Mc Daniels, Eanes. Plant Anatomy. Pub John Willey & Sons Inc.
7. Pandey, B.P. Plant anatomy , S. Chand Publications, New Delhi.
8. Sharma, P.D. 2001. Ecology and Environment. Rastogi Publication, Meerut.
9. Odum, E.P. 1983. Basic Ecology. Saunders, Philadelphia.
10. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders, Philadelphia.
11. Misra, R.&Puri, G.S. 1968. Indian Manual of Plant Ecology. Oxford & IBH, New Delhi.
12. Stiling, P. Ecology: Theories and application. Harper Collins New York.
13. S.K. Sinha; A textbook of Plant Physiology. Centrum press
14. Taiz and Zeiger; Plant Physiology. Sinauer Associates
15. S N Pandey; B K Sinha; Plant Physiology.
16. Dr. S K Verma and Mohit verma; Plant physiology, Biochemistry and Biotechnology.S Chand.
17. Verma, P. Agarwal S. Cytology. S. Chand and Co.
18. Gunnings, B.E.S. and Steer, M.W. 1996. Plant cell Biology structure & function. Jones Barlett Publishers, Boston, Massachusetts.
19. Smith, B. Hardin, P. The world of the cellPaul, A. Cell and Molecular Biology. Allied Pvt.
20. Roberties, E.D.P ., Cell and molecular biology CBS Publishers & distributors.



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B. Sc. Semester-III

BOTANY

NEP 2020 Syllabus: Effective from June - 2024

BOTANY DSC – C 233 P (Practical)

[PART- A (SESSION - I) BASED ON THEORY PAPER BOT-211]

Credits: 4 (Part -A & B)

Teaching Hours: 08 hrs / Week

Total Marks: 100 (Ext.50 + Int.50)

Session A : (25 internal + 25 External marks)

To study following practicals :

1. To study Algae – *Vaucheria*.

Classification , Mounting of Vegetative thallus. Permanent slides of sexual reproduction organs.

2. To study Algae – *Ectocarpus*.

Classification, Mounting of vegetative thallus, Unilocular and Plurilocular sporangia. Permanent slides of Unilocular and Plurilocular sporangia.

3. To study Algae - *Batrachospermum* .

Classification, Mounting of vegetative thallus, Cystocarp. Permanent slides of antheridia, archegonia and Cystocarp.

4. To study Fungi – *Claviceps*

Classification, Mounting of conidia. Permanent slide of *Claviceps* infected plant, stroma (V.S).

5. To study Fungi – *Puccinia*.

Classification, Mounting of Uredospores and Teleutospores.

Permanent slides of infected host plants, Uredospores, Teleutospores, Pycniospores and Aeciospores.

6. To study Bryophytes – *Marchantia*.

Classification, Specimen of Thallus, reproductive organs. **Sporophyte stage** Permanent slides or charts of V.S. of thallus and reproductive organs.

7. To study Bryophytes- *Funaria* (Moss).

Classification, Mounting: Antheridia, Archegonia, Peristomial teeth. Specimen : *Funaria* gametophyte with sporophyte.

Permanent slides: Antheridia, Archegonia, Sporophyte L.S.

8. To study Economic Botany

As Plant fibres : **1. Cotton** **2. Flax** **3. Coir**

As Vegetables : **4. Cabbage** **5. Bottle Gourd** **6. Potato**

As Fruits : **7. Apple** **8. Mango** **9. Chickoo**

9. As Essential oil : 1. *Eucalyptus* 2. *Jasmine* 3. *Rose*

As Medicinal Plants : **4. *Adhatoda* 5. *Licorice* 6. *Tinospora***

10. Demonstration of essential oil extraction by condensation method

Suggested Readings:

1. Practical Botany vol. I & II By Bendre and Kumar, Rastogi Publication.
2. Practical Botany by S. C. Santra, Chettarjee and Das, New Central Book Agency.
3. Experimental Plant Ecology by Pratim Kapur and Sudha Rani, CBS Publication.



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NEP 2020 Syllabus : Effective from June - 2024

BOTANY DSC – C233P

[PART- B (SESSION - II) BASED ON THEORY PAPER BOT-212]

Credits : 4 (Part -A & B) Teaching Hours: 08 hrs / Week B: Total Marks: 50 (Ext.25 + Int.25)

Session B:

To study following practicals :

1. To study Plant anatomical structure : Shoot and root apex

Permanent slides of shoot apex (*Dictyota* and *Chara*) and root apex.

2. To study Plant anatomical structures: Simple and Complex tissues.

Permanent slides of Parenchyma, Collenchyma, Sclerenchyma and Chlorenchyma
Permanent slides of Xylem, Phloem.

3. To study Primary anatomical structures in:

Permanent slides of **Sunflower** and **Maize** stem T.S

Permanent slides of **Sunflower** and **Maize** root T.S.

To prepare Double stained temporary preparation of **Sunflower** stem T.S. and **Maize** stem T.S. to study all simple and complex tissues

4. To study Normal Secondary growth.

Double stained temporary preparation of **Sunflower** stem T.S. to study normal secondary growth

5. To study External and anatomical ecological adaptation:

Hydrophytes : *Hydrilla* stem and *Eichhornia* petiole.

Xerophytes : *Nerium* leaf and *Opuntia* stem.

6. To study special modes of nutrition in plants as per theory syllabus- by charts, slides or models

7. To study Plant Biochemistry

Determination of pH of various solutions- acidic, alkaline, neutral

Enzyme activity- amylase and Catalase

Demonstration of alkaloid extraction using Soxhlet apparatus

8. To study cell organelles :

Micrograph or charts of Cell wall, Endoplasmic reticulum, Ribosome and Nucleus. Lysosome, Dictyosome and cell membrane model. -Fluid-mosaic model .

Suggested Readings:

1. Practical Botany vol. I & II By Bendre and Kumar, Rastogi Publication.
2. Practical Botany by S. C. Santra, Chettarjee and Das, New Central Book Agency.
3. Experimental Plant Ecology by Pratim Kapur and Sudha Rani, CBS Publication.



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B. Sc. Semester-III

BOTANY

NEP 2020 Syllabus : Effective from June - 2024

BOTANY DSC – C-231 T

PART- A (SESSION - II) BASED ON THEORY PAPER BOT-211]

SKELETON OF UNIVERSITY PRACTICAL EXAMINATION

Date: __ / __ / ____

Exam Hours: 5 Hours

Total Marks: 25

-
- Que. 1 Identify, classify and describe peculiarities of given Specimen **A** and **B**. 10
- Que. 2 Expose the reproductive organ from given specimen **C**. 05
Prepare temporary slide and show it to the examiner.
- Que. 3 Identify and describe the following specimens 08
- (i) Specimen: **D** (Types)
- (ii) Specimen: **E** (Types)
- (iii) Specimen: **F** (Economic Botany)
- (iv) Specimen: **G** (Economic Botany)
- Que. 4 Journal. 02
-
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[PART- B (SESSION - II) BASED ON THEORY PAPER BOT-212]

SKELETON OF UNIVERSITY PRACTICAL EXAMINATION

Date: __ / __ / ____

Exam Hours: 4 Hours 30 min

Total Marks: 25

-
- Que. 1 . Take T. S. and prepare a temporary double stained slide of given specimen **A** and show it to the examiner. (05)
- Que.2. Determine the pH of the given soil sample. (04)
- Que. 3. Identify and describe the following specimens (08)
- i. Specimen: **D** (Chart / Micrograph - Cell biology)
- ii. Specimen: **E** (Chart / Micrograph - Cell biology)
- iii. Specimen: **F** (Special mode of nutrition)
- iv. Specimen: **G** (Ecological adaptation)
- Que.5. Project (8)



GUJARAT UNIVERSITY
B. Sc. Semester-III
BOTANY

Choice Based Credit System (CBCS) Syllabus : Effective from June - 2018

UNIVERSITY THEORY EXAMINATION PAPER PATTERN

B. Sc. Semester – III Theory Examination

Month/ Year _____

BOTANY

Core Course (CC) Paper BOT - 201

[CRYPTOGAMES , PLANT PATHOLOGY & ECONOMIC BOTANY]

Core Course (CC) Paper BOT - 202

[PLANT ANATOMY, ECOLOGY, BIO-CHEMISTRY, BIO PHYSICS & CELL BIOLOGY]

Date: ___ / ___ / ___

Duration : 2.5 hours

Total Marks:50

Instructions:

Que: 1 (A) Unit-1 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 1 (A) Unit-1 Describe / Explain / Write short notes on _____ **05 marks**

Que: 1 (B) Unit-1 Describe / Explain / Write short notes on _____ **05marks**

OR

Que: 1 (B) Unit-1 Describe / Explain / Write short notes on _____ **05 marks**

Que: 2 (A) Unit-2 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 2 (A) Unit-2 Describe / Explain / Write short notes on _____ **05 marks**

Que: 2 (B) Unit-2 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 2 (B) Unit-2 Describe / Explain / Write short notes on _____ **05 marks**

Que: 3 (A) Unit-3 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 3 (A) Unit-3 Describe / Explain / Write short notes on _____ **05 marks**

Que: 3 (B) Unit-3 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 3 (B) Unit-3 Describe / Explain / Write short notes on _____ **05marks**

Que: 4 (A) Unit-4 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 4 (A) Unit-4 Describe / Explain / Write short notes on _____ **05 marks**

Que: 4 (B) Unit-4 Describe / Explain / Write short notes on _____ **05 marks**

OR

Que: 4 (B) Unit-4 Describe / Explain / Write short notes on _____ **05 marks**

Que: 5 Write your answer in short : (each sub-question carry 01 marks)_____ 10 marks

Set 14 Sub-Questions as (a),(b) ,(c)..to (n) **or**(i) ,(ii),(iii) ,...to (xiv) from

Unit-1 (3 or 4 que.) , **Unit-2** (3 or 4 que.) , **Unit-3** (3 or 4 que.) , **Unit-4** (3 or 4 que.)