HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN - 384 265

FACULTY OF SCIENCE

B.Sc. BOTANY

Semesters: IV

SYLLABUS

Curriculum as per UGC Guideline

With Semester/CBCS/Grading Pattern

With effect from June - 2021 (and thereafter)

DATE: June, 2021 **TOTAL PAGE: 19**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN - 384 265.

U.G. (B.Sc.) Programme

CBCS:: Semester :: Grading Pattern

With effect from: June - 2021

FACULTY OF SCIENCE

Subject: BOTANY

B. Sc. Semesters: IV

Total Pages: 01 to 19

Submitted on
Date: /06/2021

SUMMARY OF THE PROGRAMME

Summary of the Programme	
✓ Syllabus duration	Semester pattern i.e., **Six** months
✓ *No. of core compulsory (CC) course*	***02*** *(in each semester)*
✓ *Credits per CC course*	*03*
✓ *Total credits for CC course*	***06****/Semester*
✓ *Theory lectures per CC course*	*03 /week*
✓ *Total Theory lectures for CC course*	*06 /week*
✓ No. of Practical courses per semester	**02**
✓ Practical lectures	03 /week/course/batch
✓ Total Practical lectures	06 /week/ batch
✓ Credits per Practical course	**1.5**
✓ Total Credits of Practical course	**03** /Semester
✓ No. of Practical course (in Uni. Exam.)	**02** /Semester
✓ No. of Elective Subjective (ES) course	**01** (in each semester)
✓ Credits for ES course	**02** (in each semester)
✓ Theory lectures per ES course	02/week
✓ No. of Elective Generic (EG) course	**01**
✓ Credits for EG course	**02**
✓ Theory lectures per EG course	02/week
✓ Examination (including Preparation)(weeks)	05
✓ No. of Days per week	06
✓ Weeks (days) available for Teaching	**15** (90)
✓ Duration of each lecture (minutes)	55
✓ No. of students/batch	**20** (on approval of AC and Exam. unit)

Under Choice **B**ased **C**redit **S**ystem-Semester-Grading System pattern

U G (B. Sc.) Programme in Botany

Semester - IV

Salient Features:

- CBCS in UG programme in **Botany Semester IV shall** be offered from the Academic year **June 2021**.
- Botany subject in the Universities/Affiliated Colleges shall offer undergraduate programme in Faculty of Science from the Academic year 2021-22.
- A student will have to get enrolled a **Core course** depending upon his/her requirement of a degree in the said discipline of study. A student will have a choice of selecting an **Elective** as well as **Foundation** courses from a pool of courses.
- Each course shall be assigned a specific number of **Credits**.
- A Core course is the course which should compulsorily be studied by a candidate as a Core requirement so as to get degree in a said discipline of study.
- There shall be **Two Core Compulsory** courses (Theory) each with **3 credits** in each semester and their practical's each with **1.5 credits**. Thus, a credit weight-age in **B.Sc.** programme for each semester core course shall be of **6 credits**. In short, **9** credits multiplied by **2** subjects equal to total of **18 credits**.
- In addition to the Core courses, a student will have to choose Elective as well as Foundation courses from a pool of courses.
- **Two** courses of **Elective**, one each from **Generic Elective** and Interdisciplinary / Multidisciplinary / **Subject centric electives** shall have to be offered. The credit weight-age for each Elective course shall be of **02 Credits**. Hence, a total credit weight-age for Elective courses shall be of **4 credits**.
- One **Foundation** (English Language L.L.) course shall have to be offered. The credit weight-age for Foundation course shall be of **02 credits**.
- Each course shall have a unique Course code. The Core courses, Elective courses and the Foundation courses shall be abbreviated respectively as **CC, PC, EG, ES and FC.**

1. Core Compulsory **CC**

   Practical Core (Core Elective) **PC**
2. Elective Generic **EG**

   Elective Subject **ES**
3. Foundation Compulsory **FC**

- Each Academic year shall consist of **two** semesters, each of **15weeks** of teaching equivalent to 90 working days. The Odd semester period shall be from **July to November** and the Even semester period shall be from **December to April**.
- The course with **4 credits** shall be of **60 hrs** (15 weeks x 4 credits) duration. The course with **3 credits shall** be of **45 hrs** (15 weeks x 3 credits) duration. The course with **2 credits** shall be of **30 hrs** (15 weeks x 2 credits) duration.
- **A general framework for Bachelor of Science (B.Sc.) programme shall be as follows:**

Semester wise credits						**Total credits of the Programme**
I	**II**	**III**	**IV**	**V**	**VI**	
24	24	24	24	24	24	**144**

- **The semester wise weight age of core, elective and foundation courses shall be as follows:**

Academic year	**Core compulsory Courses**	**Elective courses**	**Foundation courses**
Semester I & II	65-75%	15-20%	10-15%
Semester III & IV	65-75%	15-20%	10-15%
Semester V & VI	65-75%	15-20%	10-15%

- **Attendance:**

  The Attendance Rules as per the norms of Hemchandracharya North Gujarat University.

- **Medium of Instruction:**
- The Medium of Instruction shall be of **Gujarati** and/or **English medium**.
- Student is free to write answers either in **Gujarati** and/or **English** language.
- **Language of Question paper:**

  Question paper should be drawn in **Gujarati** language and its **English** version should be given.

- **Evaluation Methods:**

  Academic performance in various courses *i.e.* core, discipline electives, generic electives and skill enhancement courses are to be considered as parameters for assessing the achievement of students in botany. A number of appropriate assessment methods of

botany will be used to determine the extent to which students demonstrate desired learning outcomes. Following assessment methodology should be adopted;

1. The oral and written examinations (Scheduled and surprise tests).
2. Closed-book and open-book tests.
3. Problem-solving exercises.
4. Practical assignments and laboratory reports.
5. Observation of practical skills.
6. Individual and group project reports.
7. Efficient delivery using seminar presentations.
8. Viva voce interviews are majorly adopted assessment methods for this curriculum.
9. The computerized adaptive testing, literature surveys and evaluations, peers and self-assessment, outputs form individual and collaborative work are also other important approaches for assessment purposes.
10. A student shall be evaluated through Comprehensive Continuous Assessment (**CCA**)/ (**Internal Evaluation**) as well as the **End of Semester examination** (**External Evaluation**). The weight-age of CCA shall be 30%, whereas the weight-age of the Semester end examination shall be 70%. There will be **no internal evaluation in practical courses.**
11. In Semester assessment (**CCA**)/ (**Internal Evaluation**) is spread through the duration of the course and is to be done by the Teacher teaching the course. BoS of the subjects will decide various criteria and their weight-age for CCA. The assessment is to be done by various means including:
    - ✓ Written Tests
    - ✓ MCQs based Tests/Quiz
    - ✓ Presentations/Seminars
    - ✓ Project work/Field work
    - ✓ Group discussions/Group activities
    - ✓ Assignments, etc.
12. The distribution of **Internal Evaluation** is given as per criteria given below for **30** marks:

    Written Test… **20** marks,
    Assignments/MCQs/Very Short questions… **05** marks and Attendance and
    Regularity, Punctuality… **05** marks.

13. The **End of Semester examination** (**External Evaluation**) shall have an assessment based upon following perspective with respect to all the courses:
    a. Evaluation with respect to Knowledge
    b. Evaluation with respect to Understanding
    c. Evaluation with respect to Skill
    d. Evaluation with respect to Application
    e. Higher Order Thinking Skills
14. With respect to all the above components, there shall be following types of Questions from each unit of the course.
    a. MCQs/Fill in the blanks/ Match the pairs, etc
    b. Short answer questions
    c. Medium answer questions
    d. Long answer questions
    e. Examples/ Problems, etc.
15. The End of Semester Examination will be conducted by the University. A certified journal of the respective practical course **must be produced** at the time of practical examination by the student.
16. It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks for each course shall be **40%** as decided by concern Board of Studies in Botany.
17. Promotion, Re-Admission and Time for Completion of Course, Procedure for Awarding Grades, Provision for Appeal, etc. as decided by the Hemchandracharya North Gujarat University.

STUDY TOUR:

Botanical excursion/study tour may be arranged (by the concern faculty with prior permission of **HoD and/or Principal**) within state and/or outside the state to explore/study plant diversity in its natural habitats.

SUBMISSION:

Instead of submission of Herbarium sheets and/or specimens at the time of final (Uni.) practical examination student may submit photographs/ drawings/ charts/ models or CD having such photographs/drawings of plant species to conserve plant species in their natural habitats and to avoid any damage to plant species and its natural habitat.

ELECTIVE (SUBJECTIVE) COURSE:

For semester-III and IV a list of two courses is given below.

1. **Elective (Subject) Course :: ES BOT-401 :: Plant Breeding**

SELECTION OF ELECTIVE (GENERIC) COURSE:

- For semester-III and IV a separate consists of courses is offered by university. Students may select **any one** of them from offered courses in Semester-III and Semester-IV separately.

AIMS:

1. To transform curriculum into outcome-oriented scenario.
2. To develop the curriculum for fostering discovery-learning.
3. To equip the students in solving the practical problems pertinent to India.
4. To adopt recent pedagogical trends in education including e-learning, flipped class, hybrid learning and MOOCs.
5. To mold responsible citizen for nation-building and transforming the country towards the future.
6. To provide an environment that ensures cognitive development of students in a holistic manner. A dialogue about plants and its significance is fostered in this framework, rather than didactic monologues on mere theoretical aspects.
7. To provide the latest subject matter, both theoretical as well as practical, such a way to foster their core competency and discovery learning. A botany graduate as envisioned in this framework would be sufficiently competent in the field to undertake further discipline-specific studies, as well as to begin domain-related employment.
8. To mould a responsible citizen who is aware of most basic domain-independent knowledge, including critical thinking and communication.
9. To enable the graduate prepare for national as well as international competitive examinations, especially UGC-CSIR NET and UPSC Civil Services Examination.

B. Sc. Semester-IV

CC-BOT-401: Anatomy of Angiosperms

LEARNING OUTCOMES: ***On completion of this course, the students will be able to:***

- Develop an understanding of concepts and fundamentals of plant anatomy examine the internal anatomy of plant systems and organs.
- Develop critical understanding on the evolution of concept of organization of shoot and root apex.
- Analyze the composition of different parts of plants and their relationships.
- Evaluate the adaptive and protective systems of plants.

CC–BOT-402: Economic Botany

LEARNING OUTCOMES: On completion of this course, the students will be able to:

- Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems.
- Develop critical understanding on the evolution of concept of organization of apex new crops/varieties, importance of germplasm diversity, issues related to access and ownership.
- Develop a basic knowledge of taxonomic diversity and important families of useful plants.
- Increase the awareness and appreciation of plants & plant products encountered in everyday life.
- Appreciate the diversity of plants and the plant products in human use.

ES-BOT-401: **Plant Breeding**

LEARNING OUTCOME: On completion of the course, the students will be able to:

- Develop conceptual understanding of plant genetic resources, plant breeding, gene bank and gene pool.
- Familiarize with genetic basis of heterosis.
- Classify Sexual and Asexual modes of reproduction.
- Explain monogenic and polygenic inheritance.
- Reflect upon the role of various non- conventional methods used in crop improvement.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc. Programme with 144 credits CBCS-Semester-Grading Pattern

w.e.f. June-2021

General Pattern/Scheme of study components along with credits for Science faculty.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN						
B.Sc. three year (General) Programme with 144 credits Semester-III and IV in BOTANY w.e.f. June-2021						
General Pattern/Scheme of study components along with credits						
Study Components		**Ins. Hrs/ Week**	**Examination**			**Credit**
			Internal Marks	**Uni. Exam.** Marks	**Total** Marks	
Semester-III						
	Core Compulsory (CC) Course					
CC-I-3	Core Course-I (Paper-3)	3	30	70	100	**3**
CC-I-4	Core Course-I (Paper-4)	3	30	70	100	**3**
CC-II-3	Core Course-II (Paper-3)	3	30	70	100	**3**
CC-II-4	Core Course-II (Paper-4)	3	30	70	100	**3**
	Soft-skill: Practical Core (PC) Course					
PC-I-3	Practical Core Course-I (Paper-3)	3		50	50	**1.5**
PC-I-4	Practical Core Course-I (Paper-4)	3		50	50	**1.5**
PC-II-3	Practical Core Course-II (Paper-3)	3		50	50	**1.5**
PC-II-4	Practical Core Course-II (Paper-4)	3		50	50	**1.5**
	Foundation Course (FC)					
FG-21	Compulsory English (L.L.)	2	15	35	50	**2**
	Elective Course (EC)					
EG-21	Elective (Generic) Course	2	15	35	50	**2**
ES-21	Elective (Subject) Course	2	15	35	50	**2**
		30	**165**	**585**	**750**	**24**
Semester-IV						
	Core Compulsory (CC) Course					
CC-I-5	Core Course-I (Paper-5)	3	30	70	100	**3**
CC-I-6	Core Course-I (Paper-6)	3	30	70	100	**3**
CC-II-5	Core Course-II (Paper-5)	3	30	70	100	**3**
CC-II-6	Core Course-II (Paper-6)	3	30	70	100	**3**
	Soft-skill: Practical Core (PC) Course					
PC-I-3	Practical Core Course-I (Paper-5)	3		50	50	**1.5**
PC-I-4	Practical Core Course-I (Paper-6)	3		50	50	**1.5**
PC-II-3	Practical Core Course-II (Paper-5)	3		50	50	**1.5**
PC-II-4	Practical Core Course-II (Paper-6)	3		50	50	**1.5**
	Foundation Course (FC)					
FG-21	Compulsory English (L.L.)	2	15	35	50	**2**
	Elective Course (EC)					
EG-21	Elective (Generic) Course	2	15	35	50	**2**
ES-21	Elective (Subject) Course	2	15	35	50	**2**
		30	**165**	**585**	**750**	**24**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.Sc Programme (CBCS - Semester - Grading Pattern)

B. Sc.:: BOTANY :: SEMESTER END EXAMINATION

Format for Questions paper Core Compulsory Course in Botany

(B.Sc. Sem. – IV)

(W.E.F. JUNE - 2021)

The university examination paper consists of four questions.

- First question is of 20 marks and will be from Unit – I.
- Second question is of 20 marks and will be from Unit – II.
- Third question is of 20 marks and will be from Unit – III.
- Fourth question is of 10 marks and will be from Unit – I TO IV.

Time: 2.5 Hrs **Total Marks: 70**

1. Long answered and medium answered/short note-typed questions from Unit-I 18
a. Long answered questions (Attempt any **two** from **three** each of **5** marks)
b. Medium answered or short note-typed questions (Attempt any **two** from **three** each of **4** marks)

2. Long answered and medium answered/short note-typed questions from Unit-II 17
a. Long answered questions (Attempt any **two** from **three** each of **5**marks)
b. Medium answered or short note-typed questions (Attempt any **two** from **three** , 4+3 marks)

3. Long answered and medium answered/short note-typed questions from Unit-III 18
a. Long answered questions (Attempt any **two** from **three** each of **5** marks)
b. Medium answered or short note-typed questions (Attempt any **two** from **three** , 4+3 marks)

4. a. Answer the following questions (any six out of eight) 12
(Objective type short questions)
b. Answer the following questions (any 5 out of seven) 05
(MCQs)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.Sc. Programme (CBCS - Semester - Grading Pattern)

B. Sc.:: BOTANY :: SEMESTER END EXAMINATION

Format for Questions paper Elective Course in Botany

(B.Sc. Sem – IV)

(W.E.F. JUNE - 2021)

The university examination paper consists of three questions.

- First question is of 12 marks and will be from Unit – I.
- Second question is of 12 marks and will be from Unit – II.
- Third question is of 11 marks and will be from Unit – I & II.

Time: 2 Hrs **Total Marks: 35**

Q.1 (a) Attempt any one out of two.	06 Marks
(b) Attempt any two out of three.	06 Marks
Q.2 (a) Attempt any one out of two.	06 Marks
(b) Attempt any two out of three.	06 Marks
Q.3 (a) Attempt any three out of five (SQ).	06 Marks
(b) Attempt any five out of eight.	05 Marks

B. Sc. Semester-IV

Botany :: CC-BOT-401

Anatomy of Angiosperms

(Credits: Theory-3, Practical-1.5)

Theory Lectures: 54

Unit 1: Anatomy (18 lectures)

- The three tissue systems, types of cells and tissues.
- Classification of tissues; Simple and complex tissues; tracheary elements and sieve elements.
- Types of vascular bundles; Structure of dicot & monocot stem and leaf.
- Ergastic substances (starch grains of Potato & Wheat, Aleurone layer of Maize, Aleurone crystal of Castor seed), Hydathodes, Cavities, Cystolith and Laticifers.

Unit 2: Meristems (18 Lectures)

Definition & characteristics of meristem, Evolution concept of organization of shoot apex (Apical cell theory, Histogen theory and Tunica Corpus theory).

- Organization of root apex (Histogen theory, Korper-Kappe theory and Quiescent centre theory).
- Epidermal tissue system; cuticle, epicuticular waxes.
- Trichomes (Uni-and Multicellular, Glandular and Nonglandular, two examples of each), Stomata: types, location, structure & function, classification (Metcalfe and Chalk).

Unit 3: Secondary growth (18 Lectures)

- Structure, function and activity of cambium; Secondary growth definition and types-normal and anomalous.
- Secondary growth in **Sunflower** stem and root.
- Anomalous Secondary growth in ***Salvadora*** stem and ***Tinospora*** aerial root.
- Sapwood and heartwood; Ring and diffuse porous wood; Tyloses, Periderm and Lenticels.

B. Sc. Semester-IV

Botany :: PC-BOT-401

Anatomy of Angiosperms

Practicals:

1. Study of anatomical details through permanent slides/temporary stain mounts/ macerations/ museum specimens with the help of suitable examples.
2. Ergastic substances (Aleurone layer of Maize, Aleurone crystal of Castor seed), Hydathodes, Cavities, Cystolith (*Ficus* leaf).
3. Apical meristem of root and shoot.
4. Xylem: Tracheary elements-tracheids, vessel elements; thickenings (Sunflower & *Cucurbita* stem).
5. Wood: ring porous; diffuse porous; tyloses; heart- and sapwood (chart).
6. Phloem: Sieve tubes-sieve plates; companion cells (***Cucurbita*** stem).
7. Epidermal system: stomata types (Dicot & Monocot); trichomes: non-glandular (*Abutilon*/Cotton), glandular (*Ocimum*), Periderm (PS) & Lenticels (PS).
8. Root: Secondary growth (Sunflower root & aerial root of *Tinospora*).
9. Stem: secondary growth (Sunflower & *Salvadora* stem).

Suggested Readings

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA.
3. Mauseth, J.D. (1988). Plant Anatomy. The Benjammin/Cummings Publisher, USA.
4. Evert, R.F. (2006) Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc.

B. Sc. Semester-IV

Botany :: CC-BOT-402

Economic Botany

(Credits: Theory-3, Practical-1.5)

Theory Lectures: 54

Unit 1: Plant Resources-1 (18 lectures)

- Introduction of plant resources.
- Concept of centres of origin, their importance with reference to Vavilov's work.
- Classification of economic important plants based on their uses.
- Origin, morphology, processing and uses of **Wheat** and **Rice**, Brief account of **millets**.

Unit 2: Plant Resources- 2 (18 lectures)

- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of **Chick pea** and **Pigeon pea**.
- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of **Potato**.
- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of spices: **Clove** and **Black Pepper**.
- Morphology and processing of **Sugarcane**, products and by-products of sugarcane industry.

Unit 3: **Plant Resources- 3** (18 lectures)

- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of **Groundnut** and **Mustard**.
- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of **Fennel**.
- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of **Tea**.
- Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of **Cotton** and **Jute**.

B. Sc. Semester-IV

Botany :: PC-BOT-402

Economic Botany

Practicals:

Write Scientific name, Family, Useful part, Chemical constitutes, economic important and draw labelled diagram of plant:

1. **Cereals:**
   - **Wheat** (habit sketch, starch grains, micro-chemical tests).
   - **Rice** (habit sketch, study of paddy and grain, starch grains, micro-chemical tests).
2. **Legumes:**
   - **Chick pea** and **Pigeon pea** (habit, fruit, seed structure, micro-chemical tests).
3. **Sources of oils and fats:**
   - **Mustard** and **Groundnut** –plant specimen, seeds; tests for fats in crushed seeds.
4. **Sources of sugars and starches:**
   - **Sugarcane**
   - **Potato**: Potato tuber morphology, w.m. starch grains, Iodine test).
5. **Spices:**
   - **Black pepper** (habit),
   - **Fennel** (habit) and
   - **Clove** (habit).
6. **Beverages:**
   - **Tea** (plant specimen and tea leaves).
7. **Fiber-yielding plants:**
   - **Cotton** (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose),
   - **Jute** (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).

Suggested Readings

1. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
3. Chrispeels, M.J. and Sadava, D.E. 1994 Plants, Genes and Agriculture. Jones & Bartlett Publishers.

CBCS - Semester - Grading Pattern

B. Sc.:: BOTANY :: SEMESTER-IV

ES -BOT-401 :: Plant Breeding

(Credits: Theory-2)

Theory Lectures: 30

(Effective from June 2021)

Unit 1: Plant Breeding **(15 lectures)**

- Introduction, definition and objectives of plant breeding.
- Breeding systems: modes of reproduction in crop plants.
- Important achievements and undesirable consequences of plant breeding.
- Vegetatively propagated plants – Procedure, advantages and limitations.

Unit 2: Inbreeding depression and heterosis **(15 lectures)**

- History, genetic basis of inbreeding depression and heterosis; Applications.
- Selection methods: Mass selection and Pure line selection.
- Hybridization procedure
- Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.

CBCS - Semester - Grading Pattern

B. Sc. :: BOTANY Practical :: SEMESTER-IV

PC-BOT-401

(Effective from June-2021)

Date: **Place:**

Time: 5 Hrs **Total Marks: 50**

Instructions: Strictly follow the instructions given by examiner(s).

1. Show _____ from plant material **A** stain if necessary with appropriate staining. Draw labelled diagram and show your preparation to the examiner (Unit 1). **08**

2. Expose and mount _____ from given material **B** stain if necessary show your Preparation to your examiner (Unit 2). **08**

3. Make a temporary stained preparation of specimen **C** for secondary growth. Draw labelled Diagram and show your preparation to the examiner (Unit 3). **08**

4. Identify and describe the anatomical structure observed in **16**
   1) Specimen – **D**: Permanent slide/charts (Unit – I)
   2) Specimen – **E**: Permanent slide/charts (Unit – II)
   3) Specimen – **F**: Permanent slide/charts (Unit – III)
   4) Specimen – **G**: Permanent slide/charts (Unit – I, II and III)

5. a. *Viva-voce* **05**
   b. Journal **05**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

CBCS - Semester - Grading Pattern

B. Sc. :: BOTANY Practical :: SEMESTER-IV

PC-BOT-402

(Effective from June 2021)

Date: **Place:**

Time: 5 Hrs **Total Marks: 50**

Instructions: Strictly follow the instructions given by examiner(s).

1. Perform the micro chemical tests for detection of organic molecule (Starch grain) in given sample **A** and describe the plant in details containing this molecule. Show your result to the examiner. **08**

2. Perform the micro chemical tests for detection of organic molecule (Legume protein) in given sample **B** and describe the plant in details containing this molecule. Show your result to the examiner. **08**

3. Perform the micro chemical tests for detection of organic molecule (Fats, Lignin, and Cellulose) in given sample **C** and describe the plant in details containing this molecule. Show your result to the examiner. **08**

4. Identify and write scientific name, family, useful part, economic important and draw labelled diagram (except Que: 1,2 & 3): **16**
   1. Specimen – **D**
   2. Specimen – **E**
   3. Specimen – **F**
   4. Specimen – **G**

5. a. *Viva-voce* **05**
   b. Journal **05**