

**KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY,
BHUJ.**

Year: 2023-2024



B.Sc (Honours) BOTANY
(With Research /Without Research)

Semesters: I and II
(Exit option)

FACULTY OF SCIENCE

SYLLABUS

**Curriculum as per UGC Guideline
Framed according to National Education Policy (NEP) - 2020
With effect from June - 2023 (and thereafter)**

NATURE AND EXTENT OF BACHELOR'S DEGREE PROGRAMME IN BOTANY HONOURS)

A bachelor's degree in Botany with Research or without Research is a 4 year degree course which is divided into 8 semesters.

Sr. No.	Type of Award	Stage of Exit	Mandatory Credits to be secured for the Award
1	Certificate in the Discipline	After successful completion of 1st Year	Certificate With Exit 4 Credit course (44+4)
2	Diploma in the Discipline	After successful completion of 1st and 2nd Years	Diploma With Exit 4 Credit course (88+4)
3	B.Sc. in Botany	After successful completion of 1st, 2nd and 3rd Years	Bachelor degree (132)
4	B.Sc. (Honors with Research/without Research) in Botany	After successful completion of 1st, 2nd, 3rd and 4th Years	Bachelor + Honors degree (176) Bachelor + Research degree (176)

A student pursuing 4 years undergraduate programme with research in a specific discipline shall be awarded an appropriate Degree in that discipline on completion of 8th Semester if he/she secures 176 Credits. Similarly, for certificate, diploma and degree, a student needs to fulfill the associated credits

AIMS:

1. To develop the curriculum for fostering discovery-learning.
2. 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.
3. To mould a responsible citizen who is aware of most basic domain-independent knowledge, including critical thinking and communication.
4. To enable the graduate prepare for national as well as international competitive examinations, especially UGC - CSIR NET, IIT - JAM and UPSC Civil Services Examination.

COURSE INTRODUCTION

B.Sc. Botany Programme covers academic activities within the classroom sessions along with practical concepts at laboratory sessions. Infield, outstation activities and projects would also be organized for real-life experience and learning. Candidates who have curiosity in plants kingdom, ecosystem, love exploring exotic places and wish to work as researchers or professions like Botanist, Conservationist, Ecologist, Environmentalist etc. can choose B.Sc. Botany course.

Programme outcomes (POs)

Transformed curriculum shall develop educated outcome-oriented candidature, to develop into responsible citizen for nation-building and transforming the country towards the future with their knowledge gained in the field of plant science.

Programme specific objectives (PSOs): B.Sc. I Year Certificate Course in Basic Botany

- This certificate course will provide knowledge on various fields of basic Botany.
- The syllabus is prepared to enable students for competitive exams in frontier areas of plant sciences.
- Students will be able to know about habit, habitat, morphology, anatomy and reproduction of various plant groups.
- Student shall produce competent plant biologists who can employ and implement their gained knowledge in basic and applied aspects that will profoundly influence the prevailing paradigm of agriculture, industry, healthcare and environment to provide sustainable development.
- Certificate and diploma courses are framed to generate self- entrepreneurship and self-employability, if multi exit option is opted. Lifelong learning is achieved by drawing attention to the vast world of knowledge of plants and their domestication.
- Students will increase the ability of critical thinking, development of scientific attitude, handling of problems and generating solutions, improve practical skills, social interaction, and increase awareness in judicious use of plant resources by recognizing the ethical value system.
- The training provided to the students will make them competent enough for doing jobs in Govt. and private sectors of academia, research and industry along with graduate preparation for national as well as international competitive examinations, especially UGC-CSIR NET, UPSC Civil Services Examination, IFS, NSC, FCI, BSI, FRI etc.,

EVALUATION METHODS:

Academic performance in various courses *i.e.* **DSC, IDC/MDC, AEC, VAC** and **SEC** are to be considered as parameters for assessing the achievement of students in the Botany subject. A number of appropriate assessment methods of Botany will be used to determine the extent to which students demonstrate desired learning outcomes.

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 50%, whereas the weight-age of the Semester end examination shall be 50%. CCA will include tests/online –offline exams/seminars/assignments/ submissions/student attendance and active participation (oral/poster), field work, report etc....

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. The Botanical Excursion is highly essential for to studying vegetation in its natural state. There shall be at least one Botanical Excursion.

This is compulsory to record laboratory work in the Journal. Certified journal have to produce while appearing at the time of Practical examination.

Credit Framework and course code for FIRST YEAR BOTANY Programme (B.Sc.)

Year	Semester	Course Code	Paper Title	Credits	Marks		Total
					CA	UA	
First Year	I	MAJBOT 101	Plant diversity ,Microbes, Plant Morphology , Cell biology and Genetics	3	35	40	75
		MAJ BOT 102-P	As above (lab course)	1	15	10	25
		MAJBOT 103	Algae, Fungi ,Bryophytes	3	35	40	75
		MAJ BOT 104-P	As above (lab course)	1	15	10	25
			Total Credits	8			200
		MIN BOT 105	Plant diversity ,Microbes, Plant Morphology , Cell biology and Genetics	3	35	40	75
		MIN BOT 106-P	As above (lab course)	1	15	10	25
			Total Credits	4			100
		MDC BOT 107	Plant diversity ,Microbes, Plant Morphology , Cell biology and Genetics	3	35	40	75
		MDC BOT 108-P	As above (lab course)	1	15	10	25
		Total Credits	4			100	
	II	MAJBOT 201	Anatomy, Embryology, Plant resources and Applied Botany	3	35	40	75
		MAJ BOT 202-P	As above (lab course)	1	15	10	25
		MAJBOT 203	Pteridophytes , Gymnosperms, and Angiosperms	3	35	40	75
		MAJ BOT 204-P	As above (lab course)	1	15	10	25
			Total Credits	8			200
		MIN BOT 205	Anatomy, Embryology, Plant resources and Applied Botany	3	35	40	75
		MIN BOT 206-P	As above (lab course)	1	15	10	25
			Total Credits	4			100
		MDC BOT 207	Anatomy, Embryology, Plant resources and Applied Botany	3	35	40	75
MDC BOT 208-P		As above (lab course)	1	15	10	25	
	Total Credits	4			100		

The Structure of the Question Paper for the University Exam

KSKV Kachchh University: BHUJ

FIRST YEAR B.Sc.: Semester: 1 & 2

SUBJECT: BOTANY

Total Marks: 40, Duration: 2 hours 30

PATTERN OF QUESTION PAPER FOR SEMESTER-END EXAMS

- The structure for FIRST THREE question is as under: 30 Marks (10 X 3)
- **Descriptive type 10 Marks**
- (1) Two questions of 10 Marks each. Out of which one must be answered, the type of questions is varied, like: Flow chart/ labeled diagram with explanation/ writes in detail etc.
- (2) Three questions of 05 Marks each out of which two must be answered.
- * **The structure for Fourth question is as under: 10 Marks**
Twelve questions from all three units out of which ten questions shall be answered. Each of 01 mark makes total 10 Marks.
- The types of questions are varied, like: one line answers / two line answers / definitions / reasoning / drawing small figures/ label the figure / fill in the blanks / multiple choice question/ one word answer / match the pairs etc.

Question No	Question type	Marks	Remarks
Que-1 Unit-1	Descriptive Questions with Internal Option.	10	Question may be of 10 marks/ 5 + 5 marks
Que-2 Unit-2	Descriptive Questions with Internal Option.	10	Question may be of 10 marks/ 5 + 5 marks
Que-3 Unit-3	Descriptive Questions with Internal Option.	10	Question may be of 10 marks/ 5 + 5 marks
Que-4	Do as directed.	10	Total 12 questions from all units will be ask ; students have to attempt any 10

PATTERN OF PRACTICAL FOR SEMESTER-END EXAMS

There will be FOUR Exercises in each Practical, as under, total of 10 Marks.

Instructions: Strictly follow the instructions given by examiner(s).	
Ex: 1. specimen A. (Do as Directed)	03
Ex: 2. specimen B (Do as Directed)	02
Ex: 3. specimen C. (Do as Directed)	03
Ex: 4. journal	02

- The End of Semester Examination will be conducted by the University. The Botanical Excursion is highly essential for to studying vegetation in its natural state. There shall be at least one Botanical Excursion.
- This is compulsory to record laboratory work in the Journal. Certified journal have to produce while appearing at the time of Practical examination.
- For the botanical practical fresh material of plants must be need. In absence of fresh material preserved material or specimen can be used.

DETAILED SYLLABUS OF B.Sc. I YEAR FOR CERTIFICATE COURSE IN BASIC BOTANY

KSKV Kachchh University, Bhuj - Kachchh

(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

(Course code: MAJ BOT- 101)

Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics**Credit: 3****Course Objectives**

1. Understanding subject, its scope and branches.
2. Develop understanding about the classification and diversity of different microbes including viruses, bacteria, their economic importance.
3. To gain understanding of structure of plant and its parts.
4. To learn basics of plant cell and genetics. Gain Knowledge about host –pathogen relationship and disease management.

DISCIPLINE SPECIFIC CORE COURSES (MAJOR)							
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.Sc.	MAJ BOT-101	Plant Diversity , Microbes, Plant Morphology , Cell biology and Genetics	3	45	40 Marks	35 Marks
UNIT	TOPIC						
Unit 1	<u>PLANT DIVERSITY, VIRUSES AND BACTERIA</u> <ul style="list-style-type: none"> ● Introduction to different branches and scope of Botany ● Eichler's System of classification. (upto Classes) ● Plant Viruses: Discovery, General characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), RNA virus (TMV), DNA virus (T-phase). ● General characteristics of Bacteria; Cell structure- Salient features; Types of Bacteria based on flagella, Nutritional types. (Brief explanation with suitable example). ● Reproduction: Vegetative, Asexual and Recombination. (conjugation, transformation and transduction) ● Economic importance of Bacteria with reference to their role in agriculture, fermentation and medicine. 						
Unit 2	<u>Morphology of Root, Stem, Leaf, Inflorescence and Flower and Fruit</u> <ul style="list-style-type: none"> ● Root: - Definition, Types of root, Different regions, and functions. (w/o Modifications) ● Stem: - Definition, Habit and Types. (w/o Modifications) ● Leaf:-Bearing of leaves, Phyllotaxy, Stipules and types of leaves. ● Inflorescence: - Racemose, Cymose and Special type. ● Flower:- Bracts, Symmetry, Presence of reproductive part, Number of floral parts, Position of floral organs, Calyx, Corolla, Perianth, Androecium. Gynoecium and Placentation. ● Fruits: Definition, Types and Importance. 						
Unit 3	<u>Cell biology and Genetics</u> <ul style="list-style-type: none"> ● Ultra Structure of Plant cell. (structure and function of organelles) ● Cell cycle and Cell division. (types) ● Cytoskeleton. ● Mendelian genetics, Mono & Di-hybrid ratio. ● Sex determination in plants. (definition and types) 						

Suggested readings

- Barsanti, L. and Gualtieri, P. (2014). *Algae: Anatomy, Biochemistry and Biotechnology*, 2nd Edition. CRC/ Taylor & Francis, NY.
- *Practical Botany, Vol I & II*, Bendre & Kumar
- *Books for FY & SY Botany*, by Nirav Publication
- Pandey, S.N and Trivedi, P.S. (2015). *A text book of Botany Vol.I* Vikas publishing House Pvt/ Ltd, New Delhi.
- Parihar, N.S. (1991). *An Introduction to Embryophyta Vol. I Bryophyta*. Central Book Depot, Allahabad.
- Mehrotra, R.S. and K.R. Aneja. (1999). *An Introduction to Mycology*. New Age International Publisher.
- Pelczar M.J., Chan E.C.S and Kreig N.R. (1997). *Microbiology*. Tata MacGraw Hill.
- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). *Biology*. Tata McGraw Hill, Delhi, India.
- Robert Edward Lee. (2018). *Phycology*. Cambridge University Press, U.K. 5th edition.
- Sethi, I.K. and Walia, S.K. (2011). *Text book of Fungi and Their Allies*, MacMillan Publishers Pvt. Ltd., Delhi.
- *A Text Book of Botany Vol I & II*, by Pandey S.N. , Mishra S.P. & Trivedi P.S.
- *A Text Book of Botany Vol I & II*, by Ganguli, Das & Dutta
- *A Text Book of Botany*, by Ganguli & Kar
- *Introductory Mycology*, by Alexopoulos & Mims
- Gangulee, S. C., Das, K.S, Dutta, C.D. and Kar, A.K. (1968) *College Botany Vol. I and Vol. II*
- Smith, G. M. - (1972) *Cryptogamic Botany Vol. I and Vol. II .*
- Verma, J.P. - (1968) *The Bacteria*, Vikas Publications
- Clifton, A. (1950) *Introduction to Bacteria*,
- Parihar, N.S. -(1956) *Bryophyta* 6. Parihar, N.S. -(1955) *Pteridophyta*
- Vashishta, B.R. - (2006) *Botany for Degree Students: Vol. III Bryophyta*
- *College Botany*, by A.C. Datta
- *College Botany*, by B.P. Pandey
- *A Text Book of Systematic Botany*, by R.N. Sutariya
- *Practical Botany, Vol I & II*, Bendre & Kumar
- Kumar, N. (1997) *Introduction to Horticulture*, Rajalakshmi Publications, Nagercoil. Edmond Musser & Andres, *Fundamentals of Horticulture*, McGraw Hill Book Co., New Delhi.
- Janick Jules (1979). *Horticultural Science*. (3rd Ed.), W.H. Freeman and Co., SanFrancisco, USA.
- Pandey, B.P. (2014). *Modern Practical Botany Vol. II*. S. Chand and Company Ltd., New Delhi.
- Bendre, A.M. and Kumar A. (2003). *Manual of Practical Botany Vol. II*. Rastogi Publications, Meerut.
- Santra S.C. and Chatterjee (2005). *College Botany Practical Vol. II* New Central Book Agency Pvt. Ltd.

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SEMESTER 1

**Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics
Practical/ Lab course (Course code: MAJ BOT-102-P)**

Credit: 1

Course Outcome & Objectives

After the completion of the course the students will be able to:

1. Practical understanding of bacteria and viruses.
2. To study of different plant part modifications and their structure through actual observation.
3. Practical skills in the field and laboratory experiments in Taxonomy.
4. Learn to identify and describe plants in detail.
5. Students would learn to create their small digital / hand written report.
6. Understand basic cell structure, cytology and Mendelian genetics.

DISCIPLINE SPECIFIC CORE COURSE(MAJOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.Sc.	MAJ BOT-102-P	Plant diversity, Microbes, Plant Morphology , Cell biology and Genetics	1	30	25Marks (15+10)
UNIT	TOPIC					
	<p>To study viruses using Photograph / Models/ charts: Ex 1: To study TMV. Ex 2: To study virus T-phase.</p> <p>To study Bacteria using Photograph /Charts / from temporary / permanent slides Ex 3: To study general structure of bacterial cell.</p> <p>Aim: To study Morphology as per theory.</p> <p>Ex 4: Root: - types of root. Ex 5: Stem: - Habit and types. Ex 6: Types of stem. (Aerial/ underground/Specialized) Ex 7: Leaf and its parts. Ex 8: Leaf: - Phyllotaxy. Ex 9: Leaf: - Stipules. Ex 10: Leaf: - types of leaves. Ex 11: Inflorescence: - Racemose, Ex 12: Inflorescence: - Cymose. Ex 13: Inflorescence: Special types. Ex 14: To study types of Aestivation. Ex 15: To study Morphology of Flower. Ex 16: To study types of fruits.</p> <p>Cell biology and Genetics Ex 17: To study Plant cell through Chart/ Photograph. Ex 18: To study Mitosis – Onion root tip. Ex 19: To study Cell division: Mitosis & Meiosis (Permanent slides) Ex 20: To study through Model / Chart / Photograph as per syllabus Mono & Dihybrid ratio.</p>					

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

B. Sc.: BOTANY INTERNAL PRACTICAL

Course Code: MAJBOT-102-P

Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics

Total Marks: 15

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

Ex: 1. Specimen A. (Do as Directed)	04
Ex: 2. Specimen B (Do as Directed)	04
Ex: 3. Specimen C. (Do as Directed)	04
Ex: 4. Viva-voice, submission	03

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

B. Sc.: BOTANY UNIVERSITY PRACTICAL

Course Code: MAJBOT-102-P

Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics

Total Marks: 10

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

Ex: 1. Specimen A. (Do as Directed)	03
Ex: 2. Specimen B (Do as Directed)	02
Ex: 3. Specimen C. (Do as Directed)	03
Ex: 4. Journal	02

Note: Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ Herbarium (Given by teacher or as a part of Syllabus) will be mandatory for all the students.

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

(Course code: MAJ BOT- 103)

Course Title: Algae, Fungi and Bryophytes

Credit: 3

Course Outcome & objectives

After the completion of the course the students will be able to:

1. This paper aims to develop understanding of Algae, fungi and bryophytes. Their basic structure, lifecycle and reproductive methodologies will be studied. Develop understanding about the classification and diversity of different Algae, Fungi, Lichens & their economic importance.
2. Develop conceptual skill about identifying algae, pathogens, biofertilizers & lichens.
3. Gain knowledge about developing commercial enterprise of plant products.

DISCIPLINE SPECIFIC CORE COURSES (MAJOR)

COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.Sc. I	MAJ BOT-103	Algae, Fungi and Bryophytes	3	45	40 Marks	35 Marks
UNIT	TOPIC						
Unit 1	<u>ALGAE</u> <ul style="list-style-type: none"> ● General characteristics of algae, and range of thallus organization. ● Classification system of G.M.Smith 1955 (included types up to classes). ● Reproduction in algae: Vegetative, Asexual methods, and sexual methods. ● Role of algae in the environment, agriculture, biotechnology and industry. ● Morphology and life-cycles of: <i>Sargassum</i>, <i>Polysiphonia</i> <i>Batrachospermum</i>. 						
Unit 2	<u>FUNGI</u> <ul style="list-style-type: none"> ● General characters of fungi. ● Classification of fungi by Ainsworth. (upto classes) ● <i>Morphology and Life history of Mucor (Zygomycetes), penicillium (Ascomycota), Agaricus (Basidiomycota); with reference to:</i> <ul style="list-style-type: none"> ☐ Systematic position with reasons up to family. ☐ Habit and Habitat, Vegetative structure and Reproduction. ● Symbiotic associations: Lichens- General account, reproduction and significance. ● Mycorrhiza: ectomycorrhiza, endomycorrhiza and their significance. 						
Unit 3	<u>BRYOPHYTA</u> <ul style="list-style-type: none"> ● General characteristics of Bryophytes. ● Adaptations to land habit, classification. (up to classes), (G.M. Smith 1955) ● Morphology, anatomy and reproduction of <i>Riccia</i>, <i>Anthoceros</i> and <i>Funaria</i>. ● Ecology and economic importance of bryophytes. 						

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER1

Practical/ Lab course (Course code: MAJ BOT-104-P)

Course Title: Algae, Fungi and Bryophytes

Credit: 1

Course Outcome

After the completion of the course the students will be able to:

1. Understand the instruments, techniques, lab etiquettes and practices for working algae, fungi and bryophytes in laboratory.
2. Practical understanding and identification of algae, fungi and bryophytes.

DISCIPLINE SPECIFIC CORE COURSE(MAJOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.Sc.	MAJ BOT-104-P	Algae, Fungi and Bryophytes	1	30	25Marks (15+10)
UNIT	TOPIC					
Unit 1	To study Chara (through class work Material/ fresh and permanent slide.) Ex 1: External features of thallus of <i>Chara</i> ., Classification with characters of <i>Chara</i> . Ex: 2 To study sex organs (male & female) of <i>Chara</i> . To study Sargassum (through class work Material/ fresh and permanent slide.) Ex: 3: To study external features of thallus of <i>Sargassum</i> , Classification with characters of <i>Sargassum</i> . Ex: 4: To study internal structure of male and female conceptacle of <i>Sargassum</i> . To study Polysiphonia (through class work Material/ fresh and permanent slide.) Ex 5: External features of thallus of <i>Polysiphonia</i> , Classification with characters of <i>Polysiphonia</i> . Ex 6: To study cystocarp of <i>Polysiphonia</i> . Ex 7: To study the structure of tetra sporophyte and tetrasporangium of <i>Polysiphonia</i> .					
Unit 2	To study Mucor .(through class work Material and permanent slide) Ex 8: Vegetative structure of <i>Mucor</i> , Classification with characters of <i>Mucor</i> . Ex 9: To study reproductive structure of <i>Mucor</i> . To study Penicillium (through class work Material and permanent slide.) Ex: 10 To study vegetative structure of <i>Penicillium</i> , Classification with characters of <i>Penicillium</i> . Ex: 11 To study conidia of <i>Penicillium</i> . Ex: 12 To study ascocarp, asci and ascospores of <i>Penicillium</i> . To study Agaricus through class work Material and permanent slide.) Ex: 13 To study the vegetative structure of <i>Agaricus</i> , Classification with characters of <i>Agaricus</i> . Ex: 14 To study basidiocarp, gills, basidia and basidiospores of <i>Agaricus</i> . To study types of lichens (crustose, foliose and fruticose). Ex: 15 To study of external features of lichens (crustose, foliose and fruticose).					

Unit 3	To study <i>Riccia</i> . (temporary /permanent slides) Ex 16: To study external features of gametophyte of <i>Riccia</i> , classification with characters of <i>Riccia</i> .
	Ex 17: To study anatomy of thallus of <i>Riccia</i> .
	Ex 18: To study antheridium and archegonium of <i>Riccia</i>
	To study <i>Anthoceros</i> (temporary /permanent slides)
	Ex 19: To study external features of <i>Anthoceros</i> , classification with characters of <i>Anthoceros</i> .
	Ex 20: To study antheridium and archegonium of <i>Anthoceros</i> .
	To study <i>Funaria</i> . (temporary /permanent slides)
	Ex 21: To study external features of gametophyte of <i>Funaria</i> , classification with characters of <i>Funaria</i> .
	Ex 22: To study antheridial branch and antheridium of <i>Funaria</i> .
	Ex 23: To study archegonial branch and archegonium of <i>Funaria</i> .

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)
SEMESTER 1
B. Sc. : BOTANY INTERNAL PRACTICAL
Course Code: MAJ BOT-**104-P**
Course Title: Algae, Fungi and Bryophytes
Total Marks: 15

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

Ex: 1. Identify and classify giving reasons up to family of given specimen A.	04
Ex: 2. Identify and describe structural peculiarities observed in the given specimen B.	04
Ex: 3. Make a temporary slide of the reproductive organ from the given specimen C. Draw the labeled diagram of it and show your slide to the examiner.	04
Ex: 4. Viva-voce / submission.	03

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)
SEMESTER 1
B. Sc.: BOTANY UNIVERSITY PRACTICAL
Course Code: MAJ BOT-**104-P**
Course Title: Algae, Fungi and Bryophytes
Total Marks: 10

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

Ex: 1. Identify and classify giving reasons up to family of given specimen A.	03
Ex: 2. Identify and describe structural peculiarities observed in the given specimen B.	02
Ex: 3. Make a temporary slide of the reproductive organ from the given specimen C. Draw the labeled diagram of it and show your slide to the examiner.	03
Ex: 4. Journal.	02

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

(Course code: MIN BOT- 105)

Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics

Credit: 3

Course Objectives

1. Understanding subject, its scope and branches.
2. Develop understanding about the classification and diversity of different microbes including viruses, bacteria, their economic importance.
3. To gain understanding of structure of plant and its parts.
4. To learn basics of plant cell and genetics. Gain Knowledge about host –pathogen relationship and disease management.

DISCIPLINE SPECIFIC CORE COURSES (MINOR)							
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.Sc. I	MAJ BOT-105	Plant diversity , Microbes, Plant Morphology , Cell biology and Genetics	3	45	40 Marks	35 Marks
UNIT	TOPIC						
Unit 1	<p><u>PLANT DIVERSITY, VIRUSES AND BACTERIA</u></p> <ul style="list-style-type: none"> ● Introduction to different branches and scope of Botany. ● Eichler’s System of classification. (upto Classes) ● Plant Viruses: Discovery, General characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), RNA virus (TMV), DNA virus (T-phase). ● General characteristics of Bacteria; Cell structure- Salient features; Types of Bacteria based on flagella, Nutritional types (Brief explanation with suitable example). ● Reproduction: Vegetative, Asexual and Recombination (conjugation, transformation and transduction). ● Economic importance of Bacteria with reference to their role in agriculture, fermentation and medicine. 						
Unit 2	<p><u>Morphology of Root, Stem, Leaf, Inflorescence and Flower and Fruit</u></p> <ul style="list-style-type: none"> ● Root: - Definition, Types of root, Different regions, and functions. (w/o Modifications) ● Stem: - Definition, Habit and Types. (w/o Modifications) ● Leaf:-Bearing of leaves, Phyllotaxy, Stipules and types of leaves. ● Inflorescence: - Racemose, Cymose and Special type. ● Flower:- Bracts, Symmetry, Presence of reproductive part, Number of floral parts, Position of floral organs, Calyx, Corolla, Perianth, Androecium. Gynoecium and Placentation. ● Fruits: Definition, Types and Importance. 						
Unit 3	<p><u>Cell biology and Genetics</u></p> <ul style="list-style-type: none"> ● Ultra Structure of Plant cell. (structure and function of organelles) ● Cell cycle and Cell division. (types) ● Cytoskeleton. ● Mendelian genetics, Mono & Di-hybrid ratio. ● Sex determination in plants. (Definition, types) 						

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1:

**Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics
Practical/ Lab course (Course code: MIN BOT-106-P)**

Credit: 1

Course Outcome & Objectives

After the completion of the course the students will be able to:

1. Practical understanding of bacteria and viruses.
2. To study of different plant part modifications and their structure through actual observation.
3. Practical skills in the field and laboratory experiments in Taxonomy.
4. Learn to identify and describe plants in detail.
5. Students would learn to create their small digital/hand written reports.
6. Understand basic cell structure, cytology and Cell biology and Genetics.

DISCIPLINE SPECIFIC CORE COURSE(MINOR)

COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.SC.	MIN BOT-106-P	Plant diversity , Microbes, Plant Morphology , Cell biology and Genetics	1	30	15+10 Total Marks 25
UNIT	TOPIC					
	<p>To study viruses using Photograph / Models/ charts: Ex 1: To study TMV. Ex 2: To study virus T-phase.</p> <p>To study Bacteria using Photograph /Charts / from temporary / permanent slides Ex 3: To study general structure of bacterial cell.</p> <p>Aim: To study Morphology as per theory.</p> <p>Ex 4: Root: - types of root. Ex 5: Stem: - Habit and Types. Ex 6: Types of Stem. (Aerial/ underground/Specialized) Ex 7: Leaf and its parts. Ex 8: Leaf:- Phyllotaxy, Ex 9: Leaf: - Stipules. Ex 10: Leaf: - types of leaves. Ex 11: Inflorescence: - Racemose, Ex 12: Inflorescence: - Cymose. Ex 13: Inflorescence: Special types. Ex 14: To study types of Aestivation. Ex 15: To study Morphology of Flower. Ex 16: To study types of fruits.</p> <p>Cell biology and Genetics</p> <p>Ex 17: To study Plant cell through Chart/ Photograph. Ex 18: To study Mitosis – Onion root tip. Ex 19: To study Cell division: Mitosis & Meiosis. (Permanent slides) Ex 20: To study through Model / Chart / Photograph as per syllabus Mono & Dihybrid ratio.</p>					

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

(Course code: MDC BOT- 107)

Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics

Credit: 3

Course Objectives

1. Understanding subject, its scope and branches.
2. Develop understanding about the classification and diversity of different microbes including viruses, bacteria, their economic importance.
3. To gain understanding of structure of plant and its parts.
4. To learn basics of plant cell and genetics. Gain Knowledge about host –pathogen relationship and disease management.

DISCIPLINE SPECIFIC CORE COURSES (MINOR)							
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.Sc. I	MDC BOT-107	Plant diversity , Microbes, Plant Morphology , Cell biology and Genetics	3	45	40 Marks	35 Marks
<i>UNIT</i>		<i>TOPIC</i>					
Unit 1	<p><u>PLANT DIVERSITY, VIRUSES AND BACTERIA</u></p> <ul style="list-style-type: none"> ● Introduction to different branches and scope of Botany. ● Eichler’s System of classification. (upto Classes) ● Plant Viruses: Discovery, general characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), RNA virus (TMV), DNA virus (T-phase). ● General characteristics of Bacteria; Cell structure- Salient features; Types of Bacteria based on flagella, Nutritional types (Brief explanation with suitable example). ● Reproduction: Vegetative, Asexual and Recombination (conjugation, transformation and transduction). ● Economic importance of Bacteria with reference to their role in agriculture, fermentation and medicine. 						
Unit 2	<p><u>Morphology of Root, Stem, Leaf, Inflorescence and Flower and Fruit</u></p> <ul style="list-style-type: none"> ● Root: - Definition, Types of root, Different regions, and functions. (w/o Modifications) ● Stem: - Definition, Habit and Types. (w/o Modifications) ● Leaf:-Bearing of leaves, Phyllotaxy, Stipules and types of leaves. ● Inflorescence: - Racemose, Cymose and Special type. ● Flower:- Bracts, Symmetry, Presence of reproductive part, Number of floral parts, Position of floral organs, Calyx, Corolla, Perianth, Androecium. Gynoecium and Placentation. ● Fruits: Definition, Types and Importance. 						
Unit 3	<p><u>Cell biology and Genetics</u></p> <ul style="list-style-type: none"> ● Ultra Structure of Plant cell. (structure and function of organelles) ● Cell cycle and Cell division. (types) ● Cytoskeleton. ● Mendelian genetics, Mono & Di-hybrid ratio. ● Sex determination in plants. (Definition and types). 						

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 1

Course Title: Plant diversity, Microbes, Plant Morphology, Cell biology and Genetics
Practical/ Lab course (Course code: MDC BOT-108-P)
Credit: 1

Course Outcome & Objectives

After the completion of the course the students will be able to:

1. Practical understanding of bacteria and viruses.
2. To study of different plant part modifications and their structure through actual observation.
3. Practical skills in the field and laboratory experiments in Taxonomy.
4. Learn to identify and describe plants in detail.
5. Students would learn to create their small digital/hand written report.
6. Understand basic cell structure cytology, Cell biology and Genetics.

DISCIPLINE SPECIFIC CORE COURSE(MINOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.SC.	MDC BOT-108-P	Plant diversity, Microbes, Plant Morphology , Cell biology and Genetics	1	30	15+10 Total Marks 25
UNIT	TOPIC					
	<p>To study viruses using Photograph / Models/ charts: Ex 1: To study TMV. Ex 2: To study virus T-phase.</p> <p>To study Bacteria using Photograph /Charts / from temporary / permanent slides Ex 3: To study general structure of bacterial cell.</p> <p>Aim: To study Morphology as per theory.</p> <p>Ex 4: Root:- types of root. Ex 5: Stem: - Habit and Types. Ex 6: Types of Stem. (Aerial/ underground/Specialized) Ex 7: Leaf and its parts. Ex 8: Leaf: - Phyllotaxy. Ex 9: Leaf: - Stipules. Ex 10: Leaf:- types of leaves. Ex 11: Inflorescence: - Racemose. Ex 12: Inflorescence: - Cymose. Ex 13: Inflorescence: Special types. Ex 14: To study types of Aestivation. Ex 15: To study Morphology of flower. Ex 16: To study types of fruits.</p> <p>Cell biology and Genetics</p> <p>Ex 17: To study Plant cell through Chart/ Photograph Ex 18: To study Mitosis – Onion root tip. Ex 19: To study Cell division: Mitosis & Meiosis. (Permanent slides) Ex 20: To study through Model / Chart / Photograph as per syllabus Mono & Dihybrid ratio.</p>					

DETAILED SYLLABUS OF B.Sc. I YEAR FOR CERTIFICATE COURSE IN BASIC BOTANY

KSKV Kachchh University, Bhuj - Kachchh

(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II

(Course code: MAJ BOT-201)

Course Title: Anatomy, Embryology, Plant resources and Applied Botany**Credit: 3**

Course outcomes and objectives:

After the completion of the course the students will be able to:

1. To develop understanding of plant anatomy, growth and different plant tissues.
2. To study general embryology and concepts.
3. To understand applied botany, plant applications and uses.

<i>DISCIPLINE SPECIFIC CORE COURSE(MAJOR)</i>							
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.SC. II	MAJ BOT-201	Anatomy, Embryology, Plant resources & Applied Botany	3	45	40 Marks	35 Marks
UNIT	TOPIC						
Unit 1	<p><u>Anatomy:</u></p> <ul style="list-style-type: none"> • Meristematic tissue. (Characteristics, Functions & Classification based on origin, basis of position) • Primary growth and Secondary growth. (Normal & Anomalous) • Normal secondary growth in Sunflower stems & roots. • Tissue system – Epidermal, Secretary and Mechanical. 						
Unit 2	<p><u>Embryology :</u></p> <ul style="list-style-type: none"> • Microsporangium: Structure and development of a typical Anther, Anther wall, structure and function of various layer of mature anther wall, Microsporogenesis, Formation of pollen grain, Pollen germination. (Pollen tube growth) • Megasporangium: Structure of pistil, structure of female gametophyte (Embryo sac) & its types, types of ovule. • Pollination: Types and agents of pollination. • Fertilization. (Double fertilization) 						
Unit 3	<p><u>Plant resources & Applied Botany:</u> Botanical name, local name, Family, Chemical Components, useful part, morphology and uses of following plant.</p> <ul style="list-style-type: none"> • Brief account and uses of the followings. Medicinal plants: Neem, Senna, Isabgul, Ashwgandha • Brief account and uses of the followings. Food Plants: Wheat, Gram, Sugar cane, Groundnut • Brief account and uses of the followings. Natural Rubber: Hevea 						

Suggested readings

- Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
- Gangulee H.C., Kar, A.K. and Santra S.C. (2011). College Botany Vol II. 4th Edition New Central Book Agency.
- Pandey, B.P. (2010). College Botany Vol II. S. Chand and Company Ltd., New Delhi, India.
- Parihar, N.S. (1976). Biology and Morphology of Pteridophytes. Central Book Depot.
- Parihar, N.S. (1991). An Introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.
- Sambamurty, A.V.S.S. (2010). Taxonomy of Angiosperms. I.K. International Pvt. Ltd.
- Saxena N.B. and Saxena S. (2012). Plant Taxonomy Pragati Prakashan.
- Sharma O.P. (2013). Plant Taxonomy. MC GRAW HILL INDIA.
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- Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford and IBH Pvt. Ltd., New Delhi. 3rd edition.
- The Pteridophyte Phylogeny Group (PPG Classification) (2016): A community –derived classification for extant lycophytes and ferns. Journal of Systematics and Evolution. 54(6): 563-603. Doi:10.1111/jse.12229
- Vashishta, P.C., Sinha, A.K. and Kumar, A. (2010). Gymnosperms, S. Chand and Company Ltd., Ramnagar, New Delhi, India.
- Angiosperm Phylogeny Group (APG-2016). An update of the Angiosperm Phylogeny Group Classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnaean Society 181: 1-20.
- A textbook of Botany Angiosperm Dr.B.P.Pandey
- Cryptogamic Botany Vol I &II, by G.M.Smith
- College Botany, by A.C. Datta
- College Botany, by B.P. Pandey
- Gymnosperm, by Vashishta
- A Text Book of Botany Vol I & II, by Pandey S.N. , Mishra S.P. & Trivedi P.S.
- A Text Book of Botany Vol I & II, by Ganguli, Das & Dutta
- A Text Book of Botany, by Ganguli&Kar
- Medicinal Herbs & Flowers, by S.K. Bhattacharjee
- A Handbook of Medicinal Plants, Prajapati, Purohit Sharma & Kumar
- Ethnobiology, by Rajiv K. Sinha & Sweta Sinha
- Pandey, B.P. (2014). Modern Practical Botany Vol. II. S. Chand and Company Ltd., New Delhi.
- Bendre, A.M. and Kumar A. (2003). Manual of Practical Botany Vol. II. Rastogi Publications, Meerut.
- Santra S.C. and Chatterjee (2005). College Botany Practical Vol. II New Central Book Agency Pvt. Ltd.

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II:

**Course Title: Anatomy, Embryology, Plant resources and Applied Botany
Practical/Lab course (Course code: BOT-202 P)**

Credit: 1

Course outcomes & objectives:

1. Understanding of plant anatomy and tissues using practical examples and skills.
2. To learn preparing and to studying plant embryology and process using suitable examples.
3. To learn practically about economically useful plants and there resources.

DISCIPLINE SPECIFIC CORE COURSE(MAJOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.SC.	MAJ BOT-202P	Pteridophytes, Gymnosperms and Angiosperms	1	30	25 Marks (15+10)
UNIT	TOPIC					
Unit 1	<p><u>Anatomy:</u>(single stain)</p> <p>Ex 1: To study normal secondary growth and arrangement of tissue in Sunflower stem.</p> <p>Ex 2: To study normal secondary growth and arrangement of tissue in Sunflower root.</p> <p>Ex 3: To study epidermal tissue system: Multilayered epidermis in Ficus/ Nerium leaf.</p> <p>Ex 4: To study types of stomata in Dicot and Monocot.</p> <p>Ex 5: To study secretary tissue system: Glands, Nectaries. (External Glands)</p> <p>Ex 6: To study secretary tissue system. Resin and oil ducts. (Internal Glands)</p>					
Unit 2	<p><u>Embryology :</u> (temporary /Permanent slide)</p> <p>Ex 7: To study the slide showing T.s. of mature anther.</p> <p>Ex 8: To study germination of pollen grains.</p> <p>Ex 9: To study structures and types of Ovules.</p> <p>Ex 10: To study types of embryo sac.</p>					
Unit 3	<p><u>Plant resources & Applied Botany</u></p> <p>To study Botanical name, Family, Chemical Components, useful part, morphology and uses of following plant.</p> <p>Medicinal plants:</p> <p style="padding-left: 20px;">Ex 12: Neem.</p> <p style="padding-left: 20px;">Ex 13: Senna.</p> <p style="padding-left: 20px;">Ex 14: Isabgul.</p> <p style="padding-left: 20px;">Ex 15: Ashwgandha.</p> <p>Food Plants:</p> <p style="padding-left: 20px;">Ex 16: Wheat.</p> <p style="padding-left: 20px;">Ex 17: Gram.</p> <p style="padding-left: 20px;">Ex 18: Sugar cane.</p> <p style="padding-left: 20px;">Ex 19: Groundnut.</p> <p>Natural Rubber:</p> <p style="padding-left: 20px;">Ex 20: Hevea.</p>					

KSKV Kachchh University, Bhuj - Kachchh

(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 2

Course Title: Anatomy, Embryology, Plant resources and Applied Botany

B. SC.: BOTANY INTERNAL PRACTICAL

Course Code: MAJ BOT-202-P

Total Marks: 15

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

Ex: 1. Make a temporary slide of given specimen A. Draw the labeled diagram of it and show your slide to the examiner.	04
Ex: 2 Make a temporary slide of given specimen B.	04
Ex: 3. Identify and describe Botanical name, Family , Chemical Components, useful part, and uses of given specimen C.	04
Ex: 4. Viva-voce / submission	03

KSKV Kachchh University, Bhuj - Kachchh

(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 2

Course Title: Anatomy, Embryology, Plant resources and Applied Botany

B. SC.: BOTANY UNIVERSITY PRACTICAL

Course Code: MAJ BOT-202-P

Total Marks: 10

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

Ex: 1. Make a temporary slide of given specimen A. Draw the labeled diagram of it and show your slide to the examiner.	03
Ex: 2 Make a temporary slide of given specimen B.	02
Ex: 3. Identify and describe Botanical name, Family , Chemical Components, useful part, and uses of given specimen C.	03
Ex: 4. Journal.	02

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II

(Course code: MAJ BOT-203)

Course Title: Pteridophytes, Gymnosperms and Angiosperms

Credit: 3

Course Objectives & outcome:

After the completion of the course the students will be able to:

1. Develop critical understanding on morphology, anatomy and reproduction of Pteridophytes, Gymnosperms and Angiosperms.
2. To become familiar with plant taxonomy, major taxa and their identifying characteristics, and to develop in depth knowledge of the current taxonomy of a major plant family.

DISCIPLINE SPECIFIC CORE COURSE (MAJOR)							
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.SC. II	MAJ BOT-203	Pteridophytes, Gymnosperms and Angiosperms	3	45	40 Marks	35 Marks
UNIT	TOPIC						
Unit 1	<p><u>PTERIDOPHYTES</u></p> <ul style="list-style-type: none"> ● General characteristics, classification. (up to classes by G.M. Smith) ● Early land plants (<i>Rhynia</i>). ● Morphology and reproduction of <i>Selaginella</i>, <i>Equisetum</i> and <i>Adiantum</i>. ● Stele and its type. ● Ecological and economic importance of Pteridophytes. 						
Unit 2	<p><u>Gymnosperms</u></p> <ul style="list-style-type: none"> ● General characteristics, classification (Chamberlain (1910) up to family. ● Morphology and reproduction of <i>Pinus</i>, <i>Ephedra</i> and <i>Gnetum</i>. ● Ecological and economic importance. 						
Unit 3	<p><u>Introduction to plant taxonomy</u></p> <ul style="list-style-type: none"> ● General characteristics of flowering plants, preparation of herbarium, importance of herbaria. ● Classification: Types of classification-artificial, natural and phylogenetic. ● Classification system of Bentham and Hooker (up to series without characters), ● <u>Taxonomy of plant Families</u> : (Classification, General characters, common plants with botanical name and local name ,floral formula ,floral diagram) ● Malvaceae, Asteraceae, , Lamiaceae, Euphorbiaceae, Arecaceae ,Poaceae 						

KSKV Kachchh University, Bhuj - Kachchh

(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II

Course Title: Pteridophytes, Gymnosperms and Angiosperms

Practical/Lab course (Course code: MAJ BOT-204 P)

Credit: 1

Course outcomes:

1. Student will learn identification and characters of different plants and their taxonomy
2. Understand morphology, reproduction and developmental changes of type specimens by practical work.

DISCIPLINE SPECIFIC CORE COURSE (MAJOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.SC.	MAJ BOT 204 - P	Pteridophytes, Gymnosperms and Angiosperms	1	30	25 Marks (15+10)
UNIT	TOPIC (60hr) (Class work material / temporary / permanent slide/Chart/ Photograph)					
Unit 1	To study the <i>Rhynia</i> Ex 1: To study external features and Reproductive organ of the Rhynia. To study <i>Selaginella</i> Ex 2: To study the external features of <i>Selaginella</i> , classification with characters of <i>Selaginella</i> . Ex 3: To Study spore producing organs of <i>Selaginella</i> . To study <i>Equisetum</i> Ex 4: To study external morphology of <i>Equisetum</i> , classification with characters of <i>Equisetum</i> . Ex 5: To Study spore producing organs of <i>Equisetum</i> .(T.S. cone/ L.S. cone) To study <i>Adiantum</i> Ex 6: To study external features of the plant of <i>Adiantum</i> , classification with characters of <i>Adiantum</i> . Ex 7: To Study structure of sorus of <i>Adiantum</i> .					
Unit 2	To study <i>Pinus</i> Ex 8: To study external morphology of <i>Pinus</i> , classification with characters of <i>Pinus</i> Ex 9: To study male cone and microspore of <i>Pinus</i> . Ex 10: To study L.S. of female cone and ovule of <i>Pinus</i> . To study <i>Ephedra</i> Ex 11: To study of external morphology of <i>Ephedra</i> , classification with characters of <i>Ephedra</i> . Ex 12: To study male flower of <i>Ephedra</i> . Ex 13: To study female strobilus of <i>Ephedra</i> . To study <i>Gnetum</i> Ex 14: Morphology of <i>Gnetum</i> classification with characters of <i>Gnetum</i> .					
Unit 3	Description of an angiospermic plant, To study of vegetative and floral characters (description, V.S. flower, section of ovary, floral diagram/s, floral formula/e) and systematic position of the following families according to Bentham and Hooker's system of classification: Ex: 15 Malvaceae. Ex: 16 Asteraceae. Ex: 17 Lamiaceae. Ex: 18 Euphorbiaceae. Ex: 19 Arecaceae. Ex: 20 Poaceae.					

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 2

Course Title: Pteridophytes, Gymnosperms and Angiosperms

B. SC.: BOTANY INTERNAL PRACTICAL

Course Code: MAJ BOT-204-P

Total Marks: 15

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

Ex: 1. Make a temporary slide of the reproductive organ from the given specimen A. Draw the labeled diagram of it and show your slide to the examiner.	04
Ex: 2. Identify and describe structural peculiarities observed in the given specimen B.	04
Ex: 3. Identify and classify giving reasons up to family ,Draw floral diagram and floral formula of given specimen C.	04
Ex: 4. Viva-voce /submission	03

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER 2

Course Title: Pteridophytes, Gymnosperms and Angiosperms

B. SC.: BOTANY UNIVERSITY PRACTICAL

Course Code: MAJ BOT-204-P

Total Marks: 10

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

Ex: 1. Make a temporary slide of the reproductive organ from the given specimen A. Draw the labeled diagram of it and show your slide to the examiner.	03
Ex: 2. Identify and describe structural peculiarities observed in the given specimen B.	02
Ex: 3. Identify and classify giving reasons up to family ,Draw floral diagram and floral formula of given specimen C.	03
Ex: 4. Journal.	02

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II

Course Title: Anatomy, Embryology, Plant resources and Applied Botany
(Course code: MIN BOT-205)

Credit: 3

Course outcomes and objectives:

After the completion of the course the students will be able to:

1. To develop understanding of plant anatomy, growth and different plant tissues.
2. To study general embryology and concepts.
3. To understand applied botany, plant applications and uses.

DISCIPLINE SPECIFIC CORE COURSE(MINOR)							
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	External	Internal
Certificate Course	B.SC. II	MIN BOT-205	Anatomy, Embryology, Plant resources & Applied Botany	3	45	40 Marks	35 Marks
UNIT	TOPIC						
Unit 1	<p><u>Anatomy:</u></p> <ul style="list-style-type: none"> • Meristematic tissue. (Characteristics, Functions & Classification based on origin, basis of position,) • Primary growth and Secondary growth. (Normal & Anomalous) • Normal secondary growth in Sunflower stems & roots. • Tissue system – Epidermal, Secretary and Mechanical. 						
Unit 2	<p><u>Embryology :</u></p> <ul style="list-style-type: none"> • Microsporangium: Structure and development of a typical Anther, Anther wall, structure and function of various layer of mature anther wall, Microsporogenesis, Formation of pollen grain, Pollen germination. (Pollen tube growth) • Megasporangium: Structure of pistil, structure of female gametophyte (Embryo sac) & its types, types of ovule. • Pollination: Types and agents of pollination. • Fertilization. (Double fertilization) 						
Unit 3	<p><u>Plant resources & Applied Botany :</u> Botanical name, local name, Family, Chemical Components, useful part, morphology and uses of following plant.</p> <ul style="list-style-type: none"> • Brief account and uses of the followings. Medicinal plants: Neem, Senna, Isabgul, Ashwgandha. • Brief account and uses of the followings. Food Plants: Wheat, Gram, Sugar cane, Groundnut. • Brief account and uses of the followings. Natural Rubber: Hevea. 						

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II

Course Title: Anatomy, Embryology, Plant resources and Applied Botany
Practical/Lab course (Course code: MIN BOT-206 P)
Credit: 1

Course outcomes & objectives:

1. Understanding of plant anatomy and tissues using practical examples and skills.
2. To learn preparing and to studying plant embryology and process using suitable examples.
3. To learn practically about economically useful plants and there resources.

DISCIPLINE SPECIFIC CORE COURSE(MINOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.SC.	MINBOT-206 P	Pteridophytes, Gymnosperms and Angiosperms	1	30	25 Marks (15+10)
UNIT	TOPIC					
Unit 1	<p><u>Anatomy:</u>(single stain)</p> <p>Ex 1: To study normal secondary growth and arrangement of tissue in Sunflower Stem.</p> <p>Ex 2: To study normal secondary growth and arrangement of tissue in Sunflower Root.</p> <p>Ex 3: To study epidermal tissue system: Multilayered epidermis in Ficus/Nerium leaf.</p> <p>Ex 4: To study types of stomata in Dicot and Monocot.</p> <p>Ex 5: To study secretory tissue system: Glands, Nectaries. (External Glands)</p> <p>Ex 6: To study secretory tissue system. Resin and oil ducts. (Internal Glands)</p>					
Unit 2	<p><u>Embryology :</u> (temporary /Permanent slide)</p> <p>Ex 7: To study the slide showing T.s. of mature anther.</p> <p>Ex 8: To study germination of pollen grains.</p> <p>Ex 9: To study structures and types of Ovules.</p> <p>Ex 10: To study types of embryo sac.</p>					
Unit 3	<p><u>Plant resources & Applied Botany</u></p> <p>To study Botanical name, Family, Chemical Components, useful part, morphology and uses of following plant.</p> <p>Medicinal plants:</p> <p style="padding-left: 20px;">Ex 12: Neem.</p> <p style="padding-left: 20px;">Ex 13: Senna.</p> <p style="padding-left: 20px;">Ex 14: Isabgul.</p> <p style="padding-left: 20px;">Ex 15: Ashwgandha.</p> <p>Food Plants:</p> <p style="padding-left: 20px;">Ex 16: Wheat.</p> <p style="padding-left: 20px;">Ex 17: Gram.</p> <p style="padding-left: 20px;">Ex 18: Sugar cane.</p> <p style="padding-left: 20px;">Ex 19: Groundnut.</p> <p>Natural Rubber:</p> <p style="padding-left: 20px;">Ex 20: Hevea.</p>					

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2023-24 UNDER NEP-2020)

SEMESTER II

(Course code: MDC BOT-207)

Course Title: Anatomy, Embryology, Plant resources and Applied Botany

Credit: 3

Course outcomes and objectives:

After the completion of the course the students will be able to:

1. To develop understanding of plant anatomy, growth and different plant tissues.
2. To study general embryology and concepts.
3. To understand applied botany, plant applications and uses.

DISCIPLINE SPECIFIC CORE COURSE(MINOR)							
<i>COURSE</i>	<i>SEMESTER</i>	<i>COURSE CODE</i>	<i>COURSE TITLE</i>	<i>THEORY</i>			
				<i>Credits</i>	<i>Lectures</i>	<i>External</i>	<i>Internal</i>
<i>Certificate Course</i>	<i>B.SC. II</i>	<i>MDC BOT-207</i>	Anatomy, Embryology, Plant resources & Applied Botany	3	45	40 Marks	35 Marks
<i>UNIT</i>	<i>TOPIC</i>						
Unit 1	<p><u>Anatomy:</u></p> <ul style="list-style-type: none"> • Meristematic tissue. (Characteristics, Functions & Classification based on origin, basis of position,) • Primary growth and Secondary growth. (Normal & Anomalous) • Normal secondary growth in Sunflower stems & roots. • Tissue system – Epidermal, Secretary and Mechanical. 						
Unit 2	<p><u>Embryology :</u></p> <ul style="list-style-type: none"> • Microsporangium: Structure and development of a typical Anther, Anther wall, structure and function of various layer of mature anther wall, Microsporogenesis, Formation of pollen grain, Pollen germination. (Pollen tube growth) • Megasporangium: Structure of pistil, structure of female gametophyte (Embryo sac) & its types, types of ovule. • Pollination: Types and agents of pollination. • Fertilization. (Double fertilization) 						
Unit 3	<p><u>Plant resources & Applied Botany:</u> Botanical name, local name, Family, Chemical Components, useful part, morphology and uses of following plant.</p> <ul style="list-style-type: none"> • Brief account and uses of the followings. Medicinal plants: Neem, Senna, Isabgul, Ashwgandha. • Brief account and uses of the followings. Food Plants: Wheat, Gram, Sugar cane, Groundnut. • Brief account and uses of the followings. Natural Rubber: Hevea. 						

KSKV Kachchh University, Bhuj - Kachchh
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SEMESTER II:

Course Title: Anatomy, Embryology, Plant resources and Applied Botany
Practical/Lab course (Course code: MDC BOT-208 P)
Credit: 1

Course outcomes & objectives:

1. Understanding of plant anatomy and tissues using practical examples and skills.
2. To learn preparing and to studying plant embryology and process using suitable examples.
3. To learn practically about economically useful plants and there resources.

DISCIPLINE SPECIFIC CORE COURSE(MINOR)						
COURSE	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	Internal/External
Certificate Course	B.SC.	MDC BOT-208 P	Pteridophytes, Gymnosperms and Angiosperms	1	30	25 Marks (15+10)
UNIT	TOPIC					
Unit 1	<p><u>Anatomy:</u>(single stain)</p> <p>Ex 1: To study normal secondary growth and arrangement of tissue in Sunflower Stem.</p> <p>Ex 2: To study normal secondary growth and arrangement of tissue in Sunflower Root.</p> <p>Ex 3: To study epidermal tissue system: Multilayered epidermis in Ficus/Nerium leaf.</p> <p>Ex 4: To study types of stomata in Dicot and Monocot.</p> <p>Ex 5: To study secretary tissue system: Glands, Nectaries. (External Glands)</p> <p>Ex 6: To study secretary tissue system. : Resin and oil ducts. (Internal Glands)</p>					
Unit 2	<p><u>Embryology :</u> (temporary /Permanent slide)</p> <p>Ex 7: To study the slide showing T.s. of mature anther.</p> <p>Ex 8: To study germination of pollen grains.</p> <p>Ex 9: To study structures and types of Ovules.</p> <p>Ex 10: To study types of embryo sac.</p>					
Unit 3	<p><u>Plant resources & Applied Botany</u></p> <p>To study Botanical name, Family, Chemical Components, useful part, morphology and uses of following plant.</p> <p>Medicinal plants:</p> <p>Ex 12: Neem.</p> <p>Ex 13: Senna.</p> <p>Ex 14: Isabgul.</p> <p>Ex 15: Ashwgandha.</p> <p>Food Plants:</p> <p>Ex 16: Wheat.</p> <p>Ex 17: Gram,</p> <p>Ex 18: Sugar cane.</p> <p>Ex 19: Groundnut.</p> <p>Natural Rubber:</p> <p>Ex 20: Hevea.</p>					

[Signature]
9/8/23
(Col. 21571 9/8/23)
(BOS, Botany Chairman)