

# Bhakta Kavi Narsinh Mehta University



## Choice Based Credit System (CBCS) Syllabus For Semester V & VI (B.Sc.) “BOTANY”

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### Semester – V

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- Paper No.-501** : Biology of Seed Plants
- Paper No.-502** : Ecology
- Paper No.-503** : Instrumentation, Forest and Forestry, Micro-techniques, Medicinal Plants and Horticulture

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### Semester – VI

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- Paper No.-601** : Cryptogamic Botany and Gymnosperms
- Paper No.-602** : Physiology, Biochemistry, Biostatistics, Microbiology and Pathology
- Paper No.- 603** Cytogenetics, Molecular Biology, Genetic Engineering, Advance techniques

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INFORCE FROM JUNE – 2020

## **FOREWORD**

The renewal and updating of the course curriculum are the ingredients to any vibrant academic institution. The revision of the curriculum in the different subjects should be a continuous process with a view to providing the updated and thorough education to the students as well. To meet the requirements in today's perspectives and in order to enhance the quality and standards of education, updating and restructuring the curriculum from time to time must be continued as a perpetual process. In recent past, our Saurashtra University has implemented the Choice Based Credit System (CBCS) which is the need of hour for the sake of the students. We, the member of study board in Botany have designed the new curriculum for the students of third year (i.e. Semester V and VI) Botany. For designing the curriculum we followed the guidelines of UGC with respect to model syllabus. The exercise would not have been possible without the support of our faculty members. We hope that the aims and the objectives of our university will be accomplished and the students will come to the expectations of our society.

**Members of Botany Study Board  
Bhakta Kavi Narsinh Mehta University  
Junagadh**

# **Bhakta Kavi Narsinh Mehta University, Junagadh**

## **Revised syllabus of B.Sc. Botany as per UGC guidelines**

**Effective from June 2018**

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This curriculum consists of six theory papers and six practicals. Syllabus has been divided in to two semesters (i.e. semester – V and VI). Students have to study three papers in each semester and three practical's based on theory papers. The course is to be completed by assigning six periods for each theory and six periods for each practical per week. Practical periods are inclusive to field study.

### **GENERAL DETAILS OF THEORY PAPERS**

<b>Paper no.</b>	<b>Title of the papers</b>
<b>501</b>	Biology of Seed Plants
<b>502</b>	Ecology
<b>503</b>	Instrumentation, Forest and Forestry, Micro-techniques, Medicinal Plants and Horticulture
<b>601</b>	Cryptogamic Botany and Gymnosperms
<b>602</b>	Physiology, Biochemistry, Biostatistics, Microbiology and Pathogy
<b>603</b>	Cytogenetics, Molecular Biology, Genetic Engineering, Advance techniques

### **Pattern of Examination:**

There should be two internal exams per semester. An average 10 marks should be given for internal exams and that marks will be included in final aggregate results of the semester. Besides internal examination there are two assignments of the subjects to be submitted by the students and four surprise quizzes should be attended by the students. 10 marks for assignments and 10 marks for quize will be added to the final results of the semester. Total 30 marks are internally assessed and 70 marks for external (University Exams) exams, per paper. A student's performance in every practical session is assessed and marks for a maximum of 15 is given. External practical evaluation will carry 35 marks, so total 50 marks for each practical per paper examination will be counted. The pattern of semester exam will be as follows.

**SKELETON OF QUESTION PAPER FOR THEORY PAPERS (EXTERNAL EXAMS)**

**Total Scheme of evaluation**

Semester	Theory					Practical		
	Internal			External	Total	Performance during practical sessions	External	Total
	Exam	Assignment	Quiz					
V	10	10	10	70	100	15	35	50
VI	10	10	10	70	100	15	35	50

**Distribution of three theory papers and three practicals for each semester is as follows**

SEMESTER – V			
Papers	Title of the papers	Duration	Marks
V	Biology of Seed Plants	150 min	70
VI	Ecology	150 min	70
VII	Instrumentation, Forest and Forestry, Micro-techniques, Medicinal Plants and Horticulture	150 min	70
SEMESTER – VI			
VIII	Cryptogamic Botany and Gymnosperms	150 min	70
IX	Physiology, Biochemistry, Biostatistics, Microbiology and Pathology	150 min	70
X	Cytogenetics, Molecular Biology, Genetic Engineering, Advance techniques	150 min	70

**Practicals**

SEMESTER – V			
Practicals	Title of the practicals	Duration	Marks
I	Biology of Seed Plants	3 Hours	35
II	Ecology	3 Hours	35
III	Instrumentation, Forest and Forestry, Micro-techniques, Medicinal Plants and Horticulture	3 Hours	35
SEMESTER – VI			
IV	Cryptogamic Botany and Gymnosperms	3 Hours	35
V	Physiology, Biochemistry, Biostatistics, Microbiology and Pathology	3 Hours	35
VI	Cytogenetics, Molecular Biology, Genetic Engineering, Advance techniques	3 Hours	35

## **Project work**

Science is the field of experiment research and comprehensible reading. In order to fulfill these requirements our university has introduced the project work. So that student can have habit for reading research articles and able to understand the possible cause of current problems or can visualize the diverse nature of ecosystems and its organisms. Project work contains 100 marks. Project report (50 marks) should be submitted at the end of sixth semester and its viva voce and ppt presentation (50 marks) can be arranged during practical exams of sixth semester.

## **Submission work**

1. Permanent slides (minimum 6)  
Giant Chromosomes - 1, Mitosis -1, Meiosis-1, Double Stain- 2, Embryo- 1
2. Herbarium Sheets (minimum 10)
3. Rolling chart / project with academic value
4. During the academic year compulsorily arrange one study tour of rich biodiversity region of the the state and students have to submit tour report.
5. The students should visit to one of the following institution for study purpose
  - Agriculture University – Junagadh
  - National Research Center for Ground nut (NRCG) – Junagadh
  - Aurvedic College
  - Pharmaceutical college or Institute

**Semester – V**  
**New theory Syllabus**  
**BOTANY PAPER: - 501**  
**(BIOLOGY OF SEED PLANTS)**

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<b>UNIT:-I</b>	<b>ANGIOSPERMS</b>	<b>[12 Hours]</b>	<b>0.8 Credit</b>
I.1	Origin of Angiosperms		
I.2	Concept of taxon and taxonomy		
	I.2.1 Taxonomic categories		
	I.2.2 Concept of genus and species		
	I.2.3 Concept of families		
I.3	Classification systems of		
	I.3.1 Bentham and Hooker	I.3.2 Engler and Prantal	

**Reference Books:**

- |                           |                 |
|---------------------------|-----------------|
| 1. Taxonomy of angiosperm | V. N. Naik      |
| 2. Plant Taxonomy         | Saxena & Saxena |

**UNIT: II & III TAXONOMIC STUDIES OF FOLLOWING FAMILIES**  
**(According to Bentham and Hooker System) [ 24 Hours ] 1.6 Credits**

II.1	Detailed studies of family of Polypetalae		
	II.1.1 Anonaceae	II.1.2 Capparidaceae	
	II.1.3 Cucurbitaceae	II.1.4 Tiliaceae	
	II.1.5 Lythraceae		
II.2	Detailed studies of family of Gamopetalae		
	II.2.1 Asteraceae	II.2.2 Asclepiadaceae	
	II.2.3 Convolvulaceae	II.2.4 Solanaceae	
	II.2.5 Bignoneaceae		
II.3	Detailed studies of family of Monochlamydeae		
	II.3.1 Amaranthaceae	II.3.2 Polygonaceae	
	II.3.3 Moraceae		
II.4	Detailed studies of family of Monocotyledon		
	II.4.1 Canaceae	II.4.2 Cypraceae	

**Reference Books:**

- |   |              |
|---|--------------|
| 1. A textbook of Systematic Botany                | R.N.Sutaria  |
| 2. Taxonomy of Angiosperm & utilization of plants | A. K. Sharma |
| 3. Taxonomy of angiosperms                        | B.P.Pandey   |

<b>UNIT:- IV</b>	<b>EMBRYOLOGY</b>	<b>[12 Hours]</b>	<b>0.8 Credit</b>
III.1	Endosperm		
III.2	Embryo development in monocotyledons and dicotyledons		
III.3	Types of embryo		
III.4	Embryo culture: Methods and Applications		
III.5	Polyembryony		

**Reference Books:**

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|---------------------------|----------------------|
| 1. Embryology             | P.Maheshwary         |
| 2. Anatomy and embryology | Singh, Pandey & Jain |

**UNIT:- V ECONOMIC BOTANY**

**[12 Hours]**

**0.8 Credit**

- IV.1 Tea
- IV.2 Coffee
- IV.3 Tobacco
- IV.4 Fiber yielding plants
- IV.5 Oil seeds

**Reference Books:**

1. A textbook of economic Botany V.Verma
2. Economic Botany B.P.Pandey
3. A phytochemical approach to economic botany Dr. S. D. Sabnis

**Semester – V**  
**New theory Syllabus**  
**BOTANY PAPER: - 502**  
**(ECOLOGY)**

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**UNIT:- I      ECOLOGY AND AUTECOLOGY      [ 12 Hours]      0.8 Credit**

- I.1 Basic concept of ecology
- I.2 Ecological factors
  - I.2.1 Climatic
  - I.2.2 Biotic (Interaction among organisms)
- I.3 Biological clocks
- I.4 Liebig's law of the minimum; Shelford's law of tolerance

**Reference Books:**

- 1. Fundamentals of ecology      P. D. Sharma
- 2. A textbook of ecology      Vashistha & Gill

**UNIT:- II      PLANT COMMUNITY      [ 12 Hours]      0.8 Credit**

- II.1 Characters of community
- II.2 Characters used in community structures
- II.3 Methods of ecological studies

**Reference Books:**

- 1. Ecology and Environment      P.D.Sharma
- 2. Ecology and Soil Science      Shukla & Sharma
- 3. Ecology and sustainable development      S.Ramkrishnan

**UNIT:- III      SUCCESSION & POPULATION      [ 12 Hours]      0.8 Credit**

- III.1 Plant succession: Causes, trends, types, process, examples of succession
- III.2 Population characteristics
- III.3 Ecological niche

**Reference Books:**

- 1. Fundamentals of Ecology      E.P.Odum
- 2. A textbook of plant ecology      V. Verma

**UNIT:- IV      ECOSYSTEM      [ 12 Hours]      0.8 Credit**

- IV.1 Structure of ecosystem
- IV.2 Types of ecosystems
- IV.3 Energy flow in ecosystem system
- IV.4 Productivity of ecosystem
- IV.5 Ecological pyramids

**Reference Books:**

- 1. Cell bio. , mole. bio. , gen. , evo. & ecology      N.Arumugam
- 2. Environmental biology      H. R. Singh



- V.1 Concepts of biodiversity and it's level
- V.2 Keystone species
- V.3 Measuring biodiversity
- V.4 Pytogeographical regions of India
- V.5 Conservation of Biodiversity

**Reference Books:**

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|--------------------------|----------------|
| 1. Environmental studies | N. Arumugam    |
| 2. Biodiversity          | S. chakraborty |



**Reference Books:**

1. Medicinal Plants
2. Economic botany
3. Herbal, Biotech. & Pharmacognosy

S.K.Jain

S. N. Pandey

Dr. V. Kumarsan

**UNIT:- V HORTICULTURE**

- V.1 Gardening
- V.2 Kitchen garden
- V.3 Indoor gardening
- V.4 Lawn making

**[12 Hours]**

**0.8 Credit**

**Reference Books:**

1. Horticulture & plant breeding
4. Dry land horticulture in India

Prof. V. Kumaresan

Dr. P. P. Deshmukh



**Reference Books:**

- |                          |                     |
|--------------------------|---------------------|
| 5. A text book of Botany | Singh, Pande & Jain |
| 6. Pteridophyta          | B. P. Panday        |
| 7. Gymnosperms           | O. P. Sharma        |

**UNIT:- V PALEOBOTANY [12 Hours] 0.8 Credit**

- V.1 Nomenclature of fossils and types of fossils  
V.2 Morphology and stem anatomy of following Pteridophytes fossils.  
V.2.1 *Rhynia* V.2.2 *Lepidodendron*  
V.2.3 *Calamites*  
V.3 Morphology and stem anatomy of following gymnosperm fossils.  
V.3.1 *Lyginodendrone* V.3.2 *Cycadeoidea*  
V.3.3 *Cordites* V.3.4 *Pentoxylon*

**Reference books:**

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|--|--------------|
| 1. Diversity of Ptrido. , Gymno. & Paleobotany | Satish Kumar |
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**BOTANY PRACTICAL – 1**  
**Semester – V**  
**(Based on paper – 501 – P)**

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1. To study the different plant families mentioned in theory paper (minimum two plants should be studied in each family).
2. To study the different types of ovules through permanent slides:
3. Dissection and mounting of various types of embryo.
4. Economic importance of plants mention in theory paper.

**BOTANY PRACTICAL – 2**  
**Semester – V**  
**(Based on paper – 502 – P)**

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1. To determine the minimum size of the quadrat by species area curve.
2. To demonstrate the frequency of various species occurring in a given area.
3. To demonstrate the density and abundance of various species occurring in given area.
4. To demonstrate the vegetational cover in a given area.
5. To study the species composition of an area for analyzing the biological spectrum and comparison with Raunkiaer's normal biological spectrum.
6. Comparison of dissolved oxygen (DO) content of polluted and non-polluted water by iodometric titration method.
7. Estimation of water hardness.
8. To study Bacteria in T.S. of root nodule.

**BOTANY PRACTICAL – 3**  
**Semester – V**  
**(Based on paper – 503 – P)**

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1. To study the principle, functions and applications of the instruments mentioned in the theory.
2. To measure the height of the trees in college campus.
3. Find out the basal cover and canopy cover of the plants of college campus.
4. To create a design of residential land scape garden (minimum three).
5. To study medicinal properties of medicinal plants mention in theory syllabus.
6. Microtomy: Block preparation, sectioning, staining methods.
7. To study botanical uses of spices and condiments.
8. To demonstrate herbarium techniques.

**BOTANY PRACTICAL – 4**  
**Semester – VI**  
**(Based on paper – 601 – P)**

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1. Studies of algal genera with reference to the genus mentioned in theory with the help of class work materials and permanent slides for their vegetative and reproductive structures.
2. Studies of fungal genera with reference to the genus mentioned in theory with the help of class work materials and permanent slides for their vegetative and reproductive structures.
3. Studies of morphology, anatomy and reproductive structure of representative bryophytes mentioned in theory paper.
4. Studies of morphology, anatomy and reproductive structure of representative Pteridophytes mentioned in theory paper.
5. Studies of morphology, anatomy and reproductive structure of representative gymnosperms mentioned in theory paper.
6. Studies of fossil genera through slides and specimens mentioned in theory papers.

**BOTANY PRACTICAL – 5**  
**Semester – VI**  
**(Based on paper – 602 – P)**

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1. To study different type of stomata.
2. Qualitative analysis of carbohydrates (Fehling's test, Benedict's test, Barfoed's test, Molisch's test, Anthrone test).
3. Qualitative analysis of proteins (Xanthoproteic Reaction, Biuret test, Millon's test, Hopkin's test)
4. Qualitative test for lipid (Sudan-II, Acrolein test, Solubility test, Emulsification test)
5. Estimation of fatty acid by titration.
6. Calculation of central tendencies –mean, median and mode (minimum four exercise)
7. Calculation of standard deviation (minimum three exercise)
8. Calculation of Variance. (minimum three exercise)
9. Calculation of chi-square test (minimum three exercise)
10. To study the bacterial cell morphology through Gram's staining.
11. To study plat disease as per theory.

**PRACTICAL – 6**  
**Semester – VI**  
**(Based on paper – 603 – P)**

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1. Demonstration of salivary gland chromosomes from *Chironomous* larva by Aceto orcein technique.
2. To detect presence of cell wall components.(Cellulose, Lignin, Mucilage & suberin)
3. To study chloroplast in plants.
4. To study the mitosis by Squash technique of onion root tip.
5. To study meiosis by smear technique
6. To prepare the TLC slides and separate the given biological mixture.
7. Double stain (Permanent slide) preparation.

**Reference Books:**

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|---|----------------|
| 1. A textbook of Practical Botany Vol.–I,II & III | Bendra & Kumar |
| 2. Modern Practical Botany Vol.I,II & III         | B.P. Pandey    |

## B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V

Practical – 1

(Based on paper – 501 – P)

Times:- 3 hours

Total Marks:- 35

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- Question: 1** Identify and classify given Specimen A, B & C and write floral formula floral diagram [12]
- Question: 2** Identify the given family by dissect the flower and expose the floral parts show it to examiner Specimen D [04]
- Question: 3** Prepare the slide of given Specimen E. [03]
- Question: 4** Rotation: Identify & Describe Specimen F, G [06]
- Question: 5** Viva voce [05]
- Question: 6** Certified Journal [05]

## B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V

Practical – 2

(Based on paper – 502 – P)

Times:- 3 hours

Total Marks:- 35

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- Question: 1** Measure the DO/Hardness of given water sample. [12]
- Question: 2** Find out frequency/density/abundance/veg.cover of plant species [10]
- Question: 3** Prepare slide of given material and show to the examiner [05]
- Question: 4** Viva voce [04]
- Question:5** certified Journal [04]

## B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V

Practical – 3

(Based on paper – 503– P)

Times:- 3 hours

Total Marks:- 35

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**Question: 1** Measure the Hight/Canopy cover/Basel cover of the tree. [07]

**Question: 2** Create a design of resident land scape garden [07]

**Or**

**Question: 2** Take a thin section from given block and prepare the slide.

**Question: 3** Rotation: Identify & Describe Specimen A, B & C [09]

**Question: 4** Submission: Ten herbarium sheets [07]

**Question: 5** Certified Journal [05]

## B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI

Practical – 4

(Based on paper – 601– P)

Times:- 3 hours

Total Marks:- 35

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**Question: 1** Identify, classify & describe with labeled diagram

Specimen A, B & C [12]

**Question: 2** Identify & Describe Specimen D & E [08]

**Question: 3** Expose and show the preparation of Specimen F to the examiner [03]

**Question: 4** Rotation: Identify & Describe fossils Specimen G & H [08]

**Question: 5** Certified Journal [04]

## B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI

Practical – 5

(Based on paper – 602– P)

Times:- 3 hours

Total Marks:- 35

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<b>Question: 1</b>	Two qualitative test for given sample(carbo./pro./lipid)	[06]
<b>Question: 2</b>	Quantitative estimation of given sample	[04]
<b>Question: 3</b>	Calculation of given exercise (any two can be ask)	[08]
<b>Question:4</b>	prepare a slide of stomata of given specimen & show to examiner	[05]
<b>Question: 5</b>	Perform Gram's staining	[04]
<b>Question: 6</b>	Identify and describe plant disease specimen	[05]
<b>Question: 7</b>	Certified Journal	[03]

## B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI

Practical – 6

(Based on paper – 603– P)

Times:- 3 hours

Total Marks:- 35

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<b>Question: 1</b>	Prepare a slide from a given sample (giant chromosome/chloroplast) and show to examiner	[06]
<b>Question: 2</b>	Prepare a slide from a given sample (mitosis / meiosis) and show to examiner	[05]
<b>Question: 3</b>	To detect presence of cell wall component (cellulose/lignin/mucilage/suberin)	[06]
<b>Question: 4</b>	separate the given biological sample with TLC	[05]
<b>Question: 5</b>	Submission work :	
	Permanent slide & chart	[06]
	tour report	[04]
<b>Question: 6</b>	Certified Journal	[03]



