



Bhakta Kavi Narsinh Mehta University Junagadh

Syllabus on the bases of Choice Based Credit System (CBCS)

For

Semester V & VI (T.Y. B.Sc.)

SUBJECT- BOTANY

Semester – V		Semester – VI	
Paper No.	Title of the papers	Paper No.	Title of the papers
B-501	Cryptogamic Botany and Plant Pathology	B-601	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy
B-502	Biology of Seed Plants	B-602	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity
B-503	Ecology	B-603	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany
PROJECT	Project Work should be done during whole year – 100 Mark		

INFORCE FROM JUNE - 2018



FORWARD

Renewing and updating of the curriculum is an essential part of any vibrant university academic system. Revising the curriculum should be continues process to provide an updated education to the students at large. To meet the need and requirement of the society and in order to enhance the quality and standards of education, updating and restructuring of the curriculum must continue as a perpetual process. As a part of duty of study board, we the member of botany study board designed the new curriculum for third year (i.e. semester V& VI) botany students. For designing of the curriculum we followed the UGC guideline for model curriculum. The exercise would not have been possible without the support of our respected faculties of botany. We hope that the results will fulfill expectations of the society.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Syllabus of Semester – V& VI (T.Y. B.Sc.) Botany

Effective from June 2018

This curriculum consists of six theory papers and six practical. Syllabus has been divided in to two semesters (i.e. semester – V and VI). Students have to study three paper in each semester and three practical 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 of field study.

GENERAL DETAILS OF COURSE CREDIT

Paper no.	Title of the papers	Theory Credit	Practical Credit	Total Credit
B-501	Cryptogamic Botany and Plant Pathology	04	02	06
B-502	Biology of Seed Plants	04	02	06
B-503	Ecology	04	02	06
B-601	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy	04	02	06
B-602	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	04	02	06
B-603	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany	04	02	06
PROJECT	Project Work (work should be done during whole year)			

Pattern of Examination:

Students will have to attend theory and practical both during the semester and at the end of semester, University exams will be conducted. Examination contains 70% external and 30% internal marks. A student's performance during every practical session is assessed and marks for a maximum of 15 is recorded. External practical evaluation will carry 35 marks, so total 50 marks for each practical per paper examination will be counted. Internal assessment for theory can be following any one as mention below.

Sr. No.	Pattern of Internal Exam	Marks
A	Assignments	10
	MCQ Written Test	10
	Seminar/ presentation/	10
OR		

B	MCQ Written Test	30
OR		
C	Assignments	10
	MCQ Written Test	20
OR		
D	Seminar/ presentation	10
	MCQ Written Test	20

**SKELETON OF THEORY EXAMINATION
(SEMESTER – I to VI)**

Paper Style for All Semester

1. The syllabus consists of five Units.
2. All Units carry equal marks.
3. There should be five questions in a question paper.
4. One question is to be asked from each Unit.
5. Each question carries 14 marks.
6. Time duration of 70 marks question paper is 2:30 hours.
7. Each question should be divided into a, b and c as shown below.
 - a. Answer the following. (Any one out of Two)----- (07 marks)
(Theory Question)
 - b. Attempt any one. (Out of Two)----- (04 Marks)
(Application/Example/Problem/Theory)
 - c. Attempt any three. (Out of Five) ----- (03 Marks)
(short answer/one word/one line/true or false/fill up the blanks)

Total Scheme of evaluation

Semester no.	Theory mark			Practical mark		
	Internal	External	Total	Internal	External	Total
V	30	70	100	15	35	50
VI	30	70	100	15	35	50

Course structure and Unique Code
Syllabus of Semester – V & VI (T.Y. B.Sc.) Botany
Effective from June 2018

No	Course	Sem.	Paper name	Paper No.	Credit	Unique Code No of Paper					
						Year	Faculty	Subject	Level	Sem	Option
01	UG	V	Cryptogamic Botany and Plant Pathology	B-501	06	2018	03	001509	01	05	00
02	UG	V	Biology of Seed Plants	B-502	06	2018	03	001510	01	05	00
03	UG	V	Ecology	B-503	06	2018	03	001511	01	05	00
04	UG	VI	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy	B-601	06	2018	03	001611	01	06	00
05	UG	VI	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	B-602	06	2018	03	001612	01	06	00
06	UG	VI	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany	B-603	06	2018	03	001613	01	06	00

GENERAL DETAILS OF THEORY PAPERS

SEMESTER -V	
Paper no.	Title of the papers
B-501	Cryptogamic Botany and Plant Pathology
B-502	Biology of Seed Plants
B-503	Ecology
SEMESTER -VI	
B-601	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy
B-602	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity
B-603	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany

Practicals

SEMESTER – V			
Practical	Title of the practicals	Duration	Marks
I	Cryptogamic Botany and Plant Pathology	3 Hours	35
II	Biology of Seed Plants	3 Hours	35
III	Ecology	3 Hours	35
SEMESTER – VI			
IV	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy	3 Hours	35
V	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	3 Hours	35
VI	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany	3 Hours	35
PROJECT	Project Work (work should be done during whole year)	3 Hours	100

Project work

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

Submission work

- Permanent slides (minimum 6)
 - Giant Chromosomes - 1, Mitosis -1, Meiosis-1, Double Stain- 2, Embryo- 1
- Herbarium Sheets (minimum 10)
- Rolling chart / project with academic value
- During the academic year compulsorily arrange one study tour of rich biodiversity region of the country outside the state and students have to submit tour report.
- 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
 - Field visit : Forest area / Rich biodiversity area / garden / dam site area
- Students should start preparation of the submission work from Vth–Semester. Submission work must be presented on third day of practical exam of semester – VIth.

Semester – V
New theory Syllabus
BOTANY PAPER: B-501
(CRYPTOGAMIC BOTANY AND PLANT PATHOLOGY)

UNIT: - I ALGAE [14 marks]

- I.1 Life history of following genus (Excluding development)
 - I.1.1 *Coleochetae* I.1.2 *Caulerpa*
 - I.1.3 *Chara* I.1.4 *Ectocarpus*
- I.2 Evolution of sex in algae

UNIT: - II FUNGI [14 marks]

- II.1 Life history of following genus (Excluding development)
 - II.1.1 *Peziza* II.1.2 *Alternaria*
- II.2 Different types of spores in fungi

UNIT: - III BRYOPHYTES [14 marks]

- III.1 Life history of following genus (Excluding development)
 - III.1.1 *Pellia* III.1.2 *Sphagnum*

UNIT: - IV PTERIDOPHYTES [14 marks]

- IV.1 Life history of following genus (Excluding development)
 - IV.1.1 *Ophioglossum* IV.1.2 *Marsilea*
- IV.2 Morphology and anatomy of *Rhynia*, *Lepidodendron*
- IV.3 Morphology and anatomy of *Calamites*

UNIT: - V PLANT PATHOLOGY [14 marks]

- V.1 General Symptoms of diseases
- V.2 Study of different diseases of plants
 - V.2.1 Tikka disease of ground nut
 - V.2.2 Red rot of sugarcane
 - V.2.3 Whip smut of sugarcane
 - V.2.4 Citrus canker
 - V.2.5 Leaf curl of papaya
- V.3 Plant disease control

Semester – V
New theory Syllabus
BOTANY PAPER: B-502
(BIOLOGY OF SEED PLANTS)

UNIT: - I GYMNOSPERMS [14 marks]

- I.1 Life history of following genus (Excluding development)
 - I.1.1 *Ephedra* I.1.2 *Gnetum*
- I.2 Morphology and anatomy of *Lyginodendron*, *Cycadeoidea*
- I.3 Morphology and anatomy of *Cordites*, *Pentoxylon*

UNIT:-II ANGIOSPERMS [14marks]

- II.1 Concept of taxon and taxonomic hierarchy
 - II.1.1 Taxonomic categories
 - II.1.2 Concept of genus and species
 - II.1.3 Concept of families
- II.2 Principles of taxonomy
- II.3 Classification systems of Bentham and Hooker

UNIT: III TAXONOMIC STUDIES OF FOLLOWING FAMILIES [28 marks]
(According to Bentham and Hooker System)

- III.1 Detailed studies of family of Polypetalae
 - III.1.1 Capparidaceae III.1.2 Tiliaceae
 - III.1.3 Lythraceae III.1.4 Rosaceae
- III.2 Detailed studies of family of Gamopetalae
 - III.2.1 Asteraceae III.2.2 Asclepidaceae
 - III.2.3 Convolvulaceae III.2.4 Solanaceae
 - III.2.5 Bignoneaceae
- III.3 Detailed studies of family of Monochlamydeae
 - III.3.1 Amaranthaceae III.3.2 Polygonaceae
- III.4 Detailed studies of family of Monocotyledon
 - III.4.1 Canaceae III.4.2 Cypraceae

UNIT:- IV EMBRYOLOGY [14 marks]

- IV.1 Types and function of endosperm
- IV.2 Embryo development in monocotyledons (sagittaria type)
- IV.3 Embryo development in dicotyledons (crucifer type)
- IV.4 Characters of pollen grain and factors affecting pollen germination.

Semester – V
New theory Syllabus
BOTANY PAPER: B-503
(ECOLOGY)

UNIT: - I INTRODUCTION TO ECOLOGY [14 marks]

- I.1 Structure of ecosystem
- I.2 Types of ecosystems
- I.3 Energy flow in ecosystem system
- I.4 Productivity of ecosystem

UNIT: - II COMMUNITIES STRUCTURE AND CLASSIFICATION [14 marks]

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

UNIT: - III ECOLOGICAL SUCCESSION, POPULATOION [14 marks]

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

UNIT: - IV AUTECHOLOGY [14 marks]

- IV.1 Biological clocks
- IV.2 Liebig's law of the minimum; Shelford's law of tolerance
- IV.3 Principle of limiting factors and ecological factors
- IV.4 Ecological concept of species and individuals

UNIT: - V ECOLOGICAL MANAGERMENTS [14 marks]

- V.1 Environmental education and organization
- V.2 Environmental laws
- V.3 GPS

Semester – VI
New theory Syllabus
BOTANY PAPER: B-601
(GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY,
HORTICULTURE, PLANT BREEDING AND ANATOMY)

UNIT: - I GENETICS [14 marks]

- I.1 Linkage (coupling and repulsion hypothesis)
- I.2 Crossing over (chromosome mapping)
- I.3 Structure of RNA
- I.4 Gene mutations (somatic/germ line and spontaneous / induced)

UNIT: - II MOLECULAR BIOLOGY [14 marks]

- II.1 Restriction endonucleases
- II.2 Cloning vectors
- II.3 Techniques used in recombinant DNA technology.
- II.4 Gene expression in prokaryotes (Lac operon concept)

UNIT: - III BIOTECHNOLOGY [14 marks]

- III.1 Transgenic plants
- III.2 Tissue culture: media preparation technique and application
- III.3 Cryopreservation and germplasm storage

UNIT: - IV HORTICULTURE AND PLANT BREEDING [14 marks]

- IV.1 Aims, objective and impacts of plant breeding
- IV.2 Techniques of hybridization, Emasculation, Bagging, Tagging
- IV.4 Self pollinated plants: Pedigree method, Bulk method
- IV.4 Horticulture: propagation methods (cutting, layering, budding and grafting)

UNIT: - V ANATOMY [14 marks]

- V.1 Simple tissues
- V.2 Complex tissues
- V.4 Anomalous secondary growth in stem (Salvadora, Bougainvillea)
- V.5 Histological techniques: Microtome, Block preparation, Sectioning and Staining

Semester – VI
New theory Syllabus
BOTANY PAPER: B-602
(PLANT PHYSIOLOGY, BIOCHEMISTRY, BIOSTATISTIC,
MICROBIOLOGY AND BIODIVERSITY)

UNIT: - I PLANT PHYSIOLOGY [14 marks]

- I.1 Germination: Different phases of germination, Factors affecting germination
- I.2 Respiration: Pentose phosphate pathway (PPP)
- I.3 Plant Growth Regulators (Auxins, Gibberellins, Cytokinins, Absciscic acid, Ethylene): biosynthesis and physiological functions
- I.4 Stress Physiology: Light stress and Temperature stress- Injury and resistance

UNIT: - II BIOCHEMISTRY [14 marks]

- II.1 Carbohydrates – classification, properties and functions
- II.2 Proteins – classification and Structure and functions (Primary, secondary, tertiary and quaternary)
- II.3 Lipids – classification, structure and functions
- II.4 Enzymes – classification and inhibition

UNIT: - III BIOSTATISTIC [14 marks]

- III.1 Concept of population and Sample
- III.2 Measures of central tendency: Mean, Mode and Median
- III.3 Measures of dispersion: Standard deviation, Coefficient of variation

UNIT: - IV MICROBIOLOGY [14 marks]

- IV.1 Ultra structure of *E.coli* and T4 Phage
- IV.2 Staining and sterilization methods
- IV.3 Culture media and concept of pure culture
- IV.4 Methods of population estimation, growth determination

UNIT: - V BIODIVERSITY [14 marks]

- V.1 Concept of biodiversity
- V.2 Different Levels in Biodiversity organization
- V.3 Biodiversity conservation strategies
- V.4 Biodiversity for human welfare

Semester – VI
New theory Syllabus
BOTANY PAPER: B-603
(INSTRUMENTATION, ADVANCE TECHNIQUES IN BIOLOGY, FOREST AND FORESTRY, MEDICINAL PLANTS AND ECONOMIC BOTANY)

UNIT: - I	INSTRUMENTATION	[14 marks]
	Principle, design, function of following instruments	
I.1	Spectrophotometer	
I.2	Autoclave	
I.3	Incubator	
I.4	Centrifuge	
I.5	Oven	
UNIT: - II	ADVANCE TECHNIQUES IN BIOLOGY	[14 marks]
II.1	TLC, HPLC, GC	
II.2	Electrophoresis	
II.3	PCR	
UNIT: - III	FOREST AND FORESTRY	[14 marks]
III.1	Classification of Indian forests	
III.2	Social forestry and Agricultural Forestry	
III.3	Physical properties, structural features and identification of wood	
III.4	Wild life and biosphere reserves	
III.5	Study tour of rich biodiversity region of the country outside the state and students have to submit tour report	
UNIT:-IV	MEDICINAL PLANTS	[14 marks]
IV.1	Scientific name, family, distribution, parts used and uses of following medicinal plants:	
IV.1.1	Tulsi	IV.1.2 Neem
IV.1.4	Ashwagandha	IV.1.5 Bili
IV.1.7	Eucalyptus	IV.1.6 Nagod
UNIT: - V	ECONOMIC BOTANY	[14 marks]
V.1	General account, methods of cultivation, botanical name, family and use:	
V.1.1	Cereals (Wheat, Rice and Maize)	
V.1.2	Pulses (Gram, green gram and Pea)	
V.1.3	Beverages (Tea and coffee)	
V.1.4	Oils (Groundnut and sesamum)	
V.1.5	Spices (Taj, Laving, cardamom)	

T.Y.B.Sc. – BOTANY
PRACTICAL – 1
Semester – V
(Based on paper B-501 – P)

1. Studies of *coleochetae* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
2. Studies of *caulerpa* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
3. Studies of *chara* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
4. Studies of *ectocarpus* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
5. Studies of *alternaria* fungi with help of class work materials and permanent slides for their vegetative and reproductive structures.
6. Studies of *peziza* fungi with help of class work materials and permanent slides for their vegetative and reproductive structures.
7. Studies of morphology, anatomy and reproductive structure of *pellia*.
8. Studies of morphology, anatomy and reproductive structure of *sphagnum*.
9. Studies of morphology, anatomy and reproductive structure of *ophioglossum*.
10. Studies of morphology, anatomy and reproductive structure of *marsilea*.
11. Study of plant diseases: Tikka disease of ground nut; Red rot of sugarcane; Whip smut of sugarcane; Citrus canker

PRACTICAL – 2
Semester – V
(Based on paper B-502 – P)

1. To study the anatomical structure of stem of *Ephedra* and *Gnetum* by section cuttings
2. To study the structure of leaf, leaf appendages, venation and stomata of *Ephedra* and *Gnetum*
3. To study the structure of the male and female cones of *Ephedra* and *Gnetum*
4. To study the different plant families mentioned in theory paper (minimum two plants should be studied in each family).
5. To study the different types of ovules through permanent slides:
6. Dissection and mounting of various types of embryo.

PRACTICAL – 3
Semester – V
(Based on paper B-503 – P)

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 water holding capacity.
5. Test for the presence of carbonate, nitrate and deficiency of replaceable bases.
6. Test for the presence of inorganic salts in the soil samples.
7. Comparison of dissolved oxygen (DO) content of polluted and non-polluted water by iodometric titration method.
8. Estimation of water hardness.
9. Estimation of Biological oxygen demand (BOD)

PRACTICAL – 4
Semester – VI
(Based on paper B-601 – P)

1. Demonstration of salivary gland chromosomes from *Chironomus* larva by Aceto orcein technique.
2. To study the mitosis by Squash technique of onion root tip.
3. To study meiosis by smear technique
4. To understand the concept of gene expression through chart method.
5. To study the different plant tissues by using appropriate materials.
6. To study the anomalous secondary growth in stem (salvadora and Bougainvillea)
7. To study the histological techniques : Microtome, Block preparation
8. Section cutting through microtome (In practical exam readymade block will be provided to the student).
9. Staining (In practical exam readymade slide will be provided to the students for staining).

PRACTICAL – 5
Semester – VI
(Based on paper B-602 – P)

1. To demonstrate the phenomenon of dialysis
2. To extract and separate chloroplast pigments by solvent method and demonstrate fluorescence in chloroplast extracts.
3. Preparation of solutions: Molar, Molal, Normal, Percent Concentrations
4. Qualitative analysis of carbohydrates (Fehling's test, Benedict's test, Barfoed's test, Molisch's test, Anthrone test)
5. Qualitative analysis of proteins (Xanthoproteic Reaction, Millon's test, Hopkin's test)
6. Biuret test for protein estimation.
7. Estimation of fatty acid by titration
8. Qualitative analysis of Amylase enzymes.
9. Calculation of central tendencies –mean, median and mode (minimum three exercise)
10. Calculation of standard deviation (minimum three exercise)
11. To study the bacterial cell morphology through Gram's staining.

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

1. To study the principle, functions and applications of the instruments mentioned in the theory.
2. To prepare the TLC slides and separate the given biological mixtures.
3. Separation of protein through electrophoresis technique
4. To measure the height of the trees in college campus.
5. Find out the basal cover and canopy cover of the plants of college campus.
6. Identification and characteristics of wood samples: (a) *Tectona grandis* (b) *Eucalyptus* sp. (c) *Acacia arabica*
7. Extraction of phyto-pharmaceuticals:
 - 8.1 Extraction of calcium citrate from lemon
 - 8.2 Isolation of starch from potatoes
8. Separation of plant extraction and application of separated plant ingredients as source of medicines: Tulsi, Neem and Aardul
9. Prepare ten herbarium sheets for submission.
10. Utilization of plants for human welfare: Cereals, Pulses, Beverages, Oils and Timber
11. To study the medicinal plants as per theory syllabus - Tulsi , Neem , Aardul, Ashwagandha, Bili , Nagod , Eucalyptus

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V

Practical – 1

(Based on paper B-501 – P)

Times: - 3 hours

Total Marks: - 35

Q – 1	Identify & describe with labeled diagram <u>Specimen A & B</u>	[08]
Q – 2	Identify & Classify with reasons <u>Specim C and D</u>	[08]
Q – 3	Expose & show the preparation of <u>Specimen E</u> to the examiner	[05]
Q – 4	Rotation: Identify & Describe <u>Specimen F, G, H</u>	[06]
Q – 5	(a) Viva voce	[05]
	(b) Certified Journal	[03]

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V

Practical – 2

(Based on paper B-502 – P)

Times: - 3 hours

Total Marks: - 35

Q – 1	Identify & describe with labeled diagram <u>Specimen A & B</u>	[08]
Q – 2	Identify the given family and dissect the flower and expose the floral parts show it to examiner <u>Specimen C</u>	[03]
Q – 3	Classify with reasons & draw the floral diagram and floral formula of <u>Specimen D&E</u>	[08]
Q – 4	Prepare the slides of given materials <u>Specimen F</u>	[04]
Q – 5	Rotation: Identify & Describe <u>Specimen G, H</u>	[04]
Q – 6	(a) Viva voce	[05]
	(b) Certified Journal	[03]

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V

Practical – 3

(Based on paper B-503 – P)

Times: - 3 hours

Total Marks: - 35

Q – 1	Find out the frequency / density of _____ plant species	[05]
Q – 2	Measure the water holding capacity of given soil sample	[03]
Q – 3	Find out the presence of carbonate, nitrate / inorganic salts in a given samples	[05]
Q – 4	Measure the dissolved oxygen (DO) of given water sample	[07]
Q – 5	Estimation of hardness of given water sample	[07]
Q – 6	(a) Viva voce	[05]
	(b) Certified Journal	[03]

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI

Practical – 4

(Based on paper B-601 – P)

Times:- 3 hours

Total Marks:- 35

Q – 1	Prepare the slide of giant chromosome slide	[05]
Q – 2	Perform the exercise of mitosis / meiosis	[05]
Q – 3	Take the thin section of given specimen A and - show the _____ tissues to the examiner	[05]
Q – 4	Take the thin section of given specimen B (anomalous - secondary growth) and show the examiner	[05]
Q – 5	Prepare a slide of given specimen C with double staining method- and show it to the examiner	[07]
Q – 6	(a) Viva voce	[05]
	(b) Certified Journal	[03]

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI

Practical – 5

(Based on paper B-602 – P)

Times: - 3 hours

Total Marks: - 35

Q – 1	Perform the qualitative test for Carbohydrate / Protein / Enzyme	[05]
Q – 2	Calculation of Central tendencies	[04]
Q – 3	Calculation of standard deviation	[05]
Q – 4	Gram Staining	[05]
Q – 5	Perform the exercise given by the examiner	[08]
Q – 6	(a) Viva voce	[05]
	(b) Certified Journal	[03]

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI

Practical – 6

(Based on paper B-603 – P)

Times: - 3 hours

Total Marks: - 35

Q – 1	Perform the exercise given by the examiner	
	(TLC / tree height)	[04]
Q – 2	Extract out the given plant materials	[02]
Q – 3	Rotation - specimen A, B and C	[06]
Q – 4	Tour report and institutional visit	[10]
Q – 5	Submission work	[05]
Q – 6	(a) Viva voce	[05]
	(b) Certified Journal	[03]

T.Y.B.Sc. – BOTANY PROJECT WORK

Semester – VI

Times: - 3 hours

Total Marks: - 100

Project work: The report of the project work should be submitted for assessment.

A list of reference books

- | | |
|--|------------------------|
| 1. A text book of Algae | A.V.S.S.Sambamurty |
| 2. A text book of Botany | Singh, Pande & Jain |
| 3. A textbook of ecology | Vashistha & Gill |
| 4. A textbook of economic Botany | V.Verma |
| 5. A textbook of Practical Botany Vol.–I & Vol.–II | Bendra & Kumar |
| 6. A textbook of Systematic Botany | R.N.Sutaria |
| 7. Algae | B.R.Vashishta |
| 8. Algae | G.L.Chopra |
| 9. An Introduction to plant tissue culture | M.K.Razdan |
| 10. An introduction to taxonomy of angiosperms | Shukla P. & S.P.Sharma |
| 11. Anatomy and embryology | Singh, Pandey & Jain |
| 12. Applied Plant Biotechnology | V.L.Chopra |
| 13. Basic concept in biochemistry | H.F.Gilbert |
| 14. Biochemistry | Lehninger |
| 15. Biochemistry | S.K.Dasgupta |
| 16. Biostatistics | P. Ramakrishnan |
| 17. Biotechnology | M.D.Trevan & et.al |
| 18. Bryophytes | B.R.Vashishta |
| 19. College Botany Vol. – I & Vol. – II | B.P.Pandey |
| 20. Cryptogamic Botany Vol. – I & Vol. – II | G.M.Smith |
| 21. Ecology and Environment | P.D.Sharma |
| 22. Ecology and Soil Science | Shukla & Sharma |
| 23. Ecology and sustainable development | S.Ramkrishnan |
| 24. Economic Botany | B.P.Pandey |
| 25. Embryology | P.Maheshwary |
| 26. Forest and Forestry | K.P.Sagariya |
| 27. Fundamental of biochemistry | V.K.Jain |
| 28. Fundamentals of Ecology | E.P.Odum |

29. Gene IX	Benzamin & lewin
30. Genetics Today	Jagjit Singh
31. Genetics	A.M.Winchester
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