SHIVAJI UNIVERSITY, KOLHAPUR

B
Accredited By NAAC
(2009)
Revised Syllabus For

Bachelor of Science (part III) Botany, Seed Technology
&
Plant Protection

(Subject to modifications to be made time to time)

Syllabus to be implemented from June-2010

A) Ordinance and Regulation

(As applicable to Degree Course)

B)SHIVAJI UNIVERSITY, KOLHAPUR

Revised Syllabus For Bachelor of Science

B.Sc. III Botany (Optional), Seed Technology (Vocational), Plant Protection (IDS)

GENERAL OBJECTIVES OF COURSE

(As applicable to Degree Course)

OBJECTIVES: -

_ To impart knowledge of Science is the basic objective of education.

_ To develop scientific attitude is the major objective to make the students open minded, critical, curious.

_ To develop skill in practical work, experiments and laboratory materials and equipments along with the collection and interpretation of scientific data to contribute the science.

_ To understand scientific terms, concepts, facts, phenomenon and their relationships.

_ To make the students aware of natural resources and environment.

_ To provide practical experience to the students as a part of the course to develop scientific ability to work in the field of research and other fields of their own interest and to make them fit for society.

_ To The students are expected to acquire knowledge of plant and related subjects so as to understand natural phenomenon, manipulation of nature and environment in the benefit of human beings.

_ To develop ability for the application of the acquired knowledge to improve agriculture and other related fields to make the country self reliant and sufficient.

_ To create the interest of the society in the subject and scientific hobbies, exhibitions and other similar activities.

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DURATION: -

_ The course shall be of full time course.

PATTERN: -

_ Pattern of Examination will be Annual.

FEE STRUCTURE: -

_ Refer brochure and prospectus of concern affiliated college/ institute to Shivaji University, Kolhapur.

_ Other fee will be applicable as per rules and norms Shivaji University, Kolhapur.

ADMISSION PROCEDURE: -

_ As per guidelines obtained from Shivaji University, Kolhapur by following rules and regulations regarding reservations by Govt. Of Maharashtra.

MEDIUM OF INSTRUCTION: -

_ The medium of instruction shall be in English.

STRUCTURE OF COURSE: -

B.Sc. III – Botany (Optional)

Sr.No.	Paper Number		Marks
1	Paper- V		100
2	Paper -VI		100
3	Paper -VII		100
4	Paper -VIII		100
5	Practical- I		50
6	Practical- II		50
7	Practical –III		50
8	Practical -IV		50
9		Total	600

SCHEME OF EXAMINATION: -

_ Question papers will be set in the view of the / in accordance with the entire syllabus and preferably covering each unit of the syllabus.

STANDARD OF PASSING: -

_ As prescribed under rules and regulations for each degree course.

OTHER FEATURES: -

_ In capacity / Number of students is as per university rules.

_ Teachers qualifications is as per laid down by Govt. Of Maharashtra and **Shivaji University, Kolhapur.**

_ Workload for each teacher is 20 lectures per week.

_ Workload details should be as per Apex body / UGC / State of Maharashtra / **Shivaji University norms.**

_ Library be equipped with Required Reference and Textbooks, Journals, Periodicals for higher and advanced studies are as per stated in revised syllabus and approved by BOS.

_ Specific Equipments like TV, LCD,OHP, PCs with necessary software and operating systems etc.are necessary to run the course.

LABORATORY SAFETY EQUIPEMENTS: -

_ Fire extinguishers at least two sets in each laboratory of 600 sq.ft. Area.

_ Leakage of gases be avoided.

_ First aid kit be made available.

_ Sugar / Glucose –500gm pack- a pinch of sugar and a cup of drinking water in hypoglycemic condition or in extreme weakness of student or a person concerned.

LABORATORY INSTRUCTIONS: -

_ Always wear an apron inside the laboratory.

_ Do not eat or drink in laboratory.

_ Do not place pencil, fingers or any material in the mouth. Moisten labels with water.

_ Use microscopes and other equipments carefully.

_ Discard all used glassware such as test tubes, pipettes, petry-plates, glass slides in a receptacle meant for it.

_ Put cotton plugs, papers, matches, waste dissected material etc. in a waste-paper basket.

_ Regard all cultures as pathogenic. Take every precaution against infection.

_ Report all accidents to the instructor immediately.

_ Wash hands thoroughly with soap and water before and after the experiment.

_ Always turn off water, gas and electricity before leaving the laboratory.

_ While entering the lab the students should have a laboratory journal, pencil and eraser, foot role, dissection box with necessary dissecting instruments and a small napkin.

_ All drawings must be made with drawing pencil only.

_ As the journal is to represent student's bonafide work during the whole year, the student keep it as clean as possible and DO NOT LOOSE IT.

_ The students should not forget that unless their journals are certified, they are not allowed to appear for the university examination

Shivaji University, Kolhapur
Revised Syllabus
SYLLABUS FOR BOTANY AT B. Sc. PART - III
(Introduced from2010-2011)

PAPER V - BIOLOGY OF CRYPTOGAMS, MICROBIOLOGY AND PLANT PATHOLOGY

Section – I Biology of Cryptogams (40 periods)

Unit 1. Algae : (10)

Sub-unit 1.1 Occurrence and distribution of algae.

Sub-unit 1.2 Thallus organization in algae.

Sub-unit 1.3 Origin and evolution of sex in algae.Verious theories.

Sub-unit 1.4 Types of life cycles in algae – Haplontic, Diplontic, Haplodiplontic, Isomorphic, Heteromorphic, Haplobiontic, Diplobiontic. Triphasic.

Sub-unit 1.5 Study of life cycles – *Chara, Ectocarpus* and Batrachospermum
(Excluding development of sex organs and sporophyte).

Unit 2. Fungi (10)

Sub-unit 2.1 Reproduction in Fungi.

Sub-unit 2.2 Study of following types with emphasis on classification, Structure of mycelium, nutrition, reproduction and economic importance.
a) Albugo b) Uncinula c) Agaricus.
(Excluding developmental stages.)

Sub-unit 2.3 Mushroom Cultivation – *Pleurotus sajor-kaju*

Unit 3. Bryophytes (8)

Sub-unit 3.1 Evolution of gametophyte and sporophyte.

Sub-unit 3.2 Study of life cycle of Plagiochasma
(Excluding developmental stages).

Sub-unit 3.3 Alternation of generations in Bryophytes.

Unit 4. Pteridophytes (12)

Sub-unit 4 .1 General account of Pteridophytes with reference to

a. Structure of Sporophyte. b. Structure of sori and sporangia.

c. Structure of gametophytes.d. Alternation of generations in pteridophytes.

Sub-unit 4.2 Study of life cycle of Marsilea

(Excluding developmental stages.)

Section II - Microbiology and Plant Pathology (40)

Unit 5 :Microbiology (23)

Sub-unit 5.1 Methods in Microbiology – Staining, Sterilization methods, Culture media, Pure culture methods. (8)

Sub-unit 5.2 Micro-organisms in biological world and characteristic features of different groups – (7)

a) Bacteria
b) Viruses,
c) Phytoplasma
d) Actinomycetes.

Sub-unit 5.3. Industrial applications of micro-organisms- organic acids, alcohol, antibiotics and bio-pesticides. (10)

Sub-unit 5.4. Microbial Biofertilizers. Rhizobiam,PSB BGA,Trichoderma (3)

Unit 6. Plant Pathology (5)

Sub-unit 6.1 Classification of plant diseases based on Pathogens, Crops,and Symptoms.

Sub-unit 6.2 Transmission of pathogen-Seed born, Soil born and Air born.

Unit.7. Study of Plant diseases (7)

Sub-unit 7.1 Phytoplasma – Grassy shoot disease of Sugarcane.

Sub-unit 7.2 Viral – Yellow vein mosaic of Bhendi.

Sub-unit 7.3 Bacterial – Citrus canker.

Sub-unit 7.4 Fungal – a. Downy mildew of Bajara.

b. Leaf spot of Turmeric
c. Grain Smut of Jowar.
d. Anthracnose of Bean.

Paper VI GYMNOSPERMS, PALAEOBOTANY, ANGIOSPERMS

AND ENVIRONMENTAL BIOLOGY

Section – I Gymnosperms & Palaeobotany (40 Periods)

Unit 1. Gymnosperms : (20)

Study of following gymnosperms with reference to distribution, organography, anatomy and reproductive structures, sporophytes and gametophytes, fertilization, embryogeny, seed structure and phylogeny.

Sub-unit 1.1 Cycadales - *Zamia*,

Sub-unit 1.2 Coniferals - *Thuja*,

Sub-unit 1.3 Gnetales – *Gnetum*

Unit 2. Palaeobotany **(7)**

Sub-unit 2.1 a Geological time-scale (3)
b. Carbon dating (2).

Sub-unit 2.2 Concept of form genera and nomenclature (2)

Unit 3. Study of following form genera with reference to systematic position,external morphology, anatomy and affinities (8)

a. *Calamites*
b. *Cycadeoidea*
c. *Lyginopteris*
d. *Enigmocarpon*

Unit 4. Applications of Palaeobotan **(5)**

Sub-unit 4.1 Role of microfossils in oil and coal exploration.

Sub-unit 4.2 Oil and coal as fossil fuels.

Sub-unit 4.3 Biotic origin of oil and coal.

Section II Angiosperms and Environmental Biology (40 Periods)

Unit 5. Angiosperms **(11)**

Subunit 5.1 Phylogeny of angiosperms : A general account of the origin of Angiosperms (With special reference to Bennettitalean, Gnetalean, Caytonialean theories) (4)

Subunit 5.2 Systems of Classification. (4)

a. Engler and Prantl's system.
b. Takhtajan's system.

Subunit 5.3 Modern Taxonomy : Taxonomy in relation to anatomy, embryology, palynology, cytology (Cytotaxonomy), secondary metabolites in plants(Chemotaxonomy) . (2)

Subunit 5.4 Numerical Taxonomy : Concepts, and significance (1)

Unit 6 Flower **(15)**

Subunit 6.1 Concept of flower as a modified shoot . (2)

Subunit 6.2 Structure of anther – Microsporogenesis, and development male gametophyte. (3)

Subunit 6.3 Structure of Pistil – Structure of typical ovule, ovule types, megasporogenesis, development of female gametophyte (embryo sac), embryo sac types – monosporic, bisporic and tetrasporic (4)

Subunit 6.4 Pollination (3)

a) Mechanism of pollination – Vallisneria, Calotropis , Maize.
b) Pollen stigma interaction.
c) Double fertilization and endosperm formation
d) Apomixis

Subunit 6.5 Development of embryo in Monocotyledons and Dicotyledons (3)

Unit 7 Environmental Biology **(07)**

Sub-unit 7.1 Introduction – Interrelationship between the living world and the environment, components and dynamism, homeostasis,& relevance to man (2)

Sub-unit 7.2 Impact of human activities on environment – Causes, Prevention and control of – Air, water, Soil, Noise, Thermal and Radioactive Pollution .(3)

Sub-unit 7.3 Brief account of environmental toxicology – Eutrophication, bioaccumulation and biomagnifications (2)

Unit 8 Environmental Crisis **(5)**

Sub-unit 8.1 Desertification, Ozone, depletion and Global warming (1)

Sub-unit 8.2 Environmental Impact assessment – A brief account (2)

Sub-unit 8.3 Role of National and International Organizations in environmental management. (2)

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BOTANY
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Practical I (Based on Paper V)

Unit 1. Algae

Sub-unit 1.1 Identification of following algae (any four) 1 Pr.

a) Hydrodictyon b) Zygnema c) Padina d) Caulerpa e) Diatoms

Sub-unit 1.2. Life cycle of following genera 3 Pr.

a) *Chara*
b) *Ectocarpus*
c*) Batrachospermum*

Unit 2. Fungi

Sub-unit 2.1Identification of following Fungi (any four) 1 Pr.

a) *Phyllchora b) Alternaria c) Clavaria d) Melampsora e) Rhizopus*

Sub-unit 2.2 Life cycle of following types 3 Pr

a)*Albugo*
b)*Uncinula*
c*) Agaricus*

Sub-unit 2.3 Cultivation of mushrooms 1 Pr

Unit 3. Bryophytes

Sub-unit 3.1Identification of following Bryophytes (any four) 1 Pr

a) *Marchantia b) Targionia* c) *Cyathodium*

d) *Notothyllus e) Fossombronia f) Asterella*

Sub-unit 3.2 Life cycle of Plagiochasma 2 Pr.

Unit 4 Pteridophytes

Sub-unit 4.1Identification of following Pteridophytes (Any four) 1 Pr

a) *Isoetes b) Adiantum c) Lygodium d) Osmunda*

e) Asplenium f) Azolla g) Blechnum h) *Ophioglossum*

Sub-unit 4.2 Life cycle of *Psilotum* (Permanent slides only)

Sub-unit 4.3Life cycle of *Marsilea*

Sub-unit 4.4Preparation of PDA (Slants and Plates) and sterilization 2 Pr

Sub-unit 4.5 Isolation and inoculation 1 Pr

Unit 5.

Sub-unit 5.1 Micrometry 1 Pr

Sub-unit 5.2 Plant diseases as per theory 4 Pr

Sub-unit 5.3 Study of fermentation by yeast. 1 Pr

Sub-unit 5.4 Study of bio-fertilizers. 1 Pr

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Botany Practical - II (Based on Paper VI)

Unit 1. Gymnosperms and Palaeobotany 5 Pr

Sub-unit 1.1 Anatomical structure in rachis of *Cycas* and *Zamia* by sections.

Sub-unit 1.2 Anatomical structure in wood of *Pinus* and *Thuja* by maceration.

Sub-unit 1.3 Structure of male and female cones of *Cycas,Thuja* and *Gnetum*.

Sub-unit 1.4 Study of Pollen grain structure of *Cycas, Thuja* and *Pinus* by shape, size, exine, germ pore number and number of constituent cell.

Sub-unit 1.5 Study of fossils – *Calamites, Cycadeoidea, Lyginopteris, Enigmocarpon.*

Unit 2 : Embryology 6 Pr

Sub-unit 2.1 Study of V.S. of typical ovule and types of ovules.

Sub-unit 2.2Pollen grain germination by hanging drop and sitting drop techniques in Impatiens and *Catharanthus roseus* or any suitable material.

Sub-unit 2.3 Diversity in the structure of stigma, style, stigmatic papillae and transmitting tissue of style in suitable material (*Clitoria, Hibiscus, Maize, Ocimum & Citrus)*

Sub-unit 2.4 Microdissection of embryo with suspensor in *Cucumis* ,*Grevillea, Boerhaavia* and *Cyamopsis* (any suitable material.)

Sub-unit 2.5 Study of self incompatibility in *Hamelia , Catharanthus roseus & Sesamum.*

Sub-unit 2.6 Study of seed dispersal with suitable materials.

Unit 3 : Angiosperms

Sub-unit 3.1 Study of fruit dispersal with suitable materials. 1Pr

Sub-unit 3.2 Study of following plant families. 8Pr

i) Ranunculaceae/ Menisprermaceae ii) Capparidaceae iii) Rutaceae iv) Meliaceae v) Myrtaceae vi) Cucurbitaceae vii) Fabaceae viii) Rubiaceae ix) Sapotaceae x) Apocynaceae xi) Lamiaceae xii) Amaranthaceae xiii) Polygonaceae xiv) Liliaceae xv) Musaceae xvi) Poaceae

Sub-unit 3.3 Identification of Genus and Species with the help of flora.1 Pr.

Unit : 4 Environmental Biology

Sub-unit 4.1 Determination of DO (Dissolved Oxygen) and BOD (Biological Oxygen Demand) in polluted and non polluted water samples (any two) 1 Pr

Sub-unit 4.2 Titrimeteric estimation of free CO_2 and bicarbonates in polluted and non polluted water samples (any two) 1 Pr

Sub-unit 4.3 Analysis of electrical conductivity, temperature and pH of different water samples. 1 Pr

Sub-unit 4.4 Report on environment by visits to nearby locality. Report be written in Journal. 1 Pr.

Paper VII

GENETICS, MICROBIAL GENETICS, PLANT BREEEDING AND BIOSTATISTICS.

Section I Genetics (40)

Unit 1. Mendelism (6)

Sub-unit 1.1 Introduction and Basic terminologies in genetics.

Sub-unit 1.2 Principles of Inheritance.

Law of Dominance
Law of Segregation
Law of Independent Assortment
Back Cross and Test Cross

Sub-unit 1.3 Gene Interactions

a) Complementary gene interactions
b) Supplementary gene interactions
c) Epistasis and Hypostasis.

Sub-unit 1.4 Linkage and Recombination (7)

a) Introduction
b) Cytological Proof for recombination
c) Crossing over and its significance Crossing over a measure of genetic distance, Two point test cross and Three points test cross
d) Linkage phases, Linkage groups, Complete and incomplete linkages

Unit 2. Multiple Allelism (3)

Sub-unit 2.1 Introduction and definition

Sub-unit 2.2 Eye-colour in *Drosophilla*

Unit 3. Sex Chromosomes and Sex linked inheritance (7)

Sub-unit 3.1 Autosomes and sex chromosomes.

Sub-unit 3.2 Chromosomal theory of Sex determination.

Sub-unit 3.3 Mechanism of Sex determination.

Sub-unit 3.4 Sex chromosomes in *Drosophilla*.

Sub-unit 3.5 Sex chromosomes in Human bings.

Sub-unit 3.6 Sex-linked inheritance in man -Haemophilia

Sub-unit 3.7 Quantitative Interitance (5)

a) Quantitative versus qualitative traits and analysis of quantitative traits.
b) Population Genetics - Hardy-Weinberg Law

Unit 4. Maternal Inheritance (3)

Sub-unit 4.1 Mendelian versus extrachromosomal inheritance

Sub-unit 4.2 Plastid inheritance.

Sub-unit 4.3 Self incompatibility in plants.

Sub-unit 4.4 Alterations in the genetic make-up and it's significance (9)

a) Introduction
b) Changes in chromosome structure.
c) Changes in chromosome number

Section II

Microbial genetics, Plant breeding and Biostatistics (40)

Unit 5. Microbial Genetics (6)

Sub-unit 5.1 Introduction

Sub-unit 5.2 Bacterial genome

Sub-unit 5.3 DNA viruses

Sub-unit 5.4 RNA viruses

Sub-unit 5.5 Recombination in Bacteria - Transformation, Transduction and Conjugation

Unit 6. Methods of Plant Improvement (16)

Sub-unit 6.1 Introduction.

Sub-unit 6.2 Aims and objectives of plant breeding.

Sub-unit 6.3 Scope of plant breeding.

Sub-unit 6.4 Methods of plant breeding.

a) Introduction and Acclimatization.
b) Selection
i) Mass Selection,
ii) Pure line Selection

iii) Clonal Selection

c) Hybridization techniques in self-pollinated crops and cross pollinated crops.

d) Male sterility and significance in plant breeding.

e) Selection procedures after hybridization and Hybrid vigour

Unit 7. Breeding in field crops (6)

Sub-unit 7.1 Breeding in Jowar

Sub-unit 7.2 Breeding in Groundnut

Sub-unit 7.3 Breeding in Sugarcane

Sub-unit 7.4 Role of Mutation and Polyploidy in plant breeding (3)

Unit 8. Biostatistics (7)

Sub-unit 8.1 Collection and presentation of data

Sub-unit 8.2 Measures of central tendency - Mean, Mode and Median Sub-unit 8.3 Variance and standard deviation, Coefficient of variation

Sub-unit 8.4 Test of Significance (T-text), Chi-square test (D^2test) Sub-unit 8.5 Application of Computers in Biological Education (2)

Paper VIII

BIOCHEMISTRY, MOLECULER BIOLOGY AND BIOTECHNOLOGY

Section I - Plant Biochemistry (40)

Unit 1. Carbohydrate Metabolism : (10)

Sub-unit 1.1 Introduction, broad classification of Carbohydrates.
Sub-unit 1.2 Monosaccharides – properties and examples-Triose, Tetrose, Pentose and Hexose
Sub-unit 1.3 Oligo saccharides – properties and examples-Sucrose, Maltose and Lactose.
Sub-unit 1.4 Polysaccharides – properties and examples-Starch and Cellulose
Sub-unit 1.5 Isomers, enantiomers and epimers
Sub-unit 1.6 Biosynthesis and degradation of sucrose and starch.
Sub-unit 1.7 Significance of Carbohydrates.

Unit 2. Lipid Metabolism (8)

Sub-unit 2.1 Introduction and classification of lipids
Sub-unit 2.2 Saturated fatty acids- properties and examples-Stearic and Palmatic acid.
Sub-unit 2.3 Unsaturated fatty acids- properties and examples-Linoleic and Linolenic acids.
Sub-unit 2.4 General out line of fatty acid biosynthesis.
Sub-unit 2.5 Beta Oxidation.
Sub-unit 2.6 Gluconeogenesis of fatty acids during germination.
Sub-unit 2.7 Significance of lipids

Unit 3. Protein Metabolism (15)

Sub-unit 3.1 Introduction, structure, properties and characteristics of amino acids
Sub-unit 3.2. Brief out line of biosynthesis of amino acids - Aspartate, Cysteine, Phenylamine and Proline
Sub-unit 3.3 Protein structure and classification
Sub-unit 3.4 Out line of protein biosynthesis in prokaryotes and eukaryotes
Sub-unit 3.5. Post translational modification.
Sub-unit 3.6 Protein targeting.

Sub-unit 3.7 Protein degradation.

Unit 4. Nucleic Acids (7)

Sub-unit 4.1 Composition of nucleic acids.

Sub-unit 4.2 Structure of - DNA, A, B and Z forms

Sub-unit 4.3 Structure and Types of RNA and their role.

Section II - Molecular Biology and Biotechnology (40)

Unit 5. DNA replication and recombination (5)

Sub-unit 5.1 Replication of DNA and role of DNA polymerases

Sub-unit 5.2 Denaturation and renaturation of DNA.

Sub-unit 5.3 Recombination at molecular level.

Sub-unit 5.4 Gene Structure, expression and regulation (8)

a) Gene organization in prokaryotes and eukaryotes.
b) Operon concept – lac operon
c)Gene regulation in prokaryotes and eukaryotes.
d) RNA Synthesis and processing.

Unit 6. Recombinant DNA Technology (12)

Sub-unit 6.1 Introduction and principles.

Sub-unit 6.2 Enzymes involved in recombinant DNA technology.

Sub-unit 6.3 Vectors.-Concept

Sub-unit 6.4 Southern and northern blotting.

Sub-unit 6.5 DNA fingerprinting – RFLP, RAPD, AFLP.

Sub-unit 6.6 PCR.

Sub-unit 6.7 DNA sequencing

Sub-unit 6.8 Genomics and DNA libraries.

Unit 7. Genetic Engineering (6)

Sub-unit 7.1 Introduction to transgenic plants.
Sub-unit 7.2 Reporter genes.
Sub-unit 7.3 Role of Agro bacterium in crop biotechnology
Sub-unit 7.4. Achievements in Plant Biotechnology.

Unit 8. Plant Tissue Culture (7)

Sub-unit 8.1 Principles of tissue culture.

Sub-unit 8.2 Terminology in tissue culture.

Sub-unit 8.3 Cellular differentiation and Totipotency.
Sub-unit 8.4 Organogenesis and embryogenesis.
Sub-unit 8.5 Application of plant tissue culture
a. Protoplast culture.
b. Somatic hybridization.
c. Micropropagation.
Sub-unit 8.6 SCP (Single Cell Protein) Production (2)

B. Sc. III Botany Practical - III (Based on Paper VII)
(Each sub-unit should be completed in one practical unless specifically mentioned)

Unit 1.Mendelian genetics.

1.1Study of Mendelian traits in garden pea.
1.2 Examples of linkage and crossing over.
1.3 Examples on polygene inheritance.

Unit 2. Cytological techniques

2. 1 Determination of 'chromosome count' in Allium/*Alove* root tips. (2Pr)
2.2 Determination of chromosome count in PMCs in Allium. (2 Pr)
2.3 Preparation of karyotypes – idiograms by using photographs.
2.4 Determination of interspecific variations in chromosome number in *Allium.*

Unit 3 Study of sex chromosomes

3.1 Study of sex chromosomes in *Drosophilla*
3.2 Detection of meiotic anomalies in chromosomes in *Rhoeo.*
3.3 Identification of mutant phenotypes – Body shape / nature of wings / eye colour / nature of eye – bar – rod in *Drosophilla*. (2 Pr)

Unit 4 Plant Propagation

4.1 Study of correlation of floral structure in insect pollinated plants (Any two) *Salvia, Sesamum*, Pea, *Plectranthus, Ceropegia, Helianthus*.
4.2 Study of correlation of floral structure with pollination system in castor and maize.
4.3 Field exploration for detection of male sterile lines in Jowar / Maize.
4.4 Determination of pollen fertility by using staining technique.

Unit 5 Breeding techniques

5.1 Breeding technique in Brassicaceae.
5.2 Breeding technique in Fabaceae.
5.3 Breeding technique in Malvaceae.
5.4 Breeding technique in Poaceae .

Unit 6 Biometry

6.1 Camera Lucida drawings. (Minimum two)
6.2 Measure of central tendency of given data.
6.3 Analysis of the given data using computer / Study of frequency distribution and it's graphic presentation. (2Pr)

B.Sc III Botany Practical IV (Based on Paper VIII)

(Each sub-unit should be completed in one practical unless specifically mentioned)

Unit 1. Carbohydrates

1.1 Qualitative tests for sugar in plant material. (Any two tests)

1.2 Qualitative tests for starch and cellulose in plant material (Any two tests)

Unit 2. Proteins

2.1 Qualitative tests for proteins in plant material. (Any two tests)

2.2 Determination of isoelectric point of protein in plant material.

2.3 Identification of amino acids in plant extract by TLC.

2.4 Estimation of proteins in plant sample by Biuret method.

Unit 3 Lipids

3.1 Determination of fatty acid value of oil sample.

3.2 Qualitative tests for lipid in plant material. (Any two tests)

Unit 4 Nucleic acids

4.1 Calorimetric estimation of DNA using di-phenyl amine.

4.2Isolation of plant genomic DNA and its spooling.

4.3 Isolation of total RNA from plant tissue and its calorimetric estimation. (2 Pr)

Unit 5 Tissue Culture

5.1 Preparation of tissue culture medium (M.S.) and its sterilization. (2 Pr)

5.2 Demonstration of techniques of in vitro culture of various explants. (3Pr)

Unit 6 Techniques in Biochemistry and Biology

6.1 Microtomy or Microphotography (4Pr)

6.2 Separation of alkaloids by TLC.

6.3 Separation of isozymes using gel electrophoresis. (4 Pr)

(Introduced from 2008-2009)

List of Books Recommended for B. Sc. III Botany

1. Blod, H.C., Aloxopoulos, G. J. and Delevoryas, T. 1980. Morphology Plant and Fungi (4th Edition) Harper and Foul Co., New York.
2. Clifton, A. 1958 Introduction to the Bacteria. McGraw Hill Co., New York.
3. Dube, H. C. 1990. An Introduction to Fungi Vikas Publishing House Pvt. Ltd., Delhi.
4. Gifford, E. M. and Foster, A. S. 1989. Morphology and Evolution of Vascultar Plants W.H. Freeman & Co., New York.
5. Gilbert, M. S. 1985. Cryptogamic Botany Vol. I & II (2nd Edition), Tata Mcgraw Hill Publishing Co., Ltd New Delhi.
6. Kumar, h. D. 1988, Introductory Phycology. Affiliated East-West Press Ltd., New York.
7. Mandahar, C. L. 1998 Introduction to plant Viruses Chand & Ltd., Delhi.
8. Puri, P. 1985. Bryophytes. Amarm & Sons, Delhi.
9. Rangswamy, G. and Mahadevan A. 1999. Diseases of Crop Plants in India Prentice Hall India Pvt. Ltd., New Delhi.
10. Sporne, K. R. 1991. The Moropology of Gymmosperms. B. I. Publications Pvt.,
Bombay, Calcutta, Delhi.
11. Wilson, N. S. and Rothwell, G. W. 1983 Palaeobotany and the Evolution of Plants (2nd Edition). Cambridge University Press U.K.
12. Cronquist, A.. 1968. The evolution and classification of flowering plants. Thomas
Nelson (Printers) Ltd., London & Edinburgh.
13. Delevoryas, Th. 1965 Plant Diversification. Modern Biology Series, Half Rinehart & Winston, New York.
14. Foster, A. S. and Gifford, A.E.M. jr. 1967. Comparative Morphology of Vascular
Plants Vakils, Peffer & Simons Pvt., Ltd.
15. Sporne, K.R 1977. The Mor[hology of Angiosperms. B.I. Publication, Bombay.
16. Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms 4th
revised and enlarged edition. Vikas Publishing House, Delhi.
17. Johri, B.M. 1984. Embryology of Angiosperms. Springer-Verlag Berlin.
18. Raghvan, V. 1997. Molecular Embryology of Flowering Plants. Cambridge University Press N. Y.
19. Agrios. G. N. 1997. Plant Pathology Academic Press London.

20. Albajes, R., Gullino, M.L. van Lenteren, J.C. and Elad, Y. 2000. Integrated Pest
and Disease Management in Greenhouse Crops, Kluwer Academic Publishers.
21. Bridge. P. et.al 1998. Molecular Variability of Fungal Pathogens. CAB International UK.
22. Bridge. P. et. al. 1999. Application of PCR in Mycology CAB International, UK.
23. Bridge. P. Moore, D.R. and Scott, P.R. 1998. Informational Technology, Plant Pathology and Biodiversity CAB International. UK.
24. Persley, G.J. 1996. Biotechnology and Integrated Pest Management CAB International, UK.
25. Skerritt, J.H. and Apples, R. 1995. New Diagositic in Crop Sciences. CAB International, UK.
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