## BHARATHIAR UNIVERSITY, COIMBATORE: 641 046

**B.Sc. BOTANY**

(For students admitted during the academic year 2015 – 2016 batch & onwards)

**SCHEME OF EXAMINATION** - CBCS PATTERN

<table>
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<tr>
<th>Part</th>
<th>Study Components</th>
<th>Course title</th>
<th>Ins. hrs/week</th>
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### SEMESTER – IV

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### SEMESTER – V

|        | Core Paper VII - Taxonomy of Angiosperms & Economic Botany | 5 | 3 | 25 | 75 | 100 | 4 |
|        | Core Paper VIII – Genetics Plant Breeding and Biostatistics | 4 | 3 | 25 | 75 | 100 | 4 |
|        | Core Paper IX -Ecology & Phytogeography | 4 | 3 | 25 | 75 | 100 | 4 |
|        | Core Paper X Microbiology-Fundamentals of Microbiology | 4 | 3 | 20 | 55 | 75 | 3 |
|        | Core Practical Paper VII, VIII, IX & X | 4 | - | - | - | - | - |
|        | Elective – I | 4 | 3 | 20 | 55 | 75 | 3 |
|        | Elective Practical | 2 | - | - | - | - | - |
| IV     | Skill based Subject – Biodegradable waste management Paper III – Industrial Wastes and Management | 3 | 3 | 20 | 55 | 75 | 3 |

### SEMESTER – VI

|        | Core Paper XI Biophysics Biochemistry & Plant Physiology | 5 | 3 | 25 | 75 | 100 | 4 |
|        | Core Paper- XII Horticulture | 5 | 3 | 25 | 75 | 100 | 4 |
|        | Elective – II | 5 | 3 | 20 | 55 | 75 | 3 |
|        | Elective – III | 5 | 3 | 20 | 55 | 75 | 3 |
|        | Core Practical III Paper VII, VIII, IX, X & XI | 4 | 3 | 40 | 60 | 100 | 4 |
|        | Core Practical IV - Practical for Elective subjects I, II & III | 2 | 3 | 40 | 60 | 100 | 4 |
|        | Skill based Subject – Biodegradable waste management Practical | 4 | 3 | 30 | 45 | 75 | 3 |
|        | Extension Activities @ | - | - | 50 | - | 50 | 2 |
| **Total** | | | | | | **3500** | **140** |

@ No University Examinations. Only Continuous Internal Assessment (CIA)

# No Continuous Internal Assessment (CIA). Only University Examinations.

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PAPER - I  
4 Hrs / Week

PLANT DIVERSITY - I

Algae, Fungi, Lichen, and Plant Pathology

Unit - I
Algae : Classification of Algae - G.M. Smith, Economic importance of algae, Study of the structure, reproduction and life cycle of Spirulina, Navicula and Oedogonium.

Unit - II
Structure, reproduction and life cycle of Dictyota and Polysiphonia

Unit - III
Fungi and Lichen : Classification of fungi (Alexopoulos & Mims 1973) structure and reproduction of Albugo, Saccharomyces, Puccinia and Polyporous.

Unit - IV

Unit - V
Plant Pathology : Study of the following plant diseases with special reference to the symptoms, causal organisms, and disease cycle and control measure of

1. Blast disease of rice
2. Red rot of sugarcane
3. Citrus canker
4. TMV

Practical : Study of the types mentioned in the syllabus.

References :
Algae-S.Sundararajan.,Anmol Publications.,New Delhi.2
Algae&Bryophytes.,A.Ragland., Saras Publication.,Nagercoil., Tamil Nadu
Phycology, A.Ragland., Saras Publication.,Nagercoil., Tamil Nadu
Fungi&Plant Pathology., A.Ragland., Saras Publication.,Nagercoil., Tamil Nadu
Fungi ,Bacteria and Viruses, DubeH.C., Agrobios., Jodhpur
Virology.,S.Sundararajan.,Anmol Publications.,New Delhi.2
Fungi- SKSingh.,Campus Books Int.,NewDelhi.
PAPER - II  
4 Hrs / Week
FUNDAMENTALS OF COMPUTER APPLICATIONS

**Unit - I**: Introduction to computer - components of computer - capabilities of computer - hardware - software-classification of software language-machine language -high level language- compilers, translators-input output storage devices - operating system/DOS/windows.

**Unit - II**: Introduction to internet-data communication concepts - W W W e-mail-smiley (emotion) - Acronyms, URL, FTP,INTERNET, Service Provider - Internet addressing (Domain IP)-Net Browser, search engines, news groups-intranet -web server-web pages.

**Unit - III**: Windows - 98, Xp, Windows – 8, Wi-Fi, Bluetooth and Android (overall view)

**Unit - IV**: - Microsoft word - creation of documents - Excel-spread sheet, workbook charts and table.

**Unit - V**: - Microsoft -Power Point - features - slide presentation MS Access - Creating a database.

**Practicals:**
1. Creating, editing and printing a document in MS-Word
2. Creating a table in MS-Excel
3. Creating a chart in MS-Excel
4. Creating slide presentation in MS-Power-point
5. Web Browsing
6. E-Mailing

**References**:

Introduction to Computers. Peter Nortan, Tata Mc Graw-Hill, New Delhi
Teach Yourself Windows in 24hrs Greg Perry, Techmedia Publication, New Delhi.
Lean Windows 98 in a week end Michal Meadhra and Faithe Wempen Galotia, New Delhi.
The Internet-Complete Reference, Harley Hahn, Tata Mc Grw-Hill, New Delhi.
**PAPER - III**

**8 Hrs / Week**

**PLANT DIVERSITY - II**

*(Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)*

**Unit - I** : Bryophytes  
Classification of Bryophytes (Rothmaler). Structure and reproduction of Marchantia and Polytrichum.

**Unit - II** : Pteridophytes  

**Unit - III** :  
Heterospory and Seed Habit, Structure and Reproduction of Adiantum and Marsilea


**Unit - V** : Palaeobotany. Geological time scale, Radio carbon dating, Fossils and kinds of fossils. Study of the following : Lepidodendron (Stem), Lepidocarpon (Fruit) and Stigmaria (Root).

**Practicals:** Study of the types mentioned below.  
Bryophytes : Marchantia and Polytrichum.  
Pteridophytes : Selaginella, Equisetum, Adiantum and Marsilea.  
Gymnosperms : Cycas and Gnetum.  
Palaeobotany : Lepidodendron Lepidocarpon and Stigmaria.

**References:**  
An introduction of Embryophyta - Pteridophyta - N.S.Parihar  
An introduction of Palaeobotany - Arnold.,Agrobios., Jodhpur,.  
Pteridophytes,Gymnosperms&Palaeobotany,A.Ragland.&V.Kumaresan.,Saras Pub.,Nagercoil,TN  
A text Book of Botany- Pteridohytes., RMJohn et al Scientific Pub.,Jodhpur  
Pteridophytes.,SKSingh.,Campus Books Int.,NewDelhi.
PAPER -IV

CELL BIOLOGY & LAB TECHNIQUES

Unit - I
Cell Biology: Structure of Plant Cell – Prokaryotic and Eukaryotic cell, Structure and function of cellwall, plasmamembrane, endoplasmic reticulum and ribosomes.

Unit - II
Mitochondria, Chloroplast, Nucleus, Chromosome (Structure and function only)

Unit - III
Cell Division - Mitosis, Meiosis Nucleic acid - Structure of DNA (Watson & Crick Model), Replication of DNA (Semi-conservative method). RNA - types, Protein synthesis

Unit IV
Lab Techniques: Principles, Operation, Techniques and uses of pH meter, Colorimeter, Centrifugation. Microscopy - light TEM and SEM.

Unite - V
Principles and elementary knowledge of Chromotography (paper, T L C & Column), Electrophoresis (Basics).

Practicals : In the next semester (IV)
1. Study of mitosis using Onion roots
2. Study of cell organelles through slides and Photographs
3. Demonstration of pH meter, Colorimeter, Clinical centrifuge and chromatography of leaf pigments - paper only

References :
Cell Biology -C.B. Powar Himalya publishing New Delhi.
Genetics- Verma and Agarwal,. S. Chand and Co.New Delhi.
Developmental Botany,. A.Ragland,. Saras Publication,.Nagercoil,. Tamil Nadu
Cell Biology, N.Arumugam, Saras Publication,.Nagercoil,. Tamil Nadu
Genetics,R.P Meyappan, Saras Publication,.Nagercoil,. Tamil Nadu
ANATOMY AND EMBRYOLOGY

Unit - I

Structure and function of Apical Meristems - Root Apex and Shoot Apex - Theories of Meristems. Structure and function of simple and permanent tissues - Parenchyma, Collenchyma, Sclerenchyma, Xylem and Phloem.

Unit - II


Unit - III

Anomalous secondary growth in Dicots - Intraxylary phloem, Successive cambia, cortical vascular bundles and Arborescent monocots (Primary anomalies)

Unit - IV

EMBRYOLOGY :- Structure and development of microsporangium, male gametophyte, Types of ovules, megasporangium, female gametophyte (Polygonum type)

Unit - V

Double fertilization, endosperm - Structure, development and types of endosperm. Structure and development of dicot embryo (Capsella).

Practicals:

Anatomy Study of tissues mentioned in the theory

1. Stem - Primary structure - Tridax, Cucurbita, Sorghum
2. Root Primary structure - Bean. Canna. Vanda
3. Leaf - Nerium & Grass
4. Anomalous Secondary thickening - Boerhaavia, Nyctanthes,

Embryology : T.S of anther. 2. Various stages of development of male and female gametophyte, endosperm and embryo sac to be studied from permanent slides. 3. Embryo Mounting - Tridax - Crotalaria.

References:

An introduction to the Embryology of Angiosperms - P.Maheswari
A text book of Plant Anatomy.,E.J.J.Prakash., Emkay Publication.,Delhi,51
Plant anatomy - Pandey, B.P. S.Chand & Co., NewDelhi.
Plant Anatomy&Microtechnique,V.Kumaresan, Saras Publication.,Nagercoil., Tamil Nadu.
MEDICINAL BOTANY & HUMAN WELFARE

Unit - I: Pharmacognosy - Definition and History. A general account of different survey of Different systems of medicines - Indian systems of medicine - Siddha Ayurveda and Unani systems. Classification of drugs (elementary). Chemistry of Drugs (Basics).

Unit - II: Morphological and Histological studies - Chemical constituents. Therapeutic and other Pharmaceutical uses of Bark - Cinchona, Leaves - Adathoda and Eucalyptus, Flower - Clove.

Unit - III: Fruits and seed - Wood apple, Goosberry and Poppy seed, Underground stem - Ginger, Unorganized drugs. Gum - Acacia, Resin - Turpentine, Fixed oil - Castor oil.


Practicals:
1. Morphology and anatomy of medicinal plants mentioned in the syllabus.
2. Identification of medicinal plants and their useful parts in examination.

References:
A Hand Book of Medicinal Plants, Prajapathi ND Agrobios. Jodhpur
A Hand Book of Medicinal Herbs., Deshpande DJ Agrobios. Jodhpur
PAPER - VII  5 Hrs / Week

TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

Unit - I:
Descriptive terms used in taxonomy. Taxonomy and its significance. Systems of classification - Natural - Bentham & Hooker, Modern Takhtajan (outline only)

Unit - II
Herbarium technique and uses, Nomenclature -ICBN, Priority, Typification, Effective and Valid publication. Author citation. Modern trends in Taxonomy (general)

Unit - III
A detailed study of the following families and the economic importance of types and pollination mechanisms wherever applicable. Annoanaceae, Capparidaceae, Sterculiaceae, Rutaceae, Anacardiaceae, Curcurbitaceae and Apiaceae.

Unit - IV
Rubiaceae, Apocynaceae, Asclepiadaceae, Scrophulariaceae, Acanthaceae and Lamiaceae.

Unit - V
Amaranthaceae, Euphorbiaceae, Orchidaceae, Liliaceae and Poaceae.

Practicals:
1. Taxonomical studies of selected plant species included in the families mentioned in the theory syllabus.
2. Study of economic products of the plants belonging to the families mentioned in the theory syllabus.
3. Students should submit - 20 herbarium sheets of local plants at the time of practical examination.
4. Field trip - for 5 days to study vegetation in Tamil Nadu and neighboring states.
5. Tour report should also be submitted during the practical examination.

References:
An Introduction to Systematic Botany. AK Ganguly & NCKumar., Emkay Pub., Delhi.
GENETICS, PLANT BREEDING AND BIOSTATISTICS

Unit - I
Monohybrid and Dibybrid cross, Test cross, Back cross, Incomplete dominance, Gene Interaction (Complementary, Supplementary, Duplicate and Inhibitory), Polygenic, Inheritance.

Unit - II
Linkages and crossing over Multiples alleles - Blood groups in man, Polyploidy, Sex determination.

Unit - III
Mutation types, physical and Chemical Mutagens, Cytoplasmic inheritance, Gene structure, Genetic code, DNA barcoding.

Unit - IV
Plant breeding - Objectives, Plant introduction, Selection, Hybridization, hybrid vigour, - Achievement in Crop breeding - Sugarcane.

Unit - V

Practicals:

1. Observation of charts for Mendelian ratios, Gene interaction and Linkage - Simple Problems in genetics.

References:
Essential of genetics -Powar
Plant breeding -Singh, B.D. S.Chand & Co., NewDelhi.
Principle and Practice of Plant breeding- Sharma B.D-
Principles of Genetics.- Sinnot, Dunn and Dobzhansky, Tata McGraw Hill.,New Delhi


**ECOLOGY AND PHYTOGEOGRAPHY**

**Unit - I**
Ecology-Principles and approaches, Structure and function of Ecosystem, Role of climatic, edaphic and Biotic factors on plants, Biogeochemical cycles (Nitrogen, Carbon)

**Unit - II**
Autecology and synecology-vegetation-units of vegetation (formation, association, consociation, fascination and society). Methods of studying vegetation - Quadrat, Belt and Line transect.

**Unit - III**
Hydrophytes, Mesophytes and Xerophytes - morphological and Anatomical features in relation to their habitats (Adaptation)

**Unit - IV**
Dispersal and migration, concept of Barriers, Continental drift, endemism, plants and plant communities as indictors.

**Unit - V**
Plant geography-principles and vegetational types of India - Tropical Rain forest, shoals and deciduous forest - sand dunes and mangroves scrub jungle, phytogeographical regions of India.

**Practicals :**
1. Study of morphological and anatomical adaptations of hydrophytes, xerophytes, including epiphytes and halophytes and mesophytes using representative samples.
2. Determination of frequency and density constituent of plant species in a terrestrial community through quadrat and transect (line and belt)
3. Phytogeographical regions of India.

**References :**
Environment and Pollution,N.Arumugam&V.Kumaeran, Saras Pub., Nagercoil., Tamil Nadu
Plant Ecology, AK Agarwal..Agrobios Jodhpur.
The Geography of Flowering Plants-Ronand Good.,Longman Group Ltd London.
PAPER -X

FUNDAMENTALS OF MICROBIOLOGY

Unit - I

Unit - II
Soil microbiology-Types of microorganism in soil, Role of microorganisms in plant growth, factors affecting microbial growth. Microbiology of air-Role of microorganism in air, methods of purification of air.

Unit - III

Unit - IV

Unite - V
Fermentation, dual and multiple fermentations. Detection and assay of fermentation products. Physical, chemical and biological assays (a general account to be discusses).

References :
Microbiology, Paul A Ketchum, John Wiley and Sons., USA
Microbiology, Fundamentals and applications S.S.Purohit,Agrobios Jodhpur.
Microbiology ALBhatia., Avinash Kar Publi.,Jodhpur
Applied Microbiology,TrivediPC Agrobios.,Jodhpur.
PAPER - XI
BIOPHYSICS, BIOCHEMISTRY AND PLANT PHYSIOLOGY

Unit - I
Biophysics : Electromagnetic radiation, Absorption and action spectra. Spectrophotometer (Basics) and Laws of thermodynamics (Basics)

Unit - II

Unit - III

Unit - IV

Unit - V
Growth regulators - auxins, gibberellins, Kinetins, ethylene and ABA. Physiology of flowering (Photoperiodism).

Practicals:
1. Rate of respiration in flower buds/germinated seeds using simple respiroscoper (Demonstration Only)
2. Separation of leaf pigments by paper chromatography
3. Measurement of the rate of Photosynthesis under varying concentration CO2 concentration
4. Effect of Light intensity on O2 evolution during photosynthesis
5. Effect of light intensity on transpiration. Determining the rate of transpiration using Ganong's potometer (Demonstration Only)

References:
Plant Physiology-Salisbury and Ross.,Prantices Hall.,New Delhi
Biophysics &Plant Physiology-A.Ragland.,Saras Publication.,Nagercoil., Tamil Nadu
Plant Physiology-Devlin.,Affiliated East West ,,New Delhi.,
Introductory Plant Physiology-Noggle and Fritz., Prantices Hall.,New Delhi
Biostatistics-P.Ramakrishnan., Saras Publication.,Nagercoil., Tamil Nadu
Basics Biophysics for Biologist.,Danial M., Agrobios.Jodhpur
Plant Physiology, A.Ragland et al, Saras Publication.,Nagercoil., Tamil Nadu
Plant Physiology, S.Sundararajan.,Anmol Publications.,New Delhi.2
Plant Physiology research methods,.,S S Narwal et al.,Scintific Pub.,Jodhpur.
Plant Physiology,Kumar&Purohit.,Agrobios, Jodhpur.
**PAPER - XII**

**5 Hrs / Week**

**HORTICULTURE**

**Unit - I**

**Unit - II**
Gardening: Types of gardens, Indoor garden, Kitchen garden and Public garden. Important ornamentals - habit and types - garden components - lawn making, glass house, rockery, water garden and topiary.

**Unit - III**
Production technology - Cultivation of vegetables - Brinjal, Tomato and Onion. Cultivation of fruits - Banana, Mango and Apple growth regulators in horticulture. Plant protection measures for horticulture.

**Unit - IV**
Commercial horticulture I

**Unit - V**
Commercial horticulture II
Extraction of Jasmine concrete and Papain - Bonsai Flower arrangement - Cut flowers - Preservation of fruits and vegetables.

**Practicals:**
Demonstration of vegetative methods of propagation - Flower arrangement with cut flowers.

**References:**
An introduction to Horticulture - N. Kumar Narosa Pub., NewDelhi
Vegetables – Choudhury Narosa Pub., NewDelhi
Home Gardening - Trivedi, P. Narosa Pub., NewDelhi
Introduction to Spices Plantation Crops Medicinal and Aromatic Plants
Weed control RC Mandal .,. JV Publi., House., Jodhpur
Vistas in Horticulture., SK Bhattacharya., Gene Tech Books., New Delhi.2
Commercial Floriculture., SK Chatopadhya, Gene Tech Books., New Delhi.2
SKILL BASED SUBJECT: BIODEGRADABLE WASTE MANAGEMENT

PAPER – I (3 Hours / Week)
INTRODUCTION TO ENVIRONMENTAL POLLUTION

UNIT - I Environment – introduction, a brief account of biosphere and hydrosphere.

UNIT – II Environmental pollution – introduction, definition, kinds of pollutants in water, air and soil.

UNIT – III Water pollution – industrial, agricultural and sewage, effects and control of water pollution.


UNIT - V Soil pollution – industrial, domestic and agricultural. Effects and control of soil pollution.

References:
5. Arun Kumar, Environmental problems, protection and control, Anmol Publication Pvt. Ltd.
SKILL BASED SUBJECT: BIODEGRADABLE WASTE MANAGEMENT
PAPER – II (3 Hours / Week)
URBAN WASTE AND MANAGEMENT

UNIT - I  Solid waste – definition, classification – biodegradable and nonbiodegradable.

UNIT - II  Urban waste – types and disposal, effects on biosphere.

UNIT - III  Polymers and plastic wastes, problems associated with solid wastes resistance to degradation.

UNIT - IV  Persistence of pesticides in environment, bioaccumulation and biomagnification of pesticides.

UNIT - V  Vermitechnology – earthworm for vermiculture, principles and management of vermiculture, methods of earthworm production.

References:
SKILL BASED SUBJECT: BIODEGRADABLE WASTE MANAGEMENT

PAPER – III (3 Hours / Week)

INDUSTRIAL WASTES AND MANAGEMENT

UNIT – I Scope and importance of waste management Application – Consolation of Environment

UNIT - II Industrial waste – classification, sludge treatment processes – thickening, aerobic and anaerobic digestion, conditioning, de-watering


UNIT - IV Treatment of Industrial effluents – Primary – and. Tertiary – Biological screening.

UNIT - V Bioremediator – definition, in-situ bioremediation, bioremediation of hydrocarbons, heavy and xenbiotics.

References:

SKILL BASED SUBJECT : BIODEGRADABLE WASTE MANAGEMENT

PAPER – IV - PRACTICAL (4 Hours / Week)
(Covering theory papers I, II & III)

1. Determination of Soil $p^H$
2. Effluent analysis (Paper / Distillery) – dissolved oxygen, free carbon dioxide, carbonate and bicarbonate, turbidity, total solids, dissolved solids, hardness, chloride,

References:
**ELECTIVE I – A : APPLIED MICROBIOLOGY**

**Unit - I**
Introduction to applied microbiology. Various applied aspects of microbiology. Fermentation - kinds of fermentors; fermentation media - composition; sterilization, contamination and screening.

**Unit - II**
Microbiology of domestic water. Water purification, determination of sanitary quality - chemotherapy and control of microorganisms through antibiotics. Source and mode of action of penicillin. Basic principles of immunology - structure of antigen and antibody and their reaction.

**Unit - III**
Food microbiology: Milk-physical and chemical composition, pasteurization, diary products (manufacture of cheese) Microbial flora of fresh food, microbial examination of foods-Food poisoning. Botulism.

**Unit - IV**
Industrial microbiology: Manufacture of alcohol, ethanol, antibiotics - streptomycin, Vitamin-B_{12}, enzyme-cellulase, amino acids, Glutamic, organic acid-citric acid.

**Unit - V**
Production of microbial biocides-historical background, bacteria, protozoa, fungi, actinomycetes. Microbial Biotechnology and Pollution control.

**Practicals :**
1. A study of Rhizosphere and mycorrhizae.
2. Preparation of culture media for bacteria, fungi and actinomycetes.
3. Estimation of bacteria, fungi and actinomycetes (plate count) from soil and water by series dilution method.
4. Preparation of agar streak and agar slants, sterilization and inoculation.
5. Identification of gram staining bacteria using milk or curd.
6. Observation of microbes using hanging-drop method.
7. Knowledge on antimicrobial activities using antibiotics.

**References :**
Industrial Microbiology, L.E.Casida, J.R.Willey Eastern Ltd., ISBN,
Flood, Feed and Fuel from Buiomass, Ed. D.S. Chahal, Oxford & IBH, Publishing Ltd., New Delhi, l
Microbiology, Paul A Ketchum, John Wiley and Sons., USA
General Microbiology, Schiesel, H.B. Cambridge University Press.
Microbiology, Fundamentals and applications S.S.Purohit,Agrobios Jodhpur.
Applied Microbiology,TrivediPC Agrobios.,Jodhpur.
ELECTIVE I – B : PLANT PATHOLOGY

Unit - I:  Introduction, Historical account of plant pathology
Definition- Pathogen, disease, virulence, resistance/ susceptibility, epidemics
Brief account of major epidemics, Koch’s postulates.

Unit – II:  Classification of plant diseases, dissemination of propagules of pathogens,
factors governing out break of diseases. Pathogenesis- Inoculum, inoculum
potential, penetration and entry, combination of the host, factors affecting
infections.

Unit – III:  Role of enzymes in disease development, cell wall degrading enzymes.
Toxins in relation to plant diseases: A general account, mode of action and
types.

Unit – IV:  Fungal diseases and deficiency symptoms: Symptoms, causal organism,
disease cycle and control measures of the following fungal diseases.
Club root of crucifers, Powdery mildew of wheat, Late blight of potato.
Deficiency symptoms: General account, measures to rectify.

Unit – V:  Disease management: Legislative methods, cultural methods, soil and sand
treatment, biological control, chemical control, control through resistant
varieties.

References

1. Plant pathology by G.P.Gupta
2. Illustrated dictionary of Plant pathology Vyas, N.L
3. Microbial Plant pathology- Whitney ,P.J
4. Plant pathology- Singh, R.S.
5. Plant pathology-Mehortra, R.S.
6. Introduction to principle of Plant pathology ed.3- Singh, R.S.
ELECTIVE PAPER I - C

ECONOMIC BOTANY

UNIT – I : Scope of economic botany. Origin, distribution, cultivation & economic importance of Cereals, pulses, oil crops, vegetables, fruits & nuts (General account only)

UNIT – II : Origin, distribution, cultivation & economic importance of Spices Condiments, cosmetics, essential oils, beverages.

UNIT – III : Origin, distribution, cultivation & economic importance of Timber, fuel, Fibers & dyes.

UNIT – IV : Storage facilities and preservation methods of Cereals, pulses, oil crops, vegetables, fruits & nuts.

UNIT – V : Trading of economically important products. (General account Only) Conservation and sustainable utilization of economically important products.

REFERENCES:
1. Economic Botany – Pandey B. P.
2. Economic Botany – Hill A. F.
3. Origin of cultivated species – Bailey
4. A dictionary of the Economic products of India – Wall G.
   (6 volumes)
ELECTIVE II - A : BIOTECHNOLOGY - CONCEPTS AND TECHNIQUES

Unit - I
Biotechnology - definition, history and importance - Plant tissue culture, concepts and techniques, constituents of MS and White's media. Sterilization techniques - Callogenesis, regeneration, micropropagation through somatic embryogenesis and suspension culture.

Unit - II
Anther culture, Pollen culture (Androgenic haploids), isolation and culture of protoplast, somaclonal - variations - somatic hybridization, cybrids, synthetic seeds. In vitro establishment of mycorrhizae.

Unit - III
Genetic engineering - Procedure for gene cloning, isolation of specific genes, enzymes used in gene cloning - polymerases, restriction endonucleases, ligases and reverse transcriptase.

Unit - IV
Cloning vectors - Plasmids, phages, cosmids, transposons and YAC. Gene cloning in higher plants - use of CaMV and Agrobacterium Ti - Plasmid as vehicle. Methods of direct gene transfer - elecrroporaion, micro injection and liposomes. Isolation and screening of rDNA.

Unit - V
Application and uses of PCR, RFLP, RAPD and DNA finger printing techniques in biotechnology. Southern, Northern and Western blotting techniques agarosegel - electrophoresis.

References:
Plant Biotechnology,B Nirmala MJ Public.,Chennai.
Basic Biotechnology, S. Ignacimuthu - Vishvanathan&Co.,Chennai
Plant Biotechnolgy, S. Ignacimuthu - Vishvanathan&Co.,Chennai
Biotechnology, S.S. Purohit and S.K. Mathur - Agrobios.Jodhpur
Biotechnology.,V.Kumaresan., Saras Publication.,Nagercoil., Tamil Nadu
Outlines of Biotechnology., Emkay Public., Delhi.,51.
ELECTIVE PAPER II- B : SEED BIOLOGY

UNIT - I : Morphology and structural details of seeds
   Cereals : Paddy / Wheat
   Pulses : Dolichos / Glycine
   Oil seeds : Castor
   Fibers : Cotton
   Vegetables : Cucurbita
   Study on importance of seed.

UNIT – II : Chemical composition of seeds mentioned above . Germination - General account . Factors affecting germination . Changes that take place during germination ( physical and chemical ) Treatments given to quicken germination .

UNIT – III : Seed germination test under laboratory conditions . Using paper ( BP & TP ) sand and soil . The environmental test conditions also be discussed . Evaluation of germination test .

UNIT – IV : Seed viability ; Topographical Tetrazolium Test . Preparation of solution and methods of application & evaluation . Seed vigour : Concept , Direct and Indirect vigour tests .

UNIT – V : Dormancy – Primary and secondary dormancies . Significance , factors involved , methods used to break dormancy .

References ;
6. Anatomy of seed plants .
8. Economic Botany in the tropics .
ELECTIVE II – C : POMOLOGY

UNIT – I:  Tropical fruits cultivation - .  Past and present status of tropical fruits in India. General appraisal of fruit growing regions / Zones in India and Tamil Nadu


UNIT – III:  Climate and Soil environments- varieties- Propagation-Planting requirements, manures and manuring of Papaya, Guava, Sapota, Acid lime, Lemon, Sweet orange, Jack fruit and Pine apple.

UNIT – IV:  Subtropical and humid zones of India and Tamil Nadu – importance and scope of fruit crops in these zones – varieties, propagation and planting and aftercare, – management of nutrient – water needs – weed management – Training and pruning method – physiology of flowering, use of plant growth regulators – harvesting procedures – post harvest aspects of the following crops. Mandarin, , avocado, , litchi, , carambola,


REFERENCE BOOKS
6. Fruit growers in India, W. B. Hayes Kitabishan, Allahabad.
ELECTIVE III – A : BIOTECHNOLOGY - APPLIED BIOTECHNOLOGY

Unit - I
Food Technology - SCP as microbial food for future - mass cultivation and nutritional value or Spirulina, Scenedesmus, Yeast and Methylphilus.
Mushroom Technology - Cultivation techniques and nutritional value of Pleurotus sajor and Agaricus bisporus.

Unit - II
Biofertilizers - Advantages mass cultivation and application technique of Rhizobium, Azospirillum, Blue Green Algae (nitrogen fixers), Phosphobacteria, and VAM.

Unit - III
Application of genetic engineering in agriculture (transgenic plants) medicine and insulin, hormones, vaccines, antibiotics, monoclonal antibodies and hybridoma techniques.

Unit - IV
Biological control of pathogens and weeds through engineered microbes. Bacillus thuringiensis, mycoherbicides and insects, production of secondary metabolites. Bacterial toxins and penicillin. Enzymes engineering and its uses.

Unit - V

Practical for biotechnology paper I & II :
1. Cultivation of Pleurotus sajor.
2. Preparation of M.S. Medium-sterilization and inoculation of explants - shoot tip culture.
4. Demonstration of biofertilizers - Azospirillum, Agrobacterium and antibiotics - specimens or slides or photographs.
5. Petrochemical Plants - specimens.

References :
Applied Plant Biotechnolgy, Vishvanathan&Sons.,Chennai.
Basic Biotechnology. S. Ignacimuthu - Vishvanathan&Co.,Chennai
Plant Biotechnology, S. Ignacimuthu - Vishvanathan&Co.,Chennai
Biotechnology, S.S. Purohit and S.K. Mathur - Agrobios.Jodhpur
Biotechnology.,V.Kumaresan., Saras Publication.,Nagercoil., Tamil Nadu
Biotechnology and Biologof Plants PC Trivedi., Avinash Kar Publi.,Jodhpur
Microbial Biotechnology., PC Trivedi., Avinash Kar Publi.,Jodhpur
Biotechnology.,V.Kumaresan., Saras Publication.,Nagercoil., Tamil Nadu
Outlines of Biotechnology., Emkay Public., Delhi.,51.
ELECTIVE III- B : ETHNOBOTANY

**Unit: I.** Ethnobotany: Introduction, concept, scope and objectives. Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context. Major ethnic groups in Tamilnadu. (Any five)

**Unit II.** Methodology of Ethnobotanical studies. a) Field work b) Herbarium c) Ancient Literature d) Temples and sacred places. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.

**Unit III** Plants and Tribal medicine: Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) Azadiractha indica b) Ocimum sanctum c) Vitex negundo. d) Gloriosa superba e) Tribulus terrestris f) Pongamia pinnata g) Cassia auriculata h) Indigofera tinctoria. Role of ethnobotany in modern medicine with special example Rauvolfia sepentina., Trichopus zeylanicus.

**Unit. IV.** Role of ethnic groups in conservation of plant genetic resources. Participatory forest management. Sharing of wealth concept with few examples from India.

**Unit V** Ethnobotany as a source of drug.  
   a) Reserpine b) Artemisin c) Gulipid d) Cocaine e) Strychnine.

**References**
ELECTIVE III- C : BIOINFORMATICS

Unit I: Introduction to Bioinformatics, Knowledge Base in Biology, Information Technology in Biology, Types of Sequences used in Bioinformatics- DNA Sequences, RNA Sequences, Protein Sequences, application of Bioinformatics, fields related to Bioinformatics

Unit II: Biological databases and its significance- objectives, properties and classification of Biological databases, Hard – link relationships between databases, Symbols used in databases

Unit III: Nucleotide Sequence Databases, Nomenclature of DNA Sequences, Structure of Nucleotide Sequence Databases, GenBank format, Gene expression Databases

Unit IV: Proteomics - Classification based on shape, composition function; Nomenclature of Protein Sequences; Genomics- Comparative Genomic Databases, organism specific Genomic databases.

Unit V: Gene finding, protein prediction, biomolecular visualization, phylogenetic analysis & Drug designing

REFERENCES
5. Alexeeaons and M.Leon “Internet in a Nutshell”
6. PGDCA Books vol.16 and 7-Bharathiar university
9. Bioinformatics for beginners K.Manj and Vijayaraj
10. Introduction to Bioinformatics S.Sundara Rajan and R.B
11. Introduction to Bioinformatics Arthur M.Lesle
CORE PRACTICAL-I (Papers I, II, &III)
(Algae, Fungi, Lichens, Plant Pathology; Fundamentals of Computer and applications; Bryophytes, Pteridophytes, Gymnosperms and Pale botany -2010-2011 Batch)

Time: 3 Hrs

Max. Marks: 60

1. Make suitable micro preparations of A, B & C. Draw labeled sketches.
   Identify Giving reasons and submit the slides for valuation  
   3x5=15 Marks

2. Comment on instrument D
   1x5=5 Marks

3. Identify any TWO algal members from the algal mixture E.
   2x4=8 Marks

   9x3=27 Marks

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55 Marks

Record  
5 Marks

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Total  
60 Marks

CORE PRACTICAL-I (Papers I, II, &III)
(Algae, Fungi, Lichens, Plant Pathology; Fundamentals of Computer and applications; Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)

Practical- I-KEY

1. A- Algae/ Fungi
   B- Bryophytes/ Pteridophytes
   C-Gymnosperms   (slide-2, Sketch & Reasons -3)  
   3x5=15 Marks

2. D- Computer devices
   1x5 =5 Marks

3. E- Algal Mixture   (Identification-1, Sketch & Notes-3)
   2x4=8 Marks

4. F- Algae
   G-Fungi
   H-Lichen
   I-Computer
   J-Bryophytes
   K-Pteridophytes
   L- Gymnosperms
   M-Pale botany
   N- Plant Pathology (Identification-1, Sketch & Notes -2)  
   9x3=27 Marks

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55 Marks

Record  
5 Marks

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Total  
60 Marks
CORE PRACTICAL II (PAPERS IV, V, & VI)

[Cell biology, Lab techniques, Anatomy, Embryology, & Medicinal Botany and Human welfare]

Time: 3.00 Hrs 
Max. Marks 60

1. Make squash of specimen A. Draw Sketches, Identify any one stage. Submit the slide for valuation. 7

2. Make suitable micro preparation of B & C. Draw labeled Sketches. Identify giving reasons & submit the slide for valuation. 2x6=12

3. Mount the embryo of the given specimen D & submit the slide for Valuation. 5

4. Cut T.S of E. Draw Sketches & write Notes. 6

5. Identify F,G,H,I & J 5x5=25

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55

RECORD 5

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Total 60

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CORE PRACTICAL II (PAPERS IV, V, & VI) KEY


2. B & C: Anatomy [Identification-1,Slide-2,Sketch-1,Notes-2] 2x6=12

3. D: Embryo Mounting [Tridax / Crotalaria] [Slide-2, Sketch & Notes-3] 5

4. E: Medicinal Botany [Bark leaves, Flowers, Stem, Fruits] [Identification-1, Sketch-2, &Notes-3] 6

5. F: Cell biology
    G: Lab techniques
    H: Anatomy
    I: Embryology
    J: Medicinal botany [Identification-1, Sketch-2, & Notes-2] 5x5 =25

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Record 55

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Total 60

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CORE PRACTICAL-III (Papers VII, VIII, IX & XII)
(Taxonomy & Economic Botany; Genetics, Plant Breeding & Biostatistics; Ecology
Phytogeography; and Horticulture)

Time 3 Hrs

Max. Marks 60

1. Assign specimen A and B to its respective family giving reasons.------ 2x5=10
2. Describe specimen C in technical terms. Draw sketches of floral
Parts, Construct floral diagram & write floral formula ---------------------- 10
3. Assign the specimen D to its respective habitat, giving the morphological and
Anatomical features --------------------------------------------------------------- 5
4. Analyse the plant communities present in the constructed Quadrat / Line
Transect/Belt transect E by Quantitative method. Present the data and give the
Inference ----------------------------------------------------------------------- 8
5. Work out the given Problem F --------------------------------------------------------------- 5
6. Work out the given Problem G --------------------------------------------------------------- 5
7. Comment on H ----------------------------------------------------------------------- 5
8. Identify and write notes on I --------------------------------------------------------------- 3

51
Herbarium 4
Record 5
Total 60

CORE PRACTICAL-III (Papers VII, VIII, IX & XII)
KEY

1. A & B Taxonomy (Identification -1, Reasons -4) 2x5=10
2. C. Taxonomy (sketches-3,Floral diagram-2,Floral Formula-1,Notes-4) 10
3. D. Hydrophyte / Xerophyte/Mesophyte
   (Identification -1, Slide-1,Sketch -1,Notes-2) 5
4. E. Quadrat / Line transect / Belt transect- (Identification-1, Graph & Notes-7) 8
5. F. Genetics Problem 5
7. H. Horticulture (Cutting/ Layering / Grafting)-(Identification-1,Notes-4) 5
8. Economic Botany – (Identification-1, Notes -2) 3

51
Herbarium 4
Record 5
Total 60

CORE PRACTICAL – IV - (Papers X & XI, Electives I, II, &III)
**B.Sc. Botany (College) 2015-16 onwards**  
Annexure No. 22A  
Page 33 of 34  
SCAA Dt. 24.04.2015  

(Biophysics, Biochemistry, Plant Physiology, Microbiology, Applied Microbiology; Biotechnology-Concepts and techniques; Applied Biotechnology)

**Time:** 3Hrs  
**Max.Marks:** 60  
1. Write Procedure, apparatus required for the experiment A. Give the inference from the experiment and leave the setup for valuation  
   10  
2. Test the presence of Carbohydrate/Protein in the given sample B.  
   10  
3. Write the procedure for the Gram Staining and identify the type of bacteria present in the given sample C.  
   5  
4. Write down the procedure for Preparing a medium/culture/inoculation techniques in D  
   5  
5. Identify the apparatus given in E and F and Write notes on their use  
   2x5= 10  
6. Write notes on G, H, I, J & K  
   5x3=15  

55 Marks  
Record 5 Marks  

Total 60 Marks

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**CORE PRACTICAL – IV (Papers X & XI, Electives I, II, &III)**  

**Key**  
1. A- Physiology (Requirements-2, Procedure-3, Result-5)  
   10  
2. B- Biochemistry(Requirements-2, Procedure-3, Result-5)  
   10  
3. C-Gram staining  
   5  
4. D- Culture methods/ inoculation techniques  
   5  
5. E- Physiology setup  
   F-Apparatus used in Microbiology/Biotechnology  
   2x5=10  
6. G-Biochemistry  
   H & I –Microbiology  
   J & K – Biotechnology (Identification-1, Notes-1)  
   5x2=10

55 Marks  
**RECORD 05 Marks**  

Total 60 Marks

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BIODEGRADABLE WASTE MANAGEMENT: PRACTICAL

Time: 3Hrs                                                                                           Max.Marks:60

1. Write the procedure and Requirements for estimating
   The chemical parameter of the given sample A. 10 Marks

2. Write the procedure and Requirements to calculate the parameter
   For the given sample B 10 Marks

3. Write the method of isolating the micro organism from the sample C 5 Marks

4. Write notes on D,E,F,G&H 5x3=15 Marks

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40 Marks

Record 5 Marks

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Total 45 Marks

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BIODEGRADABLE WASTE MANAGEMENT

Key

1. A-(Requirement-5,Procedure-5, Data Presentation-5 Result-5) 10 Marks

2. B-(Requirement-2, Procedure-2, Data Presentation-3 Result-3) 10 Marks

3. C-(Diagram-4 Notes-6) 5 Marks

4. D,E,F, G&H (Sketch&Notes-3) 5x3=15 Marks

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40 Marks

Record 5 Marks

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Total 45 Marks