

B.Sc. BOTANY

FIRST YEAR

Sl. No.	Papers	Max. Marks	Exam Hrs.
1.	Hindi I	100	3
2.	English	100	3
3.	Alga logy, Mycology, Bacteriology virology and plant pathology	100	3
4.	Chemistry	100	3
5.	Practical 1: Alga logy, Mycology, Bacteriology virology and plant pathology	100	3
6.	Practical 2: Chemistry	100	3

SECOND YEAR

Sl. No.	Papers	Max. Marks	Exam Hrs.
1.	Hindi II	100	3
2.	English	100	3
3.	Angiosperm anatomy, Embryology and cell biology	100	3
4.	Biostatistics and Computer Application in Biology	100	3
5.	Practical 3: Angiosperm anatomy, embryology and cell biology	100	3
6.	Practical 4: Biostatistics and Computer application in Biology	100	3

THIRD YEAR

Sl. No.	Papers	Max. Marks	Exam Hrs.
1.	Archegoniate	100	3
2.	Angiosperm morphology, taxonomy and economic botany	100	3
3.	Plant biochemistry, Physiology and ecology	100	3
4.	Biotechnology and Bio-instrumentation	100	3
5.	Genetics, plant breeding and evolution	100	3
6.	Practical –Major –III	100	3
7.	Practical – Major - IV	100	3

FIRST YEAR

Paper – 1
HINDI- I

Paper – 2
ENGLISH PAPER – I

Detailed Text

PROSE

1. In Prison – Jawaharlal Nehru
2. What is Science? – George Orwell
3. On Marriages – Nirad Chaudari
4. The Luncheon – N. Somerset Maugham
5. The Mourners – V. S. Naipaul
6. The Plane Crash – Juliane Koepcke
7. Better Late – R.K. Narayan

POETRY

1. Polonius' Advice to his Son – William Shakespeare
2. Every Town a Home Town - Kaniyan Purkunran
3. The Village Schoolmaster – Oliver Goldsmith
4. The Solitary Reaper – William Wordsworth
5. On his Blindness – John Milton
6. The Tyger – William Blake

Non-Detailed

Text : THE GIFTS AND OTHER STORIES abridged and simplified by Anthony Toyne – Oxford University Press, 1997.

The following stories

1. The Gifts – O. Henry
2. The Two Friends – Guy de Maupassant
3. The Bear Hunt – Leo Tolstoy
4. The Goblins and the Grave Digger – Charles Dickens
5. The Nightingale and the Rose – Oscar Wilde

GRAMMER

1. Articles and Prepositions
2. Infinitives and Gerunds
3. Five basic sentence patterns (SV SVC, SVO, SVOO, SVOC(A))
4. Arranging the component parts so as to form a sentence
5. Language work at the end of all lessons
6. Language work at the end of all lessons
7. Question Tag, Active and Passive Voice
8. Degrees of Comparison

COMPOSITION

1. Letter Writing (Formal and Informal)
2. Developing the hints
3. Comprehension
4. Writing Telegram
5. Completion of a passage
6. Precis Writing

Paper – 3

ALGOLOGY, MYCOLOGY, BACTERIOLOGY, VIROLOGY AND PLANT PATHOLOGY

UNIT – I : ALGOLOGY

- a) Comparative survey of important systems of classification of Algae and modern trends.
- b) Comparative account of algae with special references to Algae pigments, flagellae, chloroplasts, pyrenoids, eye spots, range of thallus, food reserves and Life cycle patterns.
- c) A brief study of form, morphology, cellular organization, reproduction and life cycle of the following genera.
 - i) Anabaena.
 - ii) Nostac.
 - iii) Chlorella.
 - iv) Valvox
 - v) Oedogonium
 - vi) Clostridium
 - vii) Chara
 - viii) Ulothrix
 - ix) Ulva
 - x) Coleocheate
 - xi) Sargassum
 - xii) Batrachosperum.

UNIT - II 1. Distribution and role of algae in soil, fresh water, marine environment and in polluted habitats.

2. Economic importance of algae with special reference to – Agar, diatomaceous earth, bio - fertilizers and role of algae in biotechnology.

UNIT – III : MYCOLOGY

- a) Recent trends in the classification of Fungi with reference to morphological criteria and mode of life of the main classes of fungi
- b) Comparative study of the following genera: Plasmodiophora, Mucor, Rhizopus, Taphrina, Albugo, Eurotium, Puccinia, Ustilago, Polyporus, Peziza, Fusarium, Cercospora.

UNIT IV Economic importance :

A general study of the following with special reference to the examples given : Antibiotics (Penicillin), fungicides (Bordeaux mixture, Hinosan), Edible fungi (Morchella).

General characters and types of the following associations and their importance : a) Mycorrhiza, b) Lichens.

UNIT – V : BACTERIOLOGY

- a) General classification of bacteria .
- b) Bacterial anatomy, Nutrition, growth and reproduction.
- c) Economic importance of bacteria with special references to Antibiotics, Nitrogen cycle, Root nodule bacteria and in industries.

UNIT – VI : VIROLOGY

- a) General characters of virus – Nomenclature and classification of plant viruses, Morphology etc.
- b) Transmission and control of plant viruses, with special reference to insect vectors.
- c) Viroides, virians, and modern concepts of oncogenic viruses.

- d) Phages – Mycophages, Phycophages, and Bacteriophages and replication.

UNIT – VII : PLANT PATHOLOGY

- a) Symptomology in fungal, bacterial and viral infections of plants.
- b) Etiology and control of following plant diseases :
- Bacteria : Citrus canker, Blight of castor, Blight of paddy.
- Fungi : Tikka disease of ground nut, Black rust of wheat, Red rot of Sugar cane.
- Virus : TMV, TYMV, Bunchy top of Banana.

Reference:

1. Fritsch F.E. 1945 : Structure and Reproduction in Algae 2 volumes. Cambridge University.
2. Smith G.M. 1955 : Cryptogamic Botany Vol, Tata McGraw Hill.
3. Moris. I 1967 : Introduction to Hutchinson University Library.
4. Chapman V.J. & Chapman D.J. 1973 : The Algae (2nd Edn) Macmillan.
5. Webster J. 1970 : Introduction to Fungi Cambridge University press.
6. Vasista B.R. 1969. Botany (for degree students) part-II fungi
7. Sri Vastva J.P. 1970 : An introduction to Fungi, Central book depot, Alahabad.

Paper – 4

Allied CHEMISTRY

INORGANIC CHEMISTRY

UNIT – I Covalent bonds:

1. Basic concepts of molecular orbital theory-bonding and non-bonding orbitals, molecular orbitals – configuration of homonuclear di atomic molecules – H₂, N₂, O₂. F₂ bond order.
2. Chemistry of ‘S’ and ‘P’ block elements.
3. Hydrogen – hydrides, classification – preparation.

4. Chemistry of halogens inter halogen compounds – ICl, IFS, BrF_3^- preparation, properties and structure – Basic properties of Iodine.
5. General methods of extraction of metals – different types of ores – different methods ore dressing – types of furnaces – Reduction and hydro and electrical methods of metallurgy different types of refining – role of carbon in steel and heat treatment of steel.

UNIT – II

1. Nomenclature - Warner, Sidgwick, Rauling theory.
2. Chelation – Biologically important chelates.
3. Fuel gases – Natural gas, water semi-water gas, producer gas – a short account.
4. Fertilizers – Urea, Ammonium sulphate, Ammonium Nitrate – Super phosphate of lime.

ORGANIC CHEMISTRY

UNIT – III

1. Isomerism – Optical isomerism – symmetry, optical activity of lactic acid and tartaric acid, Geometrical isomerism – maleic and turmeric acids.
2. Keto-enal isomerism.
3. Halogenated hydro carbons – preparation and uses of dichloromethane, chloroform, CCl_4 .
4. Chemotherapy – Sulpha drugs – preparation, uses and mechanism of action. Antibiotics – Penicillin, structure and uses – Vitamins – structure and deficiency diseases of vitamin A, B- complex, Vitamin C, D and K. Hormones – Peptide hormones – Oxytocin, protein hormones, insulin – Biological function.
5. Covalent bond - orbital overlap – hybridization and geometry of organic molecules (CH_4 , C_2H_4 , C_2H_2).
6. Polar effects, Inductive, Mesomeric, hyper conjugation and steric effects.

UNIT – IV

1. Aromatic Compounds – Electrophilic substitution reaction in benzene – nitration, Halogenation, alkylation, acetylation, sulphonation.

2. Hetero cyclic compounds – Furan Thiophene Pyrrole and pyridine – preparation – properties.

UNIT – V

Carbohydrates – classification, preparation – properties – Inter conversion of glucose and fructose.

Disaccharides – Sucrose, preparation.

Polysaccharides – properties – bases derivatives – preparation and properties.

Amino acids – classification, preparation and properties.

Peptides – preparation – proteins – classification, properties and biological signification.

UNIT – VI PHYSICAL CHEMISTRY

Energetics – spontaneous and non-spontaneous process – entropy – free energy.

Solution – types – Raoult's law – ideal and non-ideal solution – Binary liquid mixture.

Chemical kinetics – order and molecularity – rate law – measurement of rates and order – effect of temperature on the rate of chemical reaction – concept of energy of activation – Role of catalyst in a catalyzed reaction.

Surface chemistry – Absorption – Physical and chemical absorption – Absorption of gases on solid – Chromatography - Principle and application of column, paper and thin layer chromatography.

UNIT – VII

1. Kohlrausch's law – conductivity measurement in the determination of dissociation constant – conductometric extraction – electrode Galvanic cell.
2. Standard electrode potential – measurement using reference – Calomel electrode – electrochemical series – application.
3. Principles of electroplating – importance of pH and buffer in the living system - pH determination by electrometric methods – hydrolysis of salt – corrosion theories – method of preservation corrosion.
4. Phase rule – Deficiency of terms – phase rule statement and its application.

ALLIED CHEMISTRY -PRACTICAL:

Volumetric analysis :

- a) Estimation of borax using Potassium hydrogen phthalate.
- b) Estimation of H_2O_2 .
- c) Estimation of Oxalic acid.
- d) Estimation of ferrous ion using diphenylamine as internal indicator.
- e) Estimation of Dichromate versus thiosulphate.

Organic analysis:

To distinguish between aliphatic or aromatic, saturated or unsaturated compounds.

Functional group tests for phenols, amines, aldehydes, ketones aromatic acids, amides and carbohydrates.

Reference:

1. Basic Inorganic chemistry – Cotton and Wilkinson (Wiley).
2. Text book of organic chemistry P1 sonnic. Revised edition.
3. Elements of physical chemistry – Glastone and Lewis.

MAJOR PRACTICAL – I ALGALOGY, MYCOLOGY, BACTERIOLOGY, VIROLOGY AND PLANT PATHOLOGY

Algalogy

A detailed study of the genera included in the theory.

Mycology

6. Methods of isolation and culture of Fungi.
7. Study of organisms included in the theory.
8. General types of Lichens.

Bacteriology

1. Demonstration of isolation and culture of Bacteria.
2. Demonstration of staining techniques, including, simple staining and Gram's staining.

Plant pathology

Study of infected materials cited in the syllabus.

II YEAR

HINDI- I

ENGLISH PAPER – II

Detailed Text

PROSE

8. A Visit to India – Julian Huxley
9. University Days – James Thurber
10. I Have a Dream – Martin Luther King
11. The Story Teller – H.H. Munro (Saki)
12. George Bernard Shaw – Bertrand Russel
13. Only then shall we find Courage – Albert Einstein

POETRY

7. The Day is Done – Henry Wadsworth Longfellow
8. King Arthur's Farewell – Alfred Tennyson
9. O Captain! My Captain! – Walt Whitman
10. My Last Duchess – Robert Browning
11. Ode to a Nightingale – John Keats
12. Lochinvar –Walter Scott

Non-Detailed

A collection of One Act Plays -

1. Remember Ceasar – Gordon Daviot
2. The Proposal – Anotn Chekov
3. The Miracle Merchant – Saki
4. The Stepmother – Arnold Bennet
5. The Mahatma – Rama Sarma

GRAMMER

Relative Clauses

Conditional Sentences

Modal auxiliaries

Reported Speech

Transformation of Sentences

Affirmative, Negative and Interrogative Sentences

Simple, Compound and Complex Sentences

a,b,r clauses

Correction of Sentences based on

Subject, Verb and Concord

Tenses

Articles and Prepositions.

Question Tags

COMPOSITION

7. Paraphrasing
8. Dialogue Writing
9. Report Writing
10. Note Making
11. General Essay
12. Expansion of Idea.

Paper – 7

ANGIOSPERM ANATOMY, EMBRYOLOGY AND CELL BIOLOGY

ANATOMY

UNIT – I

Meristematic tissues – Apical, lateral and intercalary meristems – Ultra structure and histochemistry – Theories of apical organization – Shoot apex – Root apex

UNIT – II

Tissue systems – epidermal tissues – Trichomes, stomata – Structure and Function.
Glandular tissues – Primary tissues – parenchyma, collenchyma, sclerenchyma, Vascular tissues – xylem, phloem.

UNIT – III

- ii) Primary structure of root and stem Dicot, and monocot – Nodal anatomy, unilacunar, trilacunar, and multilacunar.
- iii) Vascular cambium - Cork cambium, - Periderm, lenticels, abscission, wound healing, Tyloses, Annual ring, Heart wood.
- iv) Secondary growth in monocot stem-Anamalous secondary thickening in dicot stems (Bougainvillea, Bignonia, Boerhaavia, etc.)

Embryology:

UNIT – IV

Microsporangium – structure and development of anther – male gametophyte.

Megaspore – Structure and development of ovule – Female gametophyte. Fertilization and post fertilization changes.

UNIT – V

Endosperm – types – Nuclear endosperm, Cellular endosperm, Helobial endosperm, Ruminant endosperm, Endosperm Haustoria - Functions of endosperm. Embryo development – monocot, and dicot embryo, - Polyembryony, parthenogenesis, Apomixis, Role of embryology in plant breeding, embryology of Hybrids.

Cell biology :

UNIT – VI

Ultra structure of plant cell and cell organelles – their functions – cell wall, cytoplasm, Endoplasmic reticulum, Golgi complex, Lysosomes. Mitochondria, Plastids, Ribosomes, Nucleus.

UNIT – VII

Chromosomes – structure and function, Euchromatin, heterochromatin, Giant chromosomes, - Polytene and Lampbrush. Nucleic Acids – Structure, Function Replication. DNA and RNA as the genetic material. Cell division, types and cell division – mechanism.

Reference:

MAJOR II ANGIOSPERM ANATOMY, EMBRYOLOGY AND CELL BIOLOGY

ANATOMY

1. Carlquist – 1961. Comparative plant anatomy – Holt Rinehart, New York.
2. Esau.K. 1965 – Plant Anatomy. Jot – John, Wiley, New York.
3. Foster. A.S. Practical Plant Anatomy. D.Van, Nostrand & Co-New York.
4. Hall – J.W. 1976 – Plant structure, Functions and adaptation – Mac Millan – London.

EMBRYOLOGY

- Bhojwani. S.S and Bhatnagar. SP. 1978. The Embryology of Angiosperms. Vikas Publishing. Pvt. Ltd.
- Maheswari. P. 1971. An Introduction to the embryology of Angiosperms. Tata Macgrew Hill company Ltd.
- Swamy. BGL and Krishnamurthy. K.V. 1980. From flower to fruit.
- Raghavan V. 1976, Experimental embryogenesis in vascular plants, Academic press, London.
- Johanson .D.A. 1950. Plant embryology. Chronica – Botanica, walthon press U.S.A.

CELL BIOLOGY

1. Brown W.V. and Berk E.M. 1984. A text book of cytology. C.V. Mosby Co. St. Louis.
2. Swanson C.P. 1971. The cell, Prentice Hall of India.
3. Friefelder D. 1995 – Molecular Biology. Narsa, Publishing House – New Delhi.
4. Cohn N.S. 1979. Elements of cytology Freeman Book company.
5. Hall. J.L. flowers. T.J. and Roberts R.M. 1978/ Plant cell structure and metabolism, Longman.

MAJOR PRACTICAL – III

ANGIOSPERM ANATOMY, EMBRYOLOGY AND CELL BIOLOGY

ANATOMY

7. Epidermal studies – Trichome, Stomata.
8. Study of Primary Structures in Monocot and Dicot plants and root.
9. Normal Secondary thickening in Dicot stem and root.
10. Anomalous secondary thickening in Bogainvillea, Bignonia, Boerhaavia and Nictanthes.

EMBRYOLOGY

1. Anther studies – various stages of development (permanent slides) and matured anther.

2. Ovule studies – Structure of ovule and various types – Various development stages (permanent slides).
3. Embryo studies – development stages of monocot and dicot embryo.
4. Endosperm studies – various types (slides).

CELL BIOLOGY

1. Study of structural organization cell and cell organelles through standard publication and Electron micrographs.
2. Study of cell division stages in meiosis and mitosis by smear and squash techniques.

PAPER – 8

ALLIED - BIOSTATISTICS AND COMPUTER APPLICATIONS IN BIOLOGY (THEORY)

BIOSTATISTICS

UNIT – I

1. Biostatistics – definition, principles, scope, limitations and uses. Collection of data - Sample, Population, Sampling techniques. Types of representation – Graphic and bar diagrams.

UNIT – II

1. Central values and dispersions – mean, mode, median – coefficient of variations, Probability, Standard deviations, Correlations.
2. Distribution – Binomial, Poisson and normal distribution.

UNIT – III

Hypothesis testing – Test of Significance, test in large samples and small samples, t-test, F-test, Chi square test.

COMPUTER APPLICATIONS IN BIOLOGY

UNIT – IV

Computer – Introduction and the application of computers in biology – Characteristics - Hardware & software – types – generation of computers – Input, output and storage devices.

UNIT – V

Fortran Programming. Basis – Representation of integer and real constants – variable s– expression – assignment and Input, output statements. Design control statements – Loops – Subscribed variable – Files.

UNIT – VI

1. Data processing – Introduction – Records, files, data collection, preparation, verification, editing and checking , backup and file recovery procedure – sorting searching and merging.
2. Ms office – Data entry – graphs and processing.

UNIT – VII

Foxpro – Introduction to Foxpro environment – Database creation and insertion, deletion and modification – managing multiple database – display of data – Foxpro programming – memory variables – date, time, string and math functions – report generations.

Reference:

Biostatistics:

1. Palanisamy .S and Manoharan M.1994. Statistical methods for Biologists. Palani paramount publications, Tamil Nadu.
2. Arota P.N. and Malhan P.K. 1996. Biostatistics Himalaya publishing House – Mumbai.
3. S.P. Gupta. Statistical method.
4. Sokal and Rohlf 1973 – Introduction to Biostatistics – Toppan co, Japan.
5. Bishop O.N. Statistics for Biology . Bostan Houghtan Miltim.

COMPUTER APPLICATIONS IN Biology

Introducing data processing – NCC Publications.

Mastering data processing – J. Bingham Macmillan Master Series.

Computer Today – S.K. Basandra, Galgotia Publications.

Illustrated Foxpro – Granillo – BPB Publications.

How Computer – (2000) Ronwhite – Techmedia.

Programming in FORTRAN – Seymanor Lipschuts and Arthur poe Schaum series 1982.

PAPER - ALLIED - BIOSTATICS AND COMPUTER APPLICATIONS IN BIOLOGY

(PRACTICAL)

3. Mean, Standard deviation and Mean deviation.
4. Correlation co-efficient.
5. Regression lines and co-efficient.
6. Students 't' test.
7. Chi-square test.
8. Database creation.
9. Updating, sorting and indexing of database.
10. Multiple database processing.
11. Reports generation.

III YEAR

Paper – 9

ARCHEGONIATAE

Bryophytes :

UNIT – I

12. General characteristics and classification, origin, and evolution of bryophytes.
13. Study of morphology and Life cycle of the following genera in detail.

- a) Marchantia, b) Anthoceras, c) Pellia, d) Sphagnum, e) Polytrichum.

UNIT II 1. Study of general topics

- a) Ecology, pollution indicators of Bryophytes.
- b) Comparative study of alternation of generation.
- c) Economic importance

Pteridophytes

UNIT – III

1. General characteristics of pteridophytes, classification, Alternation of generation, sporangial organization, Homospory, Heterospory – Development of antheridia, archegonia and embryos.
2. Apomictic life cycle – apospory, apospory, vegetative apomixis.

UNIT – IV

1. Study of morphology and Life Cycle of the following genera.
 - a) Rhynia.
 - b) Selaginella.
 - c) Isoetes
 - d) Equisetum
 - e) Ophioglossum
 - f) Dichranopteris.
 - g) Osmunda.
 - h) Adiantum.
 - i) Marsilea.

UNIT – V

Evolutionary trends in ferns – Steelar evolution, sorus evolution, prothallial evolution.

Gymnosperms :

UNIT – VI

1. Recent trends in classification of gymnosperms.
2. Morphology and anatomy of vegetative and reproductive organs.
3. Detailed study of the following genera : Cycas, Pinus and Gnetum.

UNIT – VII

Study of general topics :

1. Structure and evolution of archegonium in Bryophytes, Pteridophytes and Gymnosperms.
2. Distribution of living and fossil gymnosperms in India.
3. Evolution and Economic importance of gymnosperms.

Paper – 10

ANGIOSPERM MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

ANGIOSPERM MORPHOLOGY

UNIT – I

Plant morphology – Root - types and modifications. Stem – Types, modifications, of aerial and under ground stem. Leaf - phyllotaxy, simple and compound leaf – parts of leaves and Leaf modifications.

UNIT – II

Inflorescence – types – floral parts and their arrangements – fruits – Fleshy and Dry fruits – Types of dry fruits. Disposal of seeds and fruits – Seed germination - types.

TAXONOMY

UNIT – III

Principles of plant classification and importance – Artificial classification (Linneaus), Natural (Bentham & Hooker), Phylogenetic classification (Engler and Prantle), Modern (Cranquist, Takhtajan, and Throne classification) – Outline classification Merits & Demerits.

UNIT – IV

Botanical Nomenclature – Aim, History and Name – forms of scientific classification – ICBN – Principles – Author citation - Practical naming of plants – Naming by comparison – By means of keys – Identification by floras.

UNIT – V

Study of the following families :

1. Annonaceae.
2. Nymphaeaceae.
3. Capparaceae.
4. Sterculiaceae.
5. Leguminaceae.
6. Myrtaceae.
7. Cucurbitaceae..
8. Apiaceae.
9. Astraceae.
10. Apocynaceae.
11. Verbinaceae.
12. Asclpiadaceae.
13. Amaranthaceae.
14. Euphorbiaceae.
15. Liliaceae.
16. Poaceae.
17. Archidaceae.

ECONOMIC BOTANY :

UNIT – VI : Introduction: Study of the following plants and their economic importance:

1. Crop plants – Wheat, Rice, Sorghum, Ragi, Green & black gram, ground nut.
2. Vegetables – Carrot, Radish, Tapioca., Potato, Tomato, Lady's Finger.
3. Fruits – Citrus fruits, Mango, Pineapple, Apple.
4. Beverages – Tea, coffee, cocoa.

5. Spices and condiments – Chilies, cardamom, pepper.

UNIT – VII : PLANTS OF INDUSTRIAL AND MEDICINAL VALUE

1. Fiber crops – hemp, jute, cotton.
2. Wood – Sandal, Bamboo.
3. Rubber, latex, resins and gums.
4. Medicinal plants – Aswagandha, Ginger, Belladonna, Rouwolfia.

Paper – 11

PLANT BIOCHEMISTRY, PHYSIOLOGY AND ECOLOGY

PLANT BIO-CHEMISTRY

UNIT – I

1. Classification, occurrence and structure of carbohydrates and Lipids.
2. Amino acids, peptides and proteins – occurrence, structure, functions and synthesis of amino acids. Classification of proteins according to solubility and structure. Structural proteins, lectins and their importance.

UNIT – II :

1. Chemical nature, properties, classifications and mode of action of enzymes – Km value, regulation and compartmentalization.
2. Outlines of Nucleic acids – Structure and types.
3. Biosynthesis and function of secondary metabolites, - lignin, subarins, turpines, phenols, alkaloids and flavanoids.

PLANT PHYSIOLOGY

UNIT – III

1. Physio-chemical properties of cell – structure and composition of cell membrane – models – Fluid mosaic model, Lipoprotein model.
2. Chemistry of solutions, Colloids, bonds, pH, Oxidation and Reduction.

3. Water relations of plant – Unique – Physico-chemical properties of water, Chemical potential and water potential in the plant, Diffusion, Imbibitions, Permeability osmosis, Soil – Plant – Atmosphere – Continuum (SPAC) – Stomata - regulation and transpiration.

UNIT – IV

1. Photosynthesis – Pigments, Photo system I and II, Electron transport through cyclic, non-cyclic and photo phosphorylation, Calvin cycle, Hatch and clack pathway, Factors affecting photosynthesis, Photo respiration.
2. Respiration – Aerobic and Anaerobic. Glycolysis, Kerb's cycle, ETS – phosphorylation, substrate and oxidative – HMP Shunt - RQ, Factors influencing respiration..
3. Nitrogen metabolism – Nitrogen cycle, Nitrogen fixation – symbiotic and non-symbiotic – Ammonia assimilation – protein synthesis.

UNIT – V

1. Mineral Nutrition: Essential elements – Micro and macro elements – their deficiency diseases – Fertilizers. Foliar nutrition.
2. Growth – Measurement – Growth hormones – Photoperiodism – Thermoperiodism – vernalization – photochrome – Biological clock – Fruit - development and ripening – seed setting – Seed - Dormancy, viability and germination.

UNIT – VI

1. Ecology – Definition – Principles – environment of rooted plant – Physical factors – Temperature, light, humidity, Rain fall, wind, fire etc., and Biological factors
2. Soil - Structure and composition – Soil air, Soil water and Biological system of soil, Soil profile – Formation of soil and soil types.

UNIT – VII

1. Ecosystem concept – Tropic levels – food chain – food web – Ecological pyramids.
2. Plant succession in pond and virgin soil – climax. Classification of plants based on water relations – morphological and structural adaptations in various environment systems.

Paper – 12

BIOTECHNOLOGY AND BIOINSTRUMENTATION

BIOTECHNOLOGY

UNIT – I

1. Biotechnology – Definition, concepts, Scope-History and Achievements.
2. Plant tissue culture, anther and pollen culture – selection of mutants – callus cultivation.
3. Protoplast culture and somatic hybridization – isolation of protoplasts – Production of Cybrids and hybrids.

UNIT – II

1. Bio transformation – immobilized cell culture, bio reactors, perspectives, factors affecting yield.
2. General consideration of microbial strain improvement for agriculture, medicine and industry – strategies of strain improvement.

UNIT – III

Techniques employed in recombinant DNA technology – isolation and purification of DNA, Restriction endonucleases - agarose gel electrophoresis, Southern / Northern / Western blotting. DNA sequencing, selection and screening of recombinant clones.

UNIT – IV

Cloning – salient features – Plasmids, cosmids, single standard DNA viruses, Ti Plasmid, construction of plasmid vectors – cloning strategies, genomic libraries, C - DNA Libraries - Cloning of plant cells.

BIO INSTRUMENTATION

UNIT – V

1. Microscopy – History – optical principles, use and care of microscopes, - Different types of microscopes, - Phase contrast, Florescent and Electron microscopes.
2. Microscopic preparations – Temporary, semi permanent and permanent preparations – special techniques – smearing, squashing, macerating and whole mounts.

UNIT – VI

Reagents – Clearing Reagents, Adhesives, Embedding media, Mounting media – whole mounts.
Killing and fixation - Killing and fixing fluid for preservation.
Staining procedures – Solvents, mordents, general and specific stains, slide preparation – Hand section.

UNIT – VII

Microtomy – microtome – types.
pH meter – principles, construction and working .
Chromatography – Adsorption chromatography, Gas – liquid chromatography, gas exchange chromatography
Electrophoresis – Principle, paper and gel electrophoresis.
Centrifuge – Principle and operations.

GENETICS

UNIT – I

1. Genetic basis of heredity - Mendelian genetics – Mono and Dihybrid ratios – Allelic and non – allelic gene interactions - Polygenic inheritance – multiple alleles.

UNIT – II

1. Linkage and crossing over – mapping of genes on chromosomes, sex determination in plants.
2. Sex linked inheritance.
3. Mutation – Mutagenesis, mutation, mutagen and mutants - types of mutations, detection of lethal mutation.
4. Polyploidy - types and significance.

UNIT – III

1. Gene – Fine structure – cistron, muton and recon, Gene regulation – operon – Lac operon.
2. Genetic code.
3. Population genetics – Hardy weinburg law.

PLANT BREEDING

UNIT – IV

1. Principles involved in plant breeding – Green revolution – wheat, rice, sugar cane
2. Methods of crop improvement – selection, hybridization, introduction and assimilation.

UNIT – V

Heterosis – Effect and causes. Breeding for disease resistance. Mutation breeding. Improved seed production and seed testing techniques.

EVOLUTION

UNIT – VI

Concepts – Evolutionary concepts distinct from other in explaining the diversity of life – origin of life – spontaneous and chemosynthetic evolution of the living organisms.

UNIT – VII

Variation in nature – analysis of variation – (mutation, recombination, adaptation and selection).

MAJOR PRACTICAL – IV

Practicals covered in the subjects ARCHEGONIATAE, ANGIOSPERM MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

BRYOPHYTES

Study of the types includes in the syllabus.

PTERIDOPHYTES

1. Study of the morphology, Anatomy and structure of the spore bearing parts and gametophytes of the genera listed in the theory.

GYMNOSPERMS

Study of morphology and anatomy of the Vegetative and reproductive structures in the sporophytes and gametophytes of the genera listed in the theory.

MORPHYOLOGY

With suitable examples study of the morphology of angiosperms as in the theory.

TAXONOMY

1. Description of plants in technical terms.
2. Preparation of keys and use of keys in identification.

3. Dissection of Vegetative and floral parts of plants belonging to the theory part. Study of economically important plants mentioned in the syllabus.

Herbarium (minimum of 15 sheets of common plants of angiosperms) with proper field note book, shall be submitted at the practical examined.

PRACTICAL IV Practicals covered in the papers – Plant biochemistry, physiology and ecology, Biotechnology and bio-instrumentation, Genetics, Plant breeding and evolution.

Plant Biochemistry and Physiology :

1. Extraction and estimation of starch.
2. Extraction and estimation of lipids.
3. Estimation of amino acids by ninhydrin.
4. Separation and identification of sugars by paper chromatography.
5. Effect of temperature and chemicals on membrane permeability.
6. Separation of plant pigments by paper or thin layer chromatography.
7. Study of rate of photo synthesis under different light intensities.
8. Measurement of rate of respiration in germinating seeds / flower buds – Respiroscope methods.
9. Measurement of pH of plant sap and soil solution by pH meter.
10. Determination of ratio of water absorption and transpiration by weighing method.
11. Study of relative rate of transpiration in different plants.
12. Determination of OP by plasmolytic method.

Biotechnology and Bio- instrumentation:

1. Electrophoresis – Demonstration only.
2. Colorimetry.
3. pH meter- operation and maintenance.
4. Centrifuges - operation and maintenance.
5. Chromatography- operation and maintenance.
6. Preparing and recording of microscopic preparations.
7. Special techniques – smearing, squashing, macerating and whole mounts.

8. Techniques employed for special materials as suggested in the theory.

Genetics, Plant breeding and evolution :

1. Demonstration of hybridization technique using potted plants.
2. Problems related to Inheritance, Linkage and crossing over.

Question pattern for B.Sc., Botany

Maximum – 100 marks

Duration – 3 Hrs.

Part A

Answer **ALL** questions.

All questions carry equal marks

10 x 3 = 30

Draw suitable diagrams wherever necessary.

Q. No. 1 to 10.

Part B

Answer any **FIVE** questions.

5 x 5 = 25

All questions carry equal marks.

Draw suitable diagrams wherever necessary.

Q. No. 11 to 18.

Part C

Answer **ALL** questions.

All questions carry equal marks

3 x 15 = 45

Draw suitable diagrams wherever necessary.

Q. No. 19 to 21 (Three questions with internal choice Either / or type)

Practical:

Maximum – 100marks

Practical 85 marks

Record 15 Marks

Duration – 3 Hrs

Q.Nos 1,2,& 3 Can be subdivided into two or three questions based on the subjects to which the practical is going to be performed (Should be decided by the examiners)

Q. No 1 Practical - 25 Marks

Q. No 2 Practical - 20 Marks

Q. No 3 Practical - 15 Marks

Q. No 4 Five Spotters (5x5)- 25 Marks