NEHRU GRAM BHARTI VISHWAVIDHYALYA

Kotwa, Jamunipur, Debawal Allahabad

BOTANY SYLLABUS

(Approved By Board of Studies)

(B.S.c. Part -I,II,and III)

DEPARTMENT OF SCIENCE

B.sc. I - Botany (Total 180 Hrs)

Total marks 150

Paper - I	**Each 5 UNITs**	**34 Marks**		**60**
Lecturers	**2 Periods per week**			
Paper - II	**Each 5 UNITs**	**33 Marks**		**60**
Lecturers	**2 Periods per week**			
Paper - III	**Each 5 UNITs**	**33 Marks**		**60**
Lecturers	**2 Periods per week**			

Practical 50 Marks

B.sc. II - Botany (Total 180 Hrs)

Total marks 150

Paper - I	**Each 5 UNITs**	**34 Marks**	**60**
	Lecturers	**2 Periods per week**	
Paper - II	**Each 5 UNITs**	**33 Marks**	**60**
	Lecturers	**2 Periods per week**	
Paper - III	**Each 5 UNITs**	**33 Marks**	**60**
	Lecturers	**2 Periods per week**	

Practical 50 Marks

B.sc. III - Botany (Total 180 Hrs)

Total marks 150

Paper - I	**Each 5 UNITs**	**50 Marks**	**90**
	Lecturers	**3 Periods per week**	
Paper - II	**Each 5 UNITs**	**50 Marks**	**90**
	Lecturers	**3 Periods per week**	
Paper - III	**Each 5 UNITs**	**50 Marks**	**90**
	Lecturers	**3 Periods per week**	

Practical 75 Marks

B.Sc.- First Year

Botany

FIRST PAPER

Fungi, Microbiology, Lichens and Plant Pathology

UNIT- I

Fungi : General Character, Classification and economic importance. Fungi, Important features and life history of Mastigomicotina - **Pythophthora**, **Zygomycotina**- Mucor

UNIT - II

Important features and life history of Ascomycotina- Aspergillus, Peziza
Basidiomycyotina - Puccinia
Deuteromycotina - Fusarium

UNIT -III

Microbiology : Definition, Importance and study of microbes - bacteria, viruses, structure, nutrition, reproduction and economic importance of above microbes.

UNIT -IV

Lichens : General structure, classification, reproduction and economic importance.
Microplasma: Character, structure,reporduction and economic importance.

UNIT V

Elementary Plant Pathology :

Definition, General Symptoms of fungal, viral and bacterial diseases. General control measures. A study of following deseases, pathogens, symptoms disease cycles and control- black wart diseases of potato, White rust of crucifiers, Tikka disease of groundnut, Wilt of pigeon pea. Leaf curl and yellow vein disease of angiosperms.

SECOND PAPER

Algae And Bryophyta

UNIT-I

A general character,classification,structure and Economic importance.

UNIT - II

General characters, classification, vegetative structure, reproduction and economic importance of nostoc.(Cynophyceae)

UNIT-III

General characters, classification, vegetative structure and life history
Vaucheria(Xanthiphyceae),Ectocarpus,Sargassum(Phaeophyceae)
Polysiphonia(Rodophyceae)

UNIT -IV

Bryophyta: General character, classification, vegetative structure, reproduction and economic importance.

Life history of Riccia,Marchantia(Hepaticopsida)

UNIT-V

Bryophyta: Study of Morphology, Anatomy, Reproduction of
Anthoceros(Anthroceratopsida)Polytrichum(Bryopsida)

THIRD PAPER

Pteridophyta, Gymnosperm And Palaeobotany

UNIT -I

Pteridophyta: Important characters, classification, Stelar Organisation and Economic Importance.
Systematic Position, Occurance, Morphology, anatomy and reproduction of Rhynia.

UNIT-II

Pteridophyta: Structure classification occurence, anatomy and reproduction in Lycopodium. Selaginella, Equisetum and Marselia.

UNIT III

Gymnosperm : General Character, Classification and economic importance
Heterospory and origin of Seed habit
Evolution and diversity of Gymnosperm.

UNIT -IV

Classification, Morphology, Anatomy, Reproduction and life cycle of **Cycas**.
Classification, Morphology, Anatomy, Reproduction and life cycle of **Pinus**.
Classification, Morphology, Anatomy, Reproduction and life cycle of **Ephedra**.

UNIT -V

Paleobotany - General account, Geological time scale, Fossils, Types of Fossils, Fossilizationand famous India Poleobotanist with contribution.

PRACTICALS

SCHEME OF EXAMINATIONS

(Based on course I, II, III)

Time : 4 Hrs

Max. Marks: 50

1. Section cutting, staining, mounting and identification of any gymnosperms/ Pteridophyte material.
8

2. Study and identification of any one microbiological/Plant pathological material
5

3. Study and identification of any one algal/fungal material.
5

4. Mounting of scales/rhizoids/spores/section cutting of bryophytes material.
5

5. Spots - (1 to 6) Slides, figures and specimens.
12

6. Viva - voce.
5

7. Records
5

8. Compulsory Test.
5

References:

1. A Text Book of Botany Algae, Fungi, Bacteria, Mycoplasma, Viruses, Lichens and elementary Plant Pathology - Volume I , S.N. Pandey, P.S. Trivedi.
2. A textbook of Botany (Bryophyta, Ptridophyta, Gymnosperms and Paleobotany) - Volume II, S.N. Pandey, S.P Mishra, P.S Trivedi.
3. A textbook of microbiology - R.C Dubey.
4. The Fungi - Alexopolus and mims.
5. Bryophyta - N.S. Parihar
6. Gymnosperms

- Vasistha

7. Gymnosperms
- Chamberlin

8. Vistas in Plant Pathology and Mycology. - L.V. Gangawne, Veena Ganju

9. Practical Botany
- Volume -I, H.N. Srivastava

10. Microbilogy
- C.B. Parwar.

11. Phycology
- J.S Smith

12. The Structure and reproduction of algae. - Fritsch.

(B.Sc. - Second Year)

Botany

FIRST PAPER

Systematics of seed plant and Economic Botany.

UNIT- I

Plant Identification : Keys and taxonomic literature, Principal and rules of botanical nomenclature. Taxonomic ranks, type concept, Principle of Priority : Herbarium,

UNIT - II

Classification of Angiosperms : Salient features of the system proposed by Bentham & Hooker, Engler & Prantl, Hutchinson.

UNIT- III

Systematic Position, Diagonostic Characters of Familes :

Ranunculacea, Brassicaeae, Malvaceae, Rutaceae, Fabaceae and Apiaceae.

UNIT -IV

Systematic Position, Diagnostic Characters of Families :
Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Poaceae.

UNIT - V

Economic Botany : A General account and botany of food plants - Wheat, rice maize
Red Gram, Cajanus.
Oil Tielding Plants : Mustard, Ground Nut, Coconut.
Medicinal Plants : Rauwolfia, Poppy , Belladona, Turmeric.
Beverages and masticatories : Tea, Coffee, Tobacco.
Fibres : Cotton, Jute.
Woody Plants : Sal, Teak, Shisham.

SECOND PAPER

Plant Physiology and Biochemistry

UNIT-I

Plant - Water Relations : Types of Water, Importance of water to plant physical properties of water, diffusion, osmosis, absoption, hydroponics.

Mineral Nutrition : Essential elements, micro and macro elements. Effects of essential elements in plants.

Transport of organic substances : Mechanics of phloem transport. Souces sink relationship, factors affecting translocation.

UNIT -II

Transpiration - Physiology of stomate, factors affecting the stomatal mechanism.
Photosynthesis - Historical aspects, Photosynthetic UNITs, conecpts of both photosystem., Z-Scheme, Calvin-cycle, C-4 cycle, CAM Plants.
photorespiration.
Respiration - Respiratory Quotient, Aerobic and anaeraobic respiration, Glycolysis, Kreb's Cycle, ETS, Oxidative Phosporylation, Pentose- Phosphate
Pathway(PPP).
Nitrogen Metabolism - Nitrogen fixation(Biological), nitrogen-cycle, Importance of nitrate reductase and its regulation, Ammonium assimilation.

UNIT - III

Growth and Development - Definition, Pathway of growth and developent, seed dormancy and development, plant movements, photoperiodism, physiology of flowering phytohormones,auxins, gibberllins, cytokins, abcissic acid and ethylenes, History and mechanism of actions. Phytochrome - Physiological role and mechanism of action.

UNIT -IV

BIOCHEMISTRY

Enzymes - Nomenclature, chracters, nature, mechanism of action and regulation of the enzype activity.

Carbohydrates - Classification, Properties and biological role, Proteins, lipids and chemical composition of nucleic acids.

UNIT - V

Chlorophyll Nature, Types of chlorophyll, Chemical Composition, Atomic Structure and importance.

THIRD PAPER

Morphology, Embryology and Plant Anatomy

UNIT - I

Morphology : Definition, The basic body of a flowering plant, Morphology of leaf stem, root and flowers.
Infloresence, Types of infloresence, Speical types of Infloresence.

UNIT - II

Structure of anther, Microsporogenesis, Formation of pollen grains (Male - Gametophyte). Structure of Pistil, Ovulies, Megasporogenesis and developnet of embryo sac.

UNIT - III

Pollination, Pollen germination and pollen tube growth, Self incapability, Double fertilization, Developent of endosperm and embry in monocotyledons and dichotyledons, Fruit developent and maturation.

UNIT -IV

Primary structure of stem, root and leaf, secondary structure of stem, root and leaf, wood, Sap wood and heart wood

UNIT - V

Abnormal structure and secondary in monocots and dicots, with special reference to **Nyctanthes**, **Boerhaavia**, **Bouainvillaea**, **Casuarina** and **Darcaena.**
Cork cambium activity and its products.

PRACTICALS

SCHEME OF EXAMINATION

(Based on course I, II and III)

Time: 4 Hrs
Max. Marks : 50

Note: The Practical examination shall be based on the course prescribed in the theory papers.

1. Identification of the family along with floral diagram and floral formula. **6**
2. Anatomy of Dicot and monocot embro**.** **5**
3. Temporary mounts of double stained sections of a anatomical material. Identification with suitable comments and sketches**.** **6**
4. One physiological experiment to be sent up and described by student. **5**
5. Comments upon a pre-arranged physiological experiment/ Instrument/Appartues. **5**
6. Identification and comments upon spots 1-8, 3-3 from I and II 2 from the 3rd Paper. **8**
7. Practical record **5**
8. Field Study/Collection/models/Charts. **5**
9. **Viva-voce** **6**

Reference:

1. A Text book of Botany Angiosperms - B.P Pandey
2. Objective Botany - Dr. A.B. Sinha and Dr. B.C Srivastava
3. Plant Physiology - Salusbury & Ross.
4. Plant Physiology and Biochemisty - Dr. R.N. Singh
5. Plant anatomy -

B.P. Pandey
6. Plant Physiology and Biochemistry - S.P. Verma
7. Plant Anatomy - Cutler
8. Economic Botany - S.K. Singh, S. Srivastava.
9. Text Book of Biochemistry - G.S Sandhu
10. Practical Botany. - Volume - 2 H.N. Srivastava

(B.Sc. - Third Year)

Botany

FIRST PAPER

(Ecology, Enviornmental Biology and Forestry)

UNIT - I

Ecology :

1. Ecology, Ecosystem with reference to grassland, forest and Pond. enery flow, productivity and ecological pyramids, Ecological Niche and Biological indicators, Biogeo-chemical cycles - C. N, P and water cycles, water cycles.

UNIT - II

Ecological Factors: Climate, topographic, biotic and edaphic.

Pollutions - Air, water, noise and soild with control.

UNIT - III

Water conversation, soil erosion and soil conservation, Plant adaptations - xerophytes, hydrophytes, halophytes and epiphytes. Plant succesion.

UNIT - IV

Population ecology : Growth curves, Ecotype, ecads, commUNITy ecology - commUNITy characteristics, frequency, density, cover, life forms.

UNIT - V

Forestry : Definitions, forest - types in India, Management and economic importance, afforestation, agroforestry and social forestry in India, their scope and uses.

SECOND PAPER

Cell Biology, Genetics and Biotechnology

UNIT - I

Cell : Types of cell, structure and functions of different cell organelles, Chloroplast, mitochondria, ribosome, Golgi bodies, endoplasmic reticulum, peroxisomes, microtubles, vacuoles and cell wall.
The structure and function of nucleus - Ultra-Structure, Nucleolus, nuclear membrane and nucleosomes.
Chromosome - Morphology, Centromere and telomere, Types of chromosome alteration, deletion. duplications, translocation, inversion and polyploidy, sex chromosomes.
Cell division - Cell cycle, mitosis, meiosis.

UNIT - II

Genetics : Mendelism, Modification of Mendel's Law.
DNA, the genetic material : DNA structure, replication, protein interaction, genetic code, satellite and repetetive DNA,RNAs, Structure and functions.

UNIT - III

Gene expression : Structure of gene, transfer of genetic information, transciption, translation, protein synthesis, tRNA, ribosomes, regulation of gene expression in prokaryotes and eukaryotes.
Genetic Variations : Mutations types of mutations.
Extranuclear genome - presence and functions , mitochondrial and Plasmid DNA, Cytoplasmie inheritance.

UNIT -IV

Tools and techniques of recombinant DNA technology, cloning of vecors, genomic and eDNA library, transposable elemenets.

UNIT - V

Definition, Baisc aspects of plant tissue culture, cellular totipotency, Economic importance. Salient achievements in crop.

THIRD PAPER

(Ethnobotany, Elementary biostatics, Plant Breeding and Plant propagation)

UNIT -I

Definition, history, scope. A general-account of edible, medicinal and narcotic plants and by

Indian tribals.

UNIT -II

Modern Trends in Taxonomy , Cytology , Phytochemistry , Embryology and taximatrics.

UNIT - III

Elementary Biostatistics - Classification of date, Mean, Median and mode. Standard deviation, Standard error, Variance, co-relation, x^2 test and Experimental designs.

UNIT -IV

Plant-Breeding- Concept, Methods and objectives of somatic hybridization and hybrid vigour.

UNIT -V

PLANT- PROPAGATION - Preparation of the nursery beds, seed propagation vegetative-propagation, cutting, eye-cutting, bud-culture, Budding and grafting, morphogenesis, Embryo-Culture, root and leaf cutting.

PRACTICALS

Time - 4 Hrs.
Max-Marks : 75

Q-1. Study of ecological characters of one material with the help of suitable diagramme or one experiment of Ecology.

Q-2. Emasculation of given material with decription of the method adopted.

or

An excercise monohybrid, dihybrid crosses or working out the mode of inherit linked genes from test cross and/or F2 data.

Q-3. Demonstration of one stage of mitosis or meiosis using appropriate plant matter by acetocarmine smear method.

Q-4. Numerical Problem based on Elementrary Biostatics.
or
Chemical examination of sample polluted water to determine hydrogen ion concentration, alkalinity/acidity.

Q.5 Microsopic examination of a sample of polluted water to comment upon the plankton diversity with sketches and identification (as for as possible) of the dominant forms.

Q.6 Identification and comments upon the spots (1-8).

Q. 7- Viva-Voce

Q.8- Records

Q-9 Field study/Models/Charts etc.

References :

1. Plant Ecology, Soil Science, Cytogenetics, evolution and plant breeding - S.k Verma
2. Plant Ecology - Ambust
3. Cell Biology - C.B. Powar
4. A textbook of biotechnology - R.C. Dubey
5. Tools & Techniques of biotechnology - M.Sharma, N. Tripathi
6. A text book of botany - S.K. Singh, Seema srivastava
7. Genetic - C.B. Powar
8. Encyclopedia of Biotechnology(Set of 1 Volumes) - Varuna Mehta
9. Environmental Biology - S.N. Prasad.
10. Advanced Biotechnology - Sharma and Tripathi