DETAILED CURRICULUM B. Sc. Semester – V BOTANY

SEMESTER PATTERN :

- The course content has been designed on **Semester pattern: Two semesters (V & VI)** in an Academic Year.
- The work load for theory : There shall be **four lectures** per CC - paper in a week and **three lecture** for SEC - paper in a week set up by the department.
- The work load for Practical: There shall be **four Practical (each having 03 hrs)** in a week set up by the department.
- There shall be **four Course Core- theory paper(CC)**, **one subject elective core paper (SEC)** and **one practical paper** in Semester end Examination.
- Each theory examination paper shall be of **2:30 hours** duration and carry 70 **marks**.
- **Internal Marks: 30**
- Practical Examination: 12 Hours
- Practical paper: **200 Marks**

SEMESTER V

Sr. No	PAPER No.	Total Marks (Ext.+ Int.*) = Total	Passing Standard (Ext.+ Int.*)=Total	Total Teaching Hours	University Exam hours	Credits
1	CC-BOT-503 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
2	CC-BOT -504 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
3	CC-BOT -505 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
4	CC-BOT -506 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
5	SEC-BOT-501 Theory	70+30*=100	28+12*=40	15 weeks x3hours=45	2:30	03
6	CC-BOT -507 Practical	200	80	15 weeks x 4 day x 03hours= 180	12	12
	TOTAL	**700**	**200+80= 280**			**31**

DETAILED CURRICULUM B.Sc. Semester - V BOTANY

Paper no. : BOT – CC-503

Title of the paper: Cryptogamic Botany and Plant Pathology

Credit:4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**VIRUSES:** Brief account; Virus, Bacteria and Fungi as pathogens. Brief account; Properties; Effects of viruses on Plants, Methods of Transmission and Tobbaco Mosaic Virus. **ALGAE :** General characters of Algae;Diversified habits (terrestrial, freshwater, marine); Classification (As per F.E. Fritsch) Thallus organization; cell structure; reproduction (vegetative, asexual, sexual) and life histories of following algae: Cyanophyceae : **Gloeocapsa** Chlorophyceae: **Coleochaete** , Phaeophyceae : **Sargassum** Rhodophyceae: **Polysiphonia** Economic importance of algae.	**15**
Unit-2	**FUNGI :** General characters of fungi; Classification (As per Ainsworth). Economic importance of fungi in industry, medicine and as food; Cell structure; reproduction (vegetative, asexual, sexual); life histories of following Fungi . Phycomycotina: **Peranospora** Ascomycotina: **Peziza**, Basidiomycotina: **Puccinia, Agaricus** General Account of Mushroom cultivation. **PLANT PATHOLOGY:** Bacterial causes plant disease: **Citrus canker**. Study about pathogen, symptoms and control Plant diseases: **Wilt of cotton, Early blight of Potato**.	**15**
Unit-3	**BRYOPHYTES:** Classification (As per Smith) Occurrence, distribution, thallus organization, life history and alternation of generation of following bryophytes. (Developments of organs are excluded)Hepaticae: **Plagiochasma,** Musci: **Sphagnum** Economic Importance of Bryophytes.	**15**
Unit -4	**PTERIDOPHYTES:** Classification (As per Smith) Occurrence, distribution, thallus organization, life history and alternation of generation of following pteridophytes. (Developments of organs are excluded) Psilophyta : **Psilotom**,Lycophyta: **Isoetes**, Pterophyta: **Azolla**	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks
Assignment : 10 Marks
Attendance : 05 Marks
Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Semester - V BOTANY

Paper no. : BOT –CC- 504

Title of the paper: Systematic Botany, Taxonomic Botany and Horticulture

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**SYSTEMATIC BOTANY:** Introduction of Bentham & Hooker, Engler - Prantle and Hutchinson system of classification: its merit and demerits. ICBN: Principles and rules, Typification, Priority, Effective and valid publications; Herbarium Techniques, Role of Herbaria, Botanical Gardens. **MORPHOLOGY:** Leaf margin: Entire, Undulate, Crenate, Serrate, Spinous. Leaf surface: Glabrous, Rough, Glaucous, Spiny, Hairy. Anther-attachment; Basifixed, Adnate, Dorsifixed, Versatile. Stigma types: Capitate, Plumose, Discoid, Dumbel, Bifid.	**15**
Unit-2	**TAXONOMY** **(**Bentham & Hooker's Classification) General characters and common examples of economic/ethnobotanical important plants of following families: Bignoniaceae, Rhamnaceae, Mimosae, Convolvulaceae, Acanthaceae, Cannaceae, Poaceae.	**15**
Unit-3	**TAXONOMY** **(**Bentham & Hooker's Classification) General characters and common examples of economic/ethnobotanical important plants of following families: Lythraceae, Cucurbitaceae, Solanaceae, Lamiaceae, Musace, Cyperaceae, Verbenaceae.	**15**
Unit-4	**HORTICULTURE:** Definition, branches, importance and scope, Classification of Horticultural Crops, Special horticultural practices. Vegetative propagation: Concept, methods and applications. Fertilizers- Organic, Compost and Green manure.	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks
Assignment : 10 Marks
Attendance : 05 Marks
Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Semester- V BOTANY

Paper no. : BOT –CC- 505

Title of the paper: Plant Ecology and Environmental Biology

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**PLANT ECOLOGY** Introduction, sub-division of ecology, scope of ecology. Ecosystem: Concept, Different types of ecosystem and typical pond ecosystem. Energy flow in ecosystem: Single channel flow model. Productivity of Ecosystems: Primary productivity, Secondary productivity and Net productivity. Measurement of primary productivity.	**15**
Unit-2	**PLANT ECOLOGY** Soil: Origin, profile and various components of soil complex. Plant succession: Causes, types, general process. Various stages of succession: Hydrosere and Xerosere. Climax: Mono-climax theory, Poly-climax theory and Climax pattern hypothesis.	**15**
Unit-3	**COMMUNITY ECOLOGY** Methods for study of community ecology: Floristic method, Physiognomic method (Raunkiaer's life form) Phytosociological methods: Quadrat method, line transect and belt transect method. Phytosociological Characters: A. Analytical characters: Qualitative and Quantitative. B. Synthetic characters. **ENVIRONMENTAL BIOLOGY** Noise, Air and Water pollution; Brief account and case study and it's control. Remote Sensing: Introduction, photogrammetry, its application in agricultural, forestry and natural calamities. Analysis, Forestry and natural calamities; GIS.	**15**
Unit-4	**ECOLOGICAL ADAPTATION** Hydrophytes: Classification of hydrophytes, external features of hydrophytes, Anatomical character of hydrophytes. Xerophytes: Classification of Xerophytes, external features of Xerophytes, Anatomical character of Xerophytes.	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks
Assignment : 10 Marks
Attendance : 05 Marks
Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Semester- V BOTANY

Paper no. : BOT –CC- 506

Title of the paper: Plant Physiology, Biochemistry and Biostatistics

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**Plant Physiology** The scope of Plant Physiology. Plants and inorganic nutrients: The essential nutrient element, Nutrient roles and deficiency symptoms. Absorption of mineral salts. Translocation: Path, experimental proof and mechanism and composition in phloem.	**15**
Unit-2	**PHOTOSYNTHESIS** Brief account Bio-chemical mechanism of Photosynthesis, Phosphorylation (cyclic, non cyclic), Light and dark reactions (C3-C4 cycle), CO2–fixation, Crassulacean Acid Metabolism. **RESPIRATION** Brief account, Aerobic and anaerobic respiration, Mechanism of respiration, Glycolysis, Krebs cycle, oxidative Phosphorylation and Pentose phosphate pathway, Respiratory quotient, Photorespiration	**15**
Unit-3	**PLANT BIOCHEMISTRY:** Amino acids: Classification, structure, protein and non-protein amino acids. Protein: Classification of protein on the basis of structure Lipids: Synthesis, alpha & Beta–oxidation Enzymes: Brief account, Classification and properties.	**15**
Unit-4	**BIOSTATISTICS:** Brief account; Importance of statistical methods in Biological Measurements; Mean, Mode and Median. Standard deviation, Regression, Probability. Chi-square test Computer: Brief account; hardware & software (CPU & other devices)	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks

Assignment : 10 Marks

Attendance : 05 Marks

Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Semester- V BOTANY

Paper no. : SEC-BOT-501

Title of the paper: Medicinal Plant

Credit: 3 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**DRUGS OBTAIN FROM LOWER PLANTS** Introduction of Medicinal plants, Fungi: Penicillin, Streptomycin, Aureomycine, Chloromycetin, Ergot, Algae: Spirulina, Agar, Ulva, Lichens **DRUGS OBTAINED FROM ROOTS** *Asparagus racemosus* (Satavari**),** *Alangium salvifolium* (Ankol), *Cyperus rotundus* (Nagar moth), *Solanum indicum* (Ringan), *Desmodium gangeticum*, *Glycyrrhiza glabra* (Jethimadh).	**15**
Unit-2	**DRUGS OBTAINED FROM LEAVES** *: Bryophyllum pinnatum* (Panfuti), *Centella asiatica* (Brahmi), *Vitex nagundo* (Nagod), *Abrus precatorius* (Chanothi), Allium cepa (Dungali), *Allium sativum* (Lasan), *Annona squamosa* (Sitafal).	**15**
Unit-3	**DRUGS OBTAINED FROM STEM AND BARK** *Gmelia arborea* (Savan), *Cissus quadrangularis* (Had sankal), *Saraka asoka* (Ashok), Ephedra equisetina (Ephedra), Cinchona officinalis, Pterocarpus santalinus (Rakt-chandan)	**15**
Unit-4	**DRUGS OBTAINED FROM FRUITE AND SEEDS** Randia spinosa (Mindhal), *Ricinus communis* (Aranda), *Opium popy* (Afin/ Khas-khas), *Terminalia bellirica* (Baheda), Plantago ovate (Isabgul), Momordica charantia (Karela) , Derris indica (Karanj), Moringa oleifera (Sargvo)	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks

Assignment : 10 Marks

Attendance : 05 Marks

Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Sem. V BOTANY

Paper no. : BOT- CC – 507

Title of the paper: Practical Credit: 12

Semester end Examination: Marks: 200

- All the topics of the practicals are being taught by Available fresh / Preserve materials, Models, Charts, Figures and permanent Slides.
- Teachers may select plant species available in their locality for study of family.
- There shall be botanical study tour organized in any place of India for the study of vegetation Including visit the forest, research institutes and government institutions. Students have to joined the study tour and also participate in local excursion / environment camp and get awareness about the conservation of natural resources. Student may participate in Seminar / Workshop /Competition etc. of biological sciences.
- ***Student must submit a field / study tour report, herbarium sheets of local plants in practical examination.***
- ***Students will have to prepare their Practical journals as a part of Laboratory work and they will have to submit certified journals in the University practical exam.***
- ***Students shall not be allowed without certified journals in the University practical examination.***

Paper 507 **Detailed Syllabus**

Based on theory BOT-CC-503

1. To study Classification , thallus structure and reproductive structure of : Gleocapsa
2. To study Classification, thallus structure and reproductive structure of : Coleochaete
3. To study Classification, thallus structure and reproductive structure of : Sargassum
4. To study Classification, thallus structure and reproductive structure of : Polysiphonia
5. To study Classification, thallus structure and reproductive structure of : Peziza
6. To study Classification, thallus structure and reproductive structure of : Puccinia
7. To study Classification, thallus structure and reproductive structure of : Agaricus
8. To study of plant diseases: TMV ,Citrus canker
9. To study of plant diseases: Wilt of cotton and Early blight of Potato
10. To study Classification, thallus structure; reproductive organ of : Sphagnum
11. To study Classification ,thallus structure; reproductive organ of : Azolla
12. To study Classification ,thallus structure; reproductive organ of : Isoetes

Based on theory BOT-CC-504

1. To study morphology of Leaf margin and Leaf surface
2. To study of family: Bignonaceae
3. To study of family: Rhamnaceae
4. To study of family: Convolulaceae
5. To study of family: Acanthaceae

6. To study of family: Cannaceae
7. To study of family: Cucurbitaceae
8. To study of family: Solanaceae
9. To study of family: Lamiaceae
10. To study of family: Musace
11. To study of family: Verbinaceae
12. Gardening and bonsai technique.

Based on theory BOT-CC-505

1. To prepare a list of common plants occurring in the grassland community
2. To determine the minimum size of quadrate by species area curve method.
3. To determine the frequency and frequency classes of various species occurring in a given area by quadrate method.
4. To determine the abundance/ relative abundance and density/ relative density of various species occurring in a given area by quadrate method.
5. To determine frequency, density and abundance of various species shown on graph paper.
6. To determine the frequency, frequency classes and relative frequency of various species occurring in a given area by belt transect method.
7. To study uses of ecological apparatus.
8. To determine relative humidity by Psychrometer and wet &dry thermometer.
9. Rapid tests for given soil samples: Carbonate content, nitrate method, Base deficiency.
10. To determine the soil pH.
11. To classify hydrophytes & Xerophytes from your visit to habitat.
12. To study internal characters of hydrophytes & Xerophytes.

Based on theory BOT-CC-506

1. To compare the rate of photosynthesis in Sunlight and shade condition.
2. To observe the rate of photosynthesis under varying carbon dioxide concentration.
3. To compare the rate of photosynthesis in different wavelength of light.
4. To study experiment that indicate CO_2 is produced in the process of Respiration.
5. To study measurement of R.Q. from given material.
6. To perform the Protein test.
7. To study estimation of protein from given plant material.
8. To perform the test for lipids.
9. To study examples of Mean, Median and Mode.
10. To study examples of Standard deviation.
11. To study examples of Probability.
12. To study use of computer systems in Biological study –(hardware and software and other peripheral devices)

TEXT BOOKS RECOMMENDED

(For Theory and Practicals of Semester – 5 & 6)

- Alexopoulus, C. J., Introductory Mycology, John Wiley & Sons Inc.
- Kumar, H. D. Introductory Phycology. Affilated East-West Press Ltd., New Delhi
- Kumar & Singh, A Text Book of Algae.
- Dube, H.C. An Introduction to Fungi.
- B.R. Vashishta. Botany for Degree students: Algae, Fungi, Brypohyta
- Pandey & Trivedi. A Text Book of Botany :Vol. I
- Bilgrami, and Dube, A text book of modern plant pathology.
- Pandey & Chaddha Economic Botany – Vikas Publishing House Pvt. Ltd. New Delhi
- Alexopoulus, C. J., Introductory Mycology, John Wiley & Sons Inc..
- Parihar, N. S. Bryophyta. Central Book Depot, Allahabad.
- Sporne, K. K. The Morphology of Pteridophytes. B. I. Publishing Pvt. Ltd., Bombay.
- Vashishta, P.C. Pteridophyta.
- Chamberlin, C.J. Morphology of gymnosperms.
- Arnold, C.R. An Introduction to Palaeobotany.
- P.C. Vashishta Botany for Degree students: Pteridophyta, Gymnosperms .
- Pandey, Mishra & Trivedi. A Text Book of Botany: Vol. II
- Mehrotra, R.S. Plant Pathology.
- Bole, and Vaghani, Field Guide to Common Indian Trees.
- Sutaria R,N. Systematic Botany
- A.K. Sharma & R.Sharma, Taxonomy – Pragati Prakashan, Meerut.
- Bhatt D.C. & Mitaliya K.D. Angiosperm Taxonomy
- Annie Kumaresan Taxonomy of Angiosperm,Saras publication
- P.C.Trivedi Ethnobotany, Aavishkar Publishers, Jaipur.
- S.K. Jain, Manual of Ethnobotany –Scientific Publication, Jodhpur
- Subramanyam,Samba Murty Economic Botany –, Wiley Eastern Ltd..
- B.P. Pandey Economic Botany –, Chand & Co., New Delhi
- Quadri & Shah Pharmacognocy
- V.Kumarsen Horticulture ,Saras Publication
- Phillip Sheeler & Bianchi Cell & Molecular Biology
- Powar C,B. Essential of Cytology
- Salisbury& Ross, Plant Physiology, 4thEdition. Wadsworth Publishing Company, California.
- Witham et. al. Experiments in Plant Physiology. V N Renhold Company, New York.
- Annie Kumaresan Developmental Botany and Experimental Botany ,Saras publication
- Kumar & Bendre Practical Botany Vol.1,2.
- Pandey B.P. Modern Practical Botany –Vol.-1,2,3.
- Annie Kumaresan Developmental Botany and Experimental Botany ,Saras publication

DETAILED CURRICULUM B. Sc. Semester –VI BOTANY

SEMESTER PATTERN :

- The course content has been designed on **Semester pattern: Two semesters (V & VI)** in an Academic Year.
- The work load for theory : There shall be **four lectures** per CC - paper in a week and **three lecture** for SEC - paper in a week set up by the department.
- The work load for Practical: There shall be **four Practical (each having 03 hrs)** in a week set up by the department.
- There shall be **four Course Core- theory paper(CC)**, **one subject elective core paper (SEC)** and **one practical paper** in Semester end Examination.
- Each theory examination paper shall be of **2:30 hours** duration and carry 70 **marks**.
- **Internal Marks: 30**
- Practical Examination: 12 Hours
- Practical paper: **200 Marks**

SAMESTER-VI

Sr. No	PAPER No.	Total Marks (Ext.+ Int.*) = Total	Passing Standar (Ext.+ Int.*)=Tot	Total Teaching Hours	University Exam hours	Credits
1	CC-BOT-603 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
2	CC-BOT -604 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
3	CC-BOT -605 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
4	CC-BOT -606 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours=60	2:30	04
5	SEC-BOT-601 Theory	70+30*=100	28+12*=40	15 weeks x3hours=45	2:30	03
6	CC-BOT -607 Practical	200	80	15 weeks x 4 day x 03hours= 180	12	12
	TOTAL	**700**	**200+80= 280**			**31**

DETAILED CURRICULUM B.Sc. Semester - VI BOTANY

Paper no. : BOT – CC-603

Title of the paper: Gymnosperm, Paleobotany, and Plant utilization

Credit:4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**GYMNOSPERMS:** Classification (As per Chamberlain) Habit, anatomy, reproduction, life history and alternation of generation of following gymnosperms (Developments of organs are excluded). Gnetales: **Ephedra**, Ginkgoales: **Ginkgo** Economic importance of gymnosperm.	**15**
Unit-2	**PALAEOBOTANY:** Process of fossilization. Types of fossils (compression, impression, petrification, coal balls, carbon dating). Detailed study of fossil types and their restructure: **Pteridophytes: Rhynia** **Lepidocarpon** **Gymnosperms: Cordites** (root, stem, leaf), **Calamitis (**stem)	**15**
Unit-3	**ECONOMIC BOTANY:** **Spices** - flavouring materials: Cloves(Laving), Cumin (Jiru) Cinnamom (Taj), Cardamom (Elaichi), Pepper (Kala mari), Mint (Fudina), Curry Leaf (Mihto limdo), Asafoetida (Hing), Saffron (Kesar) and Cinnamon Leaf (Tamal Patra) **Natural dyes and pigments:** Turmeric (Haldar), Catechu (katho) and Marigold (Galgota). **Oil and oil yielding plant:** Introduction, Types of Oil, Essential oils: Sandalwood oil, Eucalyptus oil, Clove oil; Non essential oils: Cotton seed oil , Groundnut seed oil, Castor seed oil **sugar and starch products:** sugar: sugarcane, sugar beet starch: potato, wheat, rice, maize	**15**
Unit -4	**ETHNOBOTANY:** Ethnobotanical studies of following important plants: **Aegle marmelos** (Bili), **Terminalia bellirica** (Baheda), **Acacia nilotica** (Desi baval), **Butea monosperma** (Kesudo), **Andrographis paniculata** (Lilu kariyatu), **Oroxylum indicum** (Tetoo)	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks

Assignment : 10 Marks

Attendance : 05 Marks

Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Semester - VI BOTANY

Paper no. : BOT –CC- 604

Title of the paper: Plant Anatomy, Physiology, Biochemistry and Floriculture

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**PLANT ANATOMY** Anatomy of root: (Gram, Canna, Arial root of Tinospora) Anatomy of leaf: (Mangifera, Maize, Bamboo) Leaf fall and wound healing Nodal anatomy: Hibiscus, Ixora, Nerium. Anomalous secondary growth in plants. Internal structure of Salvadora, Bougainvillea, Bignonia and Dracaena.	**15**
Unit-2	**PLANT PHYSIOLOGY:** Growth and development: Brief account, Plant growth, growth curve and measurement of growth. Factor affecting growth. Plant Growth regulators (PGR): Structure, function, bioassays, physiological roles and applications of Auxin, Cytokinin, Gibberellin, Abscissic acid and Ethylene. Florigen concept; Photoperiodism; Vernalization; Fruit ripening.	**15**
Unit-3	**PLANT BIOCHEMISTRY:** Water: Brief account, Properties and its importance; pH: Brief account, Properties and its importance; Chromatography: General account, HPTLC technique, Paper chromatography: Separation and characterization of biomolecules. Solution: Expression of concentration for Molar, Molal, Normal and Percent Concentrations.	**15**
Unit-4	**FLORICULTURE** Concept, components, scenario and advantages in India. Production and post harvest practices for tuberose, gladiolus, and rose. Green House technique	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks

Assignment : 10 Marks

Attendance : 05 Marks

Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Sem. - VI BOTANY

Paper no. : BOT –CC- 605

Title of the paper: Plant cell and Molecular Biology, Biotechnology

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**CELL BIOLOGY:** An overview of cell organization; Ultrastructure and functions of following organelles: Nucleus, Chromosomes, Endoplasmic reticulum, Golgi complex, Mitochondria, Ribosomes and Lysosomes. Cell cycle and cell division – Meiosis and Mitosis in plants.	**15**
Unit-2	**GENETICS:** Brief account, Interaction of genes; Inhibitory and Lethal genes, Polymerism, Linkage and crossing over. Cytoplasmic inheritance in plant. Sex determination in plants. DNA - Experiment of Griffith, Avery, Macleod and McCarthy proved that DNA is the genetic material. Structure of DNA, Types of DNA. RNA- Experiment of Fraenkel-Conrat proved that RNA is the genetic material. Structure and Types of RNA,	**15**
Unit-3	**MOLECULAR BIOLOGY:** Brief account; Replication of DNA. Genetic code and its properties. DNA finger printing and its importance Protein synthesis: Transcription of DNA, Translation of RNA, DNA- polymerase, RNA-polymerase. Polyribosome. Operon hypothesis and Lac operon.	**15**
Unit-4	**PLANT BIOTECHNOLOGY:** Brief account; Tissue culture techniques: laboratory facilities, types of culture, nutritional media - composition, Initiation and maintenance of callus cultures. Transgenic plants. Application of plant tissue culture.	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks
Assignment : 10 Marks
Attendance : 05 Marks
Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Sem. III BOTANY

Paper no. : BOT –CC- 606

Title of the paper: Embryology, Plant Biodiversity, Plant Breeding and Forestry

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**EMBRYOLOGY:** Pollen-stigma interaction; Characters of Pollen grains; Types of ovules, Types of Embryo. Pollination in Salvia and Calotropis **PALENOLOGY:** concept of palynogram, application of palynology in taxonomy. Apomixis.	**15**
Unit-2	**PHARMACOGNOCY:** Study of source, family, geographical distribution, chemical constituents and uses of following drug plants: Gum: Acacia (Baval), Neem (Limdo), Moringa (Saragvo) Resin: Ginger (Aadu), India's Myrrh (Guggul) Alkaloid: Nux Vomica (Zer kochalu), Mexican poppy (Darudi). **FORESTRY:** Introduction and scope of forestry, Social forestry. Major products of Forest: Porous and non porous wood. (Nilgiri / Sandle wood & Pine / Devdar) Minor product of forest: Katha and Cutch, Beedi leaf. Sustainable developments of forest products; Forest Survey of India (FSI)	**15**
Unit-3	**PLANT BIODIVERSITY :** Concept; Value of biodiversity; biodiversity at national level, biodiversity in ecosystem functions and stability. In–situ and ex-situ conservation : Principles and practices; botanical gardens, National Bureau of Plant Genetic Resources (NBPGR), Indian Council of Agricultural Research (ICAR),	**15**
Unit-4	**PLANT BREEDING** Methods and objectives of plant breeding; Hybridization: Pedigree and bulk methods. Procedures in hybridization; Hybridization techniques. Importance in crop improvement and its limitations.	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks

Assignment : 10 Marks

Attendance : 05 Marks

Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Sem. III BOTANY

Paper no. : BOT –SEC- 601

Title of the paper: Plant Micro-techniques and Instrumentation

Credit: 3 Marks: 70

Semester end Examination: 70 marks

Continuous Internal Evaluation: 30 marks

UNIT	Detailed Syllabus	Hours
Unit-1	**MICROSCOPY** Introduction to Microscopy, Magnification & Resolving power Types of Microscopes: Light Microscopes and Electron Microscopes **PREPARATION OF PERMANENT SLIDES** Sample collection & Fixation, Dehydration and Embedding Sectioning with microtome and Staining techniques	**15**
Unit-2	**CHROMATOGRAPHY TECHNIQUES** Introduction to chromatography Types of chromatography Paper chromatography Thin layer chromatography Column chromatography Gas chromatography	**15**
Unit-3	**CENTRIFUGATION TECHNIQUES** Introduction to centrifugation Structure of centrifuge Preparative and analytical centrifuge, Ultra centrifuge.	**15**
Unit-4	**SPECTROSCOPY TECHNIQUES** Introduction to spectroscopy technique Principle and theory of visible spectroscopy, Types of Spectroscopy (In Brief): Visible spectroscopy, UV spectroscopy, IR spectroscopy, NMR spectroscopy, Mass spectroscopy, Atomic absorption spectroscopy.	**15**

Break up of Continuous Internal Evaluation:

Internal Test : 15 Marks
Assignment : 10 Marks
Attendance : 05 Marks
Total Marks : 30 Marks

DETAILED CURRICULUM B.Sc. Sem. V BOTANY

Paper no. : BOT- CC – 607

Title of the paper: Practicals Credit: 12

Semester end Examination: Marks: 200

- All the topics of the practicals are being taught by Available fresh / Preserve materials, Models, Charts, Figures and permanent Slides.
- Teachers may select plant species available in their locality for study of family and utilization of plants.
- There shall be botanical study tour organized in any place of India for the study of vegetation including visit the forest, research institutes and government institutions. Student have to joined the study tour and also participate in local excursion / environment camp and get awareness about the conservation of natural resources. Student may participate in Seminar / Workshop /Competition etc. of biological sciences.
- ***Student must submit a field / study tour report, Permanent slides and herbarium sheets of local plants in practical examination.***
- ***Students will have to prepare their Practical journals as a part of Laboratory work and they will have to submit certified journals in the University practical exam.***
- ***Students shall not be allowed without certified journals in the University practical examination.***

PAPER: BOT-CC- 607 **Detailed Syllabus**

Based on theory paper BOT –CC- 603

01. To study Classification ,thallus structure; reproductive organ of : Ephedra.
02. To study reproductive organ of : Ephedra.
03. To study Classification ,thallus structure: Ginkgo.
04. To study reproductive organ of : Ginkgo.
05. To study of fossil types : Rhynia, Lepidocarpon, Cordites, Calamitis.
06. To study Spices & flavoring materials - I (Laving, jiru, taj, elaichi, kala mari)
06. To study Spices & flavoring materials - II (fudina, mitho limdo, hing, kesar, tamal patra)
08. To study Natural dyes and pigments. (As per theory)
09. To study Ethnobotany of plants. (As per theory)
10. To study oil yielding plants (As per theory)
11. To study sugar and starch. (As per theory)
12. To visit medicinal plant garden / Nursary/ field study.

Based on theory paper BOT –CC- 604

01. To study anatomy of root: Gram
02. to study anatomy of root: Canna
03. To study anatomy of root: Tinospora
04. To study anatomy of leaf: Mangifera
04. To study anatomy of leaf: Maize

05. To study Nodal anatomy.
06. To study anomalous sec. growth in stem: Salvadora
07. To study anomalous sec. growth in stem: Bouganvillea
08. To study anomalous sec. growth in stem: Bignonia
10. To study paper chromatography for chlorophyll pigment.
11. To study pH of given material.
12. To study of double staining method and prepare permanent slides. (At least two slides must be submitted in examination.)

Based on theory paper BOT –CC- 605

01. To study electron micrographs of Nucleus, Endoplasmic reticulum, Golgi complex.
02. To study electron micrographs of Mitochondria, Ribosomes and Lysosomes.
03. To study meiosis in plants.
04. To study mitosis in plants.
04. To study Genetics examples. (Inhibitory and Lethal genes)
05. To study Genetics examples. (Linkage and crossing over)
06. To study structure of DNA.
07. To study structure of RNA
08. To study transgenic plant technique
10. To study instruments used in tissue culture techniques. (Weighing balance, pH meter, autoclave, laminar air flow, BOD incubators, culture room)
11. To study nutritional media composition (MS media) and Callus culture technique in plant tissue culture.
12. To visit a plant tissue culture laboratory or research institute

Based on theory paper BOT –CC- 606

01. To study pollen-pistil interaction
02. To study pollen grains of Hibiscus, Datura, Catharanthus, Canna, Pinus.
03. To study exposition and mountings of Endosperm haustoria : Cucumis
04. To study exposition and mountings of Developing embryo : Mustard
04. To study V.S. of Ovule.
05. To study embryo sac with megaspore mother cell.
06. To study hybridization technique
07. To study Pharmacognocy. (Gum)
08. To study Pharmacognocy. (Resin)
10. To study Pharmacognocy. (Alkaloid)
11. To study major & minor forest products.
12. Field study/ Excursion/ tour report

TEXT BOOKS RECOMMENDED

(for Theory and Practicals of Semester – 5 & 6)

- Pandey & Chaddha Economic Botany – Vikas Publishing House Pvt. Ltd. New Delhi
- Pandey, Mishra & Trivedi. A Text Book of Botany: Vol. II
- Bole, and Vaghani, Field Guide to Common Indian Trees.
- Sutaria R,N. Systematic Botany
- A.K. Sharma & R.Sharma, Taxonomy – Pragati Prakashan, Meerut.
- Bhatt D.C. & Mitaliya K.D. Angiosperm Taxonomy
- Annie Kumaresan Taxonomy of Angiosperm,Saras publication
- P.C.Trivedi Ethnobotany, Aavishkar Publishers, Jaipur.
- S.K. Jain, Manual of Ethnobotany –Scientific Publication, Jodhpur
- Subramanyam,Samba Murty Economic Botany –, Wiley Eastern Ltd..
- B.P. Pandey Economic Botany –, Chand & Co., New Delhi
- Quadri & Shah Pharmacognocy
- V.Kumarsen Horticulture ,Saras Publication
- Esau, K. 1975 - Plant Anatomy.
- Fahn, A. 1990 - Plant Anatomy.
- Phillip Sheeler & Bianchi Cell & Molecular Biology
- Powar C,B. Essential of Cytology
- Salisbury& Ross, Plant Physiology, 4thEdition. Wadsworth Publishing Company, California.
- Witham et. al. Experiments in Plant Physiology. V N Renhold Company, New York.
- P. K. Gupta, Genetics. Rastogi Publications. Shivaji Road Meerut, India.
- Russel P.J. Genetics (5th Ed.)
- Lewin, B. (2003). Genes, VII, John Wiley & Sons.
- DeRobertis Cell and molecular biology, 1987 : Lee and Febiger, Washington.
- Bhojwani and Bhatnagar, The embryology of Angiosperms.
- S.N.Pandey /Ajantha Chadha. Plant Anatomy & Embryology
- Maheshwari,P. 1950 - An introduction to the embryology of Angiosperms. Reference Books
- Kumar & Bendre Practical Botany Vol.1 & 2.
- Pandey B.P. Modern Practical Botany –Vol.-1, 2 &3.