BAGALKOT UNIVERSITY

Mudhol Road, Jamkhandi – 587301 Dist: Bagalkote

PROGRAM /COURSE STRUCTURE AND SYLLABUS

for

V & VI Semester 2025-2026 ONWARDS

Botany

As Per NEP – 2020 and Adapted from RCU Belagavi
Applicable from the Academic Year 2025-26

BOTANY

V Semester

	Course Code	Course Title	Credits Assigned	Instructional hours per week		Duration of exam	IA	Exam	Total
DSC	126BSC05BOTDSC09T	Plant morphology and taxonomy (Theory)	4	4		2	40	60	100
	126BSC05BOTDSC10L	Plant morphology and taxonomy (Practical)	2		4	3	25	25	50
	126BSC05BOTDSC11T	Genetics and Plant Breeding (Theory)	4	4		2	40	60	100
	126BSC05BOTDSC12L	Genetics and Plant Breeding (Theory)	2		4	3	25	25	50

VI Semester

	Course Code	Course Title	Credits Assigned	Instructional hours per week		Duration of exam	IA	Exam	Total
DSC	126BSC05BOTDSC13T	Cell Biology (Theory)	4	4		2	40	60	100
	126BSC05BOTDSC14L	Cell Biology (Practical)	2		4	3	25	25	50
	126BSC05BOTDSC15T	Plant Physiology and Biochemistry (Theory)	4	4		2	40	60	100
	126BSC05BOTDSC16L	Plant Physiology and Biochemistry (Practical)	2		4	3	25	25	50
		Project	2	25	25	50			

V Semester

Plant Morphology and Taxonomy (Theory)

Program Name	**B.Sc. in BOTANY**	Semester	**V**
Course Title	**Plant Morphology and Taxonomy (Theory)**		
Course Code:	**126BSC05BOTDSC09T**	No. of Credits	**04**
Contact hours	**56 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s):

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1.Understanding the main features in Angiosperm evolution
CO2.Ability to identify, classify and describe a plant in scientific terms, thereby, Identification of plants using dichotomous keys. Skill development in identification and classification of flowering plants.
CO3.Interpret the rules of ICN in botanical nomenclature.
CO4.Classify Plant Systematic and recognize the importance of herbarium and Virtual Herbarium, Evaluate the Important herbaria and botanical gardens.

CO5. Recognition of locally available angiosperm families and plants and economically important plants. Appreciation of human activities in conservation of useful plants from the past to the present.

Contents	**56 hrs**
Unit I	**14hrs**
Morphology of Root, Stem and Leaf. Their modifications for various functions. Inflorescence – types. Structure and variations of flower. Fruits–types. Floral diagram and floral formula. **Introduction to Taxonomy**: History, objectives, scope and relevance of Taxonomy **Systems of classification**: Artificial, Natural and Phylogenetic; brief account of Bentham & Hooker's, Engler and Prantl's system and Merits and demerits of classification. **Taxonomic literatures:** Floras, Monograph. Revisions, Journals. **Herbaria and Botanical gardens:** Important herbaria and Botanical gardens of the world and India, technique of Herbarium Preparation. **Virtual herbarium:** E-flora, Documentation.	
Unit II	**14hrs**
Plant identification: Taxonomic dichotomous keys; intended (yolked) and bracketed keys. (Brief account only). **Plant descriptions**: Common terminologies used for description of vegetative and reproductive parts of the following families.	
Study of the diagnostic features of Angiosperm families : Annonaceae, Brassicaceae, Malvaceae, Fabaceae (with sub Families), Apiaceae, Cucurbitaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Orchidaceae ,Liliaceaeand Poaceae. **Plant Taxonomic Evidences:** from palynology embryology, cytology, phyto-chemistry and molecular data. Field inventory.	

Unit III	14hrs
Taxonomic Hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concepts (biological, morphological, evolutionary). Modes of speciation. **Botanical Nomenclature:** Principles and rules (ICN); Brief account of Ranks of taxa, Type concept (Typification), Rule of priority, Author citation., valid publication, rejection of names, principle of priority and its limitations; Names of hybrids/cultivated species.	
Unit IV	**14hrs**
Biometrics, Numerical Taxonomy; Phenetics and Cladistics: Characters; Variations; OTUs, character weighting and coding; Cluster analysis; Phenograms, cladograms (definitions and differences). **Phylogenetic Systematics:** Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly, clades, synapomorphy, symplesiomorphy, apomorphy, lineage sorting, serial homology etc). **Origin and evolution of angiosperms;** Co-evolution of angiosperms and animals; Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram). **Molecular taxonomy:** DNA sequences of chloroplast genes (*atp*B, rbcl.,) and one nuclear gene (nuclear ribosomal 18s DNA).	

V Semester

Plant Morphology and Taxonomy (Practical)

Program Name	**B.Sc. in BOTANY**	Semester	**V**
Course Title	**Plant Morphology and Taxonomy (Practical)**	Practical Credits	**02**
Course Code	**126BSC05BOTDSC10L**	Contact Hours	**4 Hours per week**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Practical Content

1. Study of root, stem and leaf structure and modifications. Study of inflorescence types. Study of flower and its parts, Study of fruits. Floral diagram and floral formula. **04 hrs**

2. Study of families mentioned in theory with at least two examples for each family and make suitable diagrams, describe them in technical terms (Description, V.S. flower, section of ovary, floral diagrams, floral formulae and systematic position according to Bentham & Hooker's system of classification) and identify up to species using the flora. **26 hrs**

3. Construction of plant phylogenetic trees using various loci (*atp*B & rbcL,) with various phylogenetic methods (Neibour Joining, Maximum Likelihood etc). (Demonstration). **06 hrs.**

4. Identify plants / plant products of economic importance belonging to the families mentioned in the syllabus; with binomial, family and morphology of useful parts. Cotton, Mango, Red gram, Green gram, Horse gram, Black gram, Bengal gram, Indigo, Brinjal, Tomato, Chilly, Tamarind, Bitter gourd, *Luffa*, Asfoetida, Cumin, Coriander, Coffee, Rubber, Tapioca, Ricinus, Ginger, Turmeric, Coir,
Arecanut, Rice, Wheat, Ragi, Sugarcane *Annonamuricata, Catharanthus roses*, *Rauvolfia serpentaina, Justicia Adhatoda*, *Vitex nigundo* and *Leucas aspera.* **16 hrs.**

5. **Field visit**: Local or outside area / Botanical Garden/ tribal settlements minimum 3 to 5 days.

6. Submission: Record book, Tour report and Herbarium Preparation of 10 properly identified herbarium specimens; (mounting of a properly dried and pressed specimen of any common plants from your locality with herbarium label).

Pedagogy: Teaching and learning, conducting experiments, field visits.

SCHEME OF PRACTICAL EXAMINATION

(Distribution of marks): 25 marks for the Semester end examination

Time: 3 hours. **Max marks: 25**

1. Identify, classify and describe the specimen A & B taxonomically	6 Marks
2. Identify the given specimen C with the help of Key using Flora	4 Marks
3. Draw the floral diagram and write floral formula of the given specimen D	2 Marks
4. Identification of Specimen/slides E, F and G	6 Marks
5. Tour report	2 Marks
6. Submission (Herbarium- any 10 local plants)	5 Marks

Total 25 marks General instructions:

Q1. Give specimen from Dicotyledons (A) and Monocotyledons (B)
Q2. Give specimen from family they studied (C)
Q3. Give specimen from family they studied (D)
Q4. Specimen /Slides/ materials from Root/Stem/ Leaf/ Inflorescence (E), Flower/Fruit (F) and Economic importance (G)
Q5. Tour report
Q6. Submission (Herbarium- any 10 local plants)

References

1	Baker. H.G. 1970. Plant and Civilization, Wadsworth Publishing Company.
2	Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons –Chichester
3	Cotton, C.M. 1996. Ethnobotany – Principles and Applications. Wiley and Sons
4	Datta S C, 1988. *Systematic Botany*, 4th Ed, Wiley Estern Ltd., New Delhi,
5	Eames A. J. - *Morphology of Angiosperms* - McGraw Hill, New York.
6	Hall, B.G. 2011. *Phylogenetic Trees Made Easy: A How-To Manual*. Sinauer Associates, Inc. USA
7	Heywood - *Plant taxonomy* - Edward Arnold London.
8	Jeffrey C .J. and A. Churchil - *An introduction to taxonomy* – London.
9	Jeffrey, C. (1982). An Introduction to *Plant Taxonomy.* Cambridge University Press, Cambridge

10	Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F., Donogue, M.J., 2002. *Plant Systematics: A Phylogenetic approach,* 2nd edition. Sinauer Associates, Inc., USA.
11	Lawrence - *Taxonomy of Vascular Plants* - Oxford & I B H, New Delhi.
12	Manilal, K.S. and M.S. Muktesh Kumar 1998. *A Handbook on Taxonomy Training*. DST, New Delhi.
13	Manilal, K.S. and A.K. Pandey, 1996. *Taxonomy and Plant Conservation*. C.B.S. Publishers & Distributors, New Delhi.
14	Manilal, K.S. 2003. *Van Rheede's Hortus Malabaricus. English Edition*, with Annotations and Modern Botanical Nomenclature. (12 Vols.) University of Kerala, Trivandrum.
15	Naik V.N., *Taxonomy of Angiosperms*, 1991. Tata Mcgraw-Hill Pub. Co. Ltd., New Delhi.
16	Pandey, S. N, and S.P. Misra (2008)-*Taxonomy of Angiosperms*- Ane Books India, New Delhi.
17	Radford A B, W C Dickison, J M Massey & C R Bell, 1974.*Vascular Plant Systematics*, Harper & Row Publishers, New York.
18	Singh G.2012. *Plant systematics: Theory and Practice*. Oxford and IBH, Pvt. Ltd., New Delhi.
19	Singh V. & Jain - *Taxonomy of Angiosperms* - Rastogi Publications, Meerut.
20	Sivarajan V. V - *Introduction to Principles of taxonomy* - Oxford &I B H New Delhi.
21	Any local / state / regional flora published by BSI or any other agency.

V Semester

Genetics and Plant Breeding (Theory)

Program Name	**B.Sc. in BOTANY**	Semester	**V**
Course Title	**Genetics and Plant Breeding (Theory)**		
Course Code:	**126BSC05BOTDSC11T**	No. of Credits	**04**
Contact hours	**56 Hours**	Duration of Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60 ourse Pre-requisite (s):**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:.

CO1.Understand the basics of genetics and plant breeding
CO2.Ability to identify, calculate and describe crossing over, allelic generations and frequencies of recombination.
CO3.Interpret the results of mating and pollinations.
CO4.Classify plant pollination methods
CO5. Recognition of modes of inheritance of traits/ phenotypes and phenotype-genotype correlation.

Contents	**56 Hrs.**
Unit I	**14 hrs.**
Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and Co-dominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals and polygenic inheritance. Extra chromosomal Inheritance Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast.	
14hrs Unit II	
Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numerical based on gene mapping; Sex Linkage. Variation in chromosome number and structure: **Gene mutations:** Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CLB method, Role of Transposons in mutation, DNA repair mechanisms. Fine structure of gene (Population and Evolutionary Genetics**,** Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, Genetic drift, Genetic variation and Speciation.	
Unit III Plant Breeding: Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding. Methods of crop improvement. Introduction: Centers of origin and domestication of crop plants, plant genetic resources, Acclimatization.	**14hrs**

Selection methods: Self-pollinating and cross-pollinating plants and types of vegetative propagation in plants.	
Unit IV Hybridization: self, cross and vegetative propagation in plants – Procedure, advantages and limitations. **Quantitative inheritance:** Concept, mechanism, examples of inheritance of Kernel colour in wheat, Monogenic vs Polygenic inheritance. **Inbreeding depression and heterosis:** History, genetic basis of inbreeding depression and heterosis; Applications. Role of mutations in crop improvement; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.	

V Semester

Genetics and Plant Breeding (Practical)

Program Name	**B.Sc. in BOTANY**	Semester	**V**
Course Title	**Genetics and Plant Breeding (Practical)**	Practical Credits	**02**
Course Code	**126BSC05BOTDSC12L**	Contact Hours	**4 Hours per week**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Practical Content

Practical: Plant breeding:

1. Reproductive biology, self and cross pollinated plants; vegetative propagation
2. Hybridization: Emasculation, bagging, pollination and production of hybrids and pollen fertility
3. Origin, distribution and centres of diversity of crop plants: Wheat, Sorghum, Rice, Chilly Sugarcane, Cotton, Potato, coffee, Sunflower and groundnut
4. Visit to nursery / horticulture.

Practical: Genetics

1. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square.
2. Chromosome mapping using point test cross data.
3. Pedigree analysis for dominant and recessive autosomal and sex-linked traits.
4. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
5. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.
6. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.

Pedagogy: Teaching and learning, conducting experiments, field / Lab.visits

SCHEME OF PRACTICAL EXAMINATION

(Distribution of marks): 25 marks for the Semester end examination

Time: 3 Hrs **Max. Marks: 25**

1. Perform the emasculation / pollen viability / fertility of the given sample **A** 5 Marks
2. Solve the given genetic problem **B** 4 Marks
3. Identification of Specimen/slides/ Photographs **C, D** and **E** 6 Marks
4. Viva Voce 5 Marks
5. Submission (Report of visit to nursery/horticulture) 5 Marks

General instructions:

Q1 Material **Cassia**// **Hibiscus**/ etc (A)

Q2. Genetic problems (B)

Q3. Down's, Klinefelter's and Turner's syndromes, Translocation Ring, Laggards and Inversion Bridge (C, D and E)

Q4. Viva voce

Q5. Submission (Report of visit to nursery/horticulture)

References	
1	Acquaah, G.(2007). Principles of Plant Genetics &Breeding.NewJearsey, U.S.: Blackwell Publishing.
2	Singh, B.D. (2005). Plant Breeding: Principles and Methods, 7th edition. New Delhi, Delhi: Kalyani Publishers.
3	Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding, 2nd edition. New Delhi, Delhi: Oxford – IBH.
4	Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, 8th edition. New Delhi, Delhi: John Wiley & sons
5	Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis, 10th
	edition. New York, NY: W.H. Freeman and Co.
6	Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics, 10th edition. San Francisco, California: Benjamin Cummings
7	Raven, F.H., Evert, R. F., Eichhorn, S.E. (1992).Biology of Plants. New York, NY: W.H. Freeman and Co.
8	Welsh, J. R. (1981). Fundamentals of Plant Genetics and Breeding. John Wiley and Sons, New York.
9	Poehlman, J.M. (1987). Breeding Field Crops, 3rd Ed. AVI Publishing Co. Inc., Westport, Connecticut
10	Chopra, V.L. (2000). Plant Breeding: Theory and Practice 2nd Ed. Oxford & IBH, New Delhi.

VI Semester

CELL BIOLOGY (THEORY)

Program Name	**B.Sc. in BOTANY**	Semester	**VI**
Course Title	**Cell Biology (Theory)**		
Course Code:	**126BSC05BOTDSC13T**	No. of Credits	**04**
Contact hours	**56 Hours**	Duration of Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite (s):
Course Outcomes (COs): After the successful completion of the course, the student will be able to:. CO1. Understanding of Cell metabolism, chemical composition, physiochemical and functional organization of organelle
CO2. Contemporary approaches in modern cell and molecular biology. CO3.To study the organization of cell, cell organelles and biomolecules (i.e protein, carbohydrate, lipid and nucleic acid) CO4.To gain knowledge on the activities in which the diverse macro molecules and microscopic structures inhabiting the cellular world of life are engaged. CO5.To understand the various metabolic processes such as respiration, photosynthesis etc. which are important for life.

Contents	**56 Hrs**
Unit I	**14hrs**
Structure of Plant Cell – Prokaryotic and Eukaryotic cell, plasma membrane (fluid mosaic Model), Mitochondria, Chloroplast, Nucleus and ribosomes. Chromosomes: History, types and functions of chromosomes. Giant chromosomes, Polytene chromosome and Lampbrush chromosome.	
Unit II	**14hrs**
Cell wall, distribution, chemical composition, functions and variations in prokaryotic and eukaryotic cells (primary and secondary wall), Glycocalyx, Cell-cell interactions / Junctions, pit connections. Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle-checkpoints, role of protein kinases. Programmed Cell Death; Biology and elementary knowledge of development and causes of cancer.	
Unit III	**14hrs**
Active and passive transport, proton pumps associated (Na-K, Cacalmodulin etc. and their distribution), phagocytosis, pinocytosis, exocytosis. Marker enzymes in cell organelles, Biogenesis of mitochondria and chloroplasts, brief account of transport in mitochondria and chloroplasts (Tim/Tom; Tic/Toc) and semiautonomous nature of mitochondria and chloroplast	
Unit IV Nuclear envelope, structure of nuclear pore complex, nuclear lamina, transport across nuclear membrane, Nucleolus, rRNA processing. **Endoplasmic Reticulum**: Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export of proteins and lipids. **Golgi Apparatus**: organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes.	**14hrs**

VI Semester
CELL BIOLOGY (Practical)

Course Title	**Cell Biology (Practical)**	Practical Credits	**02**
Course Code	**126BSC05BOTDSC14L**	Contact Hours	**4 Hours per week**
Formative Assessment	**25Marks**	Summative Assessment	**25 Marks**

Practical Content

1. Study of plant cell structure with the help of epidermal peel mount of Onion/ *Rhoeo*/ Crinum.
2. Study of cell and its organelles with the help of electron micrographs.
3. Measurement of length and breadth of plant cell using micrometry.
4. Study different stages of mitosis and meiosis (Onion/ *Rhoeo*/ Crinum)
5. Study of Karyotype using camera-lucida / chart.
6. Isolation of cell organelle – Chloroplast.

References

1	Cooper, G.M., Hausman, R.E. (2009). The Cell: A Molecular Approach, 5th edition. Washington, D.C.: ASM Press & Sunderland, Sinauer Associates, MA
2	Karp, G. (2010). Cell Biology, 6th edition. New Jersey, U.S.A.: John Wiley & Sons.
3	De Robertis, E. D. P. and De Robertis R. E. 2009. Cell and Molecular Biology, 8th edition. Lippincott Williams and Wilkins, Philadelphia.
4	Becker W. M., Kleinsmith L.J. and Bertni G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San fransisco.
5	Reven, F.H., Evert, R.F., Eichhorn, S.E. (1992). Biology of Plants. New York, NY: W.H.Freeman and Company
6	Alberts, B., Bray, D., Hopkin, K., Johnson, A. D., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2013). Essential cell biology (4th ed.). Garland Publishing.
7	Raven, F.H., Evert, R. F., Eichhorn, S.E. (1992).Biology of Plants. New York, NY: W.H. Freeman and Co.
8	Verma, P. S. (2004). Cell Biology,Genetics, Molecular Biology: Evoloution and Ecology. India: S. Chand Limited.

VI Semester

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY (THEORY)

Program Name	**BSc BOTANY**	Semester	**VI**
Course Title	**Plant Physiology and Plant Biochemistry (Theory)**		
Course Code:	126BSC05BOTDSC15T	No. of Credits	**04**
Contact hours	**56 Hours**	Duration of Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite (s):	
Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1.Importance of water and the mechanism of transport. CO2.To understand biosynthesis and breakdown of biomolecules. CO3.Role of plant hormones in plant development and about secondary metabolites. CO4.Preliminary understanding of the basic functions and metabolism in a plant body. CO5.To understand the importance of nutrients in plant metabolism and crop yield.	
Contents	**56 hrs**
UNIT I	**14 hrs**
Plant water relations: Importance of Water as a solvent, Diffusion, osmosis, imbibition, osmotic pressure, osmotic potential, turgor pressure, wall pressure, water potential and its components. Mechanism of water absorption, Factors affecting water absorption. **Transpiration.** Types and process, Mechanism of guard cell movement, K^+ ion mechanism, Antitranspirants. **Mechanism of ascent of sap:** Vital and physical force theories. **Phloem Transport:** Transport of organic solutes. Path of transport, vein loading and unloading. Transcellular hypothesis, mass flow hypothesis. **Mineral nutrition:** Micro and macro nutrients **-** their importance and deficiency symptoms.	
UNIT II	**14 hrs**
Photosynthesis: Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration. **Respiration**: Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Oxidative Pentose Phosphate Pathway. **Nitrogen metabolism:** Biological nitrogen fixation: Nitrate and ammonia assimilation.	
UNIT III Plant growth regulators: Definition and classification, Site of synthesis, biosynthesis pathway and metabolism and influence on plant growth development - Auxins, Gibberellins, cytokinins, ABA and ethylene . Synthetic growth regulators: Classification, their effect on plant growth and development. Practical utility in agriculture and horticulture. **Sensory Photobiology:** Biological clocks, photoperiodism, function & structure of phytochromes, phototropin & cryptochromes. Senescence, Aging & Cell Death (PCD and Autophagosis).Plant Movements	**14 hrs**

UNIT IV **Biochemistry :** **Introduction and scope of Biochemistry** **Carbohydrates** :Structure, Classification and functions of Carbohydrates **Enzymes:** Classification, kinetics and mechanism of action. **Proteins and amino acids**: Classification, structure - primary, secondary, tertiary and quaternary. Classification of Amino acids. **Vitamins**: Classification, distribution, structure, production, function. **Lipids:** Classification, structure, function and biosynthesis of fatty acids. **Secondary plant products**: Structure, biosynthesis and distribution of terpenes, phenolics and nitrogen containing compounds.	**14 hrs**

VI Semester

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY (Practical)

Course Title	**Plant Physiology and Biochemistry (Practical)**	Practical Credits	**2**
Course Code	126BSC05BOTDSC16L	Contact Hours	**4 Hours**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Practical Content

1. Experiment to demonstrate the phenomenon of exosmosis and endosmosis.
2. To determine the osmotic pressure of the cell sap by plasmolytic method. (Major)
3. To demonstrate root pressure / transpiration pull in plants.
4. To compare the rate of transpiration from the two surfaces of leaf by cobalt chloride paper method 5. To demonstrate that oxygen is liberated in the process of photosynthesis.
6. Separation of photosynthetic pigments by paper chromatography and measure their Rf values (Major)
7. Estimation of total chlorophyll content by Arnon method. (Major)
8. To isolate and identify the amino acids from a mixture using paper chromatography. (Major)
9. To Study of Phototrophism.
10. Qualitative test for Starch, Protein, Reducing Sugars and Lipids.
11. Estimation of TAN (Titratbale acid Number) from *Bryophllum* leaves /*Aloe vera*. (Major)

SCHEME OF PRACTICAL EXAMINATION

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

Time: 03 hrs Max. Marks: 25

1. Conduct Major Experiment A 06 marks
2. Comment on minor Experiments B & C 06 marks
3. Micro Chemical test D 03 marks
4. Viva-voce 05 marks
5. Practical Record 05 marks

General Instructions:

Q1. Osmotic potential/paper chromatographic separation of pigments **(A)**

Q2. $CoCl_2$ /O_2 evolution/Root pressure/transpiration pull experiments **(B & C)**

Q3. Qualitative tests for Starch, Protein, Reducing Sugars and Lipids **(D)** Q4. Viva-voce

Q5. Practical record

REFERENCES

1. Wilson, K. and Walker, J. 1994 Fundamentals of Biochemistry 2nd Ed, John Wiley and Sons Inc.
2. JainV K, 2008. Fundamentals of Plant Physiology.S Chand and Co.
3. Kochhar P L, Krishnamoorthy H N. Plant Physiology. Atmaram and sons, Delhi.
4. Kumar and Purohit. Plant Physiology: Fundementals and Applications.Agrobotanical Publishers.
5. Malik CP, 2002. Plant Physiology. Kalyani publishers.
6. Mukherjii S, Ghosh AK, 2005. Plant Physiology. New Central Book Agency, Culcutta.
7. Noggle GR, Fritz GJ, Introductory Plant Physiology.Prentice Hall of India.
8. Pandey SN, Sinha BK, 2006. Plant physiology.Vikas Publishing House, NewDelhi.
9. Salisbury F B, Ross C W, 1992. Plant Physiology. CBS publishers and Distributers, NewDelhi.
10. Sinha A K, 2004. Modern Plant Physilogy. Narosa publishing House, NewDelhi.
11. Srivastava H S, 2004. Plant physiology and Biochemistry. Rasthogi publications.
12. Verma V, 2007.Text Book of Plant Physiology. Ane Books Pvt. Ltd.

General instructions for conducting project:

1. Project work is compulsory for all the students of B.Sc VI semester.
2. Assign the Title of the project related to Botany subject.
3. Marks are allotted based on the performance in Power point presentation, Vivo-voce and submission of dissertation.
4. Duration of the project work is minimum 2 months.
5. The project guide should maintain the attendance of the students.
6. Group of 4-5 students is assigned for each project.