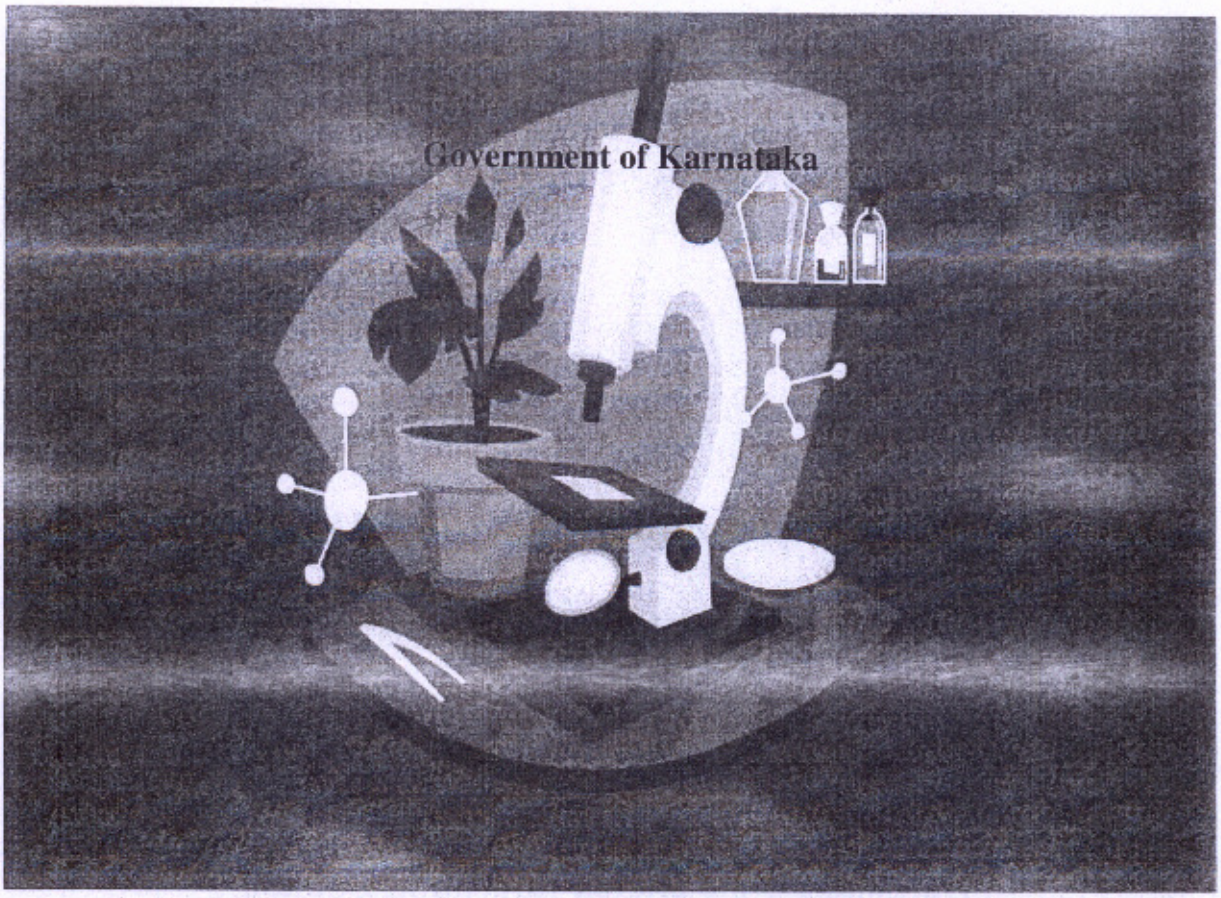

Curriculum Framework for Undergraduate Programme in Colleges and Universities of Karnataka State.

6th Semester Model Syllabus for B.Sc. in BOTANY

Submittedto:

Vice Chairman
Karnataka State Higher Education Council
30, Prasanna Kumar Block, Bengaluru City University
Campus, Bengaluru, Karnataka– 560009

Government of Karnataka

Model Curriculum of B.Sc. in BOTANY

6th Semester

Karnataka State Higher Education Council

Composition of Subject Expert Committee Members

SN	Name & Organization
1	Dr. G. R. Naik, Vice Chancellor, Garden City University, Bengaluru
2	Dr. Rajasab, M S Ramaiah University of Applied Science, Bangalore
3	Dr. G. R. Janardhana , Professor, University of Mysore, Mysuru
4	Dr. Kotresh K, Professor, Karnatak University, Dharwad
5	Dr. L. Rajanna , Professor, Bangalore University, Bengaluru
6	Dr. Siddaraju M L , Professor, Mangalore University, Konaje
7	Dr. Krishnamurthy YL , Professor, Kuvempu University, Shivamogga
8	Dr. Govindappa M, Professor, Davanagere University, Davanagere
9	Dr. Sharanappa P, Hassan University Hassan.
10	Dr. H. Ramakrishnaiah, Assoc. Professor, Maharani Cluster University, Bengaluru
11	Shri M. N. Mallikarjunaiah, Assoc. Professor, Mandya University, Mandya.
12	Dr. Abdul Khayum , Assoc. Professor, Govt. Womens College, Kolar – 563 101
13	Dr. Mamatha, Assoc. Professor, GFGC, Vijayanagar, Bengaluru
14	Dr. Jayakara Bhandary, Professor, GFGC, Mangalore.
15	Dr. Latha Devi Karekal, Sharanabasaveshwara college of Science, Kalaburgi.
16.	Smt. Akshatha Chandra G. R., Special Officer, KSHEC- Member Convenor

Government of Karnataka
BOTANY Curriculum

PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY (THEORY)

Program Name	BSc/ BOTANY	Semester	VI
Course Title	Plant Physiology and Plant Biochemistry (Theory)		
Course Code:	BOT C15-T	No. of Credits	04
Contact hours	60 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	60 Hrs
UNIT 1	**15 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 :**A brief account on Micro and macro nutrients .	
UNIT 2	**15 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, Glyoxylate, Oxidative Pentose Phosphate Pathway. **Nitrogen metabolism:** Biological nitrogen fixation; Nitrate and ammonia assimilation.	
UNIT 3	**15 Hrs**
Definition and classification of plant growth regulators- Hormones. Site of synthesis, biosynthesis pathway and metabolism and influence on plant growth development of individual group of hormone- Auxins, Gibberlins, cytokinins, ABA, 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	

UNIT 4	15 Hrs
Carbohydrate metabolism **Enzymes** - classification, kinetics and mechanism of action. **Proteins and amino acids**: classification, structure - primary, secondary, tertiary and quaternary	
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.	

Assessment	Marks
Attendance	10 Marks
Test	10 Marks
Seminar	10 Marks
Assignment	10 Marks
Total	40 Marks
Formative Assessment as per guidelines are compulsory	

Pedagogy:

Course Title	**Plant Physiology and Biochemistry (Practical)**	Practical Credits	2
Course Code	**BOT C16-P**	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.
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.
7 Estimation of total chlorophyll content by Arnon method.
7. To isolate and identify the amino acids from a mixture using paper chromatography.
8. To Study of Phototrophism.
9. Quantities test for Starch, Protein, Reducing Sugars and Lipids.
10. Estimation of TAN(Titratbale acid Number) from Bryophllum leaves/Aloe Vera ..

GENERAL PATTERN OF THEORY QUESTION PAPER

(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions: 10 marks

Part-B

11. Question number 07- 11 carries 05 Marks each. Answer any 04 questions: 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub-questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.

SCHEME OF PRACTICAL EXAMINATION
PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

Time =03 hrs **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 + Industrial visit report — 05 marks

Pedagogy: Teaching and learning, Seminar, Assignments, etc

Formative Assessment for Practical	
Assessment	**Marks**
Attendance	10 Marks
Test	10 Marks
Project report / Industrial visit	05 Marks
Total	**25 Marks**
Formative Assessment as per guidelines are compulsory	

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4. Kumar and Purohit. Plant Physiology: Fundementals and Applications.Agrobotanical Publishers.
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BIOINFORMATICS (THEORY)

Program Name	B.Sc. in BOTANY	Semester	VI
Course Title	Bioinformatics (Theory)		
Course Code:	BOT-C 17-T	No. of Credits	04
Contact hours	45 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 l completion of the course, the student will be able to:

CO1. Understand the concept of databases and use of different public domain for DNA and proteins sequence retrieval.

CO2. Understand the concept of pairwise alignment of DNA sequences using algorithms.

CO3.Explain the structure of proteins homology modeling approach using SWISS MODEL and SWISS-PDB.

CO4.Reflect upon the role of various models in molecular evolution.

CO5.Analyze the role of (QSAR) techniques in Drug Design.

Contents	45 Hrs
Unit1:	**15hrs**
Introduction to bioinformatics, Bioinformatics-Definition, History, Scope and Applications. Opportunities in Bioinformatics. Fundamental of IT: Social and Ethical aspects of IT; Data, information, Knowledge; Introduction to Hardware (CPU, memory, storage, etc.); Role of IT in Bioinformatics; Introduction to problem solving: algorithms, flow charts; Introduction to networking: Types of networks, world wide web; distributed computing; Biological databases : Nucleotide databases, Protein databases, Genome databases Organization of data in NCBI, DDBJ, EBI, PDB, Swiss PROT and retrieval and storage of data in different file formats	
Unit2:	**15hrs**
Sequence alignment: Types – Local Alignment and Global Alignment, Pair wise and Multiple alignments of protein and DNA sequences. Algorithms for used for sequence alignment. Use of sequence alignment tools: BLAST, Clustal Omega; interpretation of the results to derive biological significance of the queried DNA/protein sequences. Prediction of structure of proteins by homology modeling approach using SWISSMODEL and SWISS-PDB. Models of molecular Evolution, Selection of best-fitting models, Methods of Phylogeny reconstruction: Phenetic vs. Cladistic, Neighbor Joining, UPGMA, Maximum Parsimony, Maximum Likelihood, Bayesian Inference, Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction.	
Unit 3:	**15hrs**
Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design. Structure-based drug designing approaches: - Target Identification and Validation, homology modeling and protein folding, receptor mapping, active site analysis and pharmacophore mapping, Grid maps. Ligand-based drug designing approaches: Lead Designing, combinatorial chemistry, High Throughput Screening (HTS), QSAR, Database generation and Chemical libraries, ADME property. Docking methods to generate new structure; Tools and Molecular docking programs: AutoDock,	

Dock, HEX	

Pedagogy: Teaching and learning, Seminar, Assignments, etc

Formative Assessment for Theory	
Assessment Occasion/type	**Marks**
Attendance	10
Test (Objective type)	10
Assignments	10
Seminar	10
Total	**40 Marks**
Formative Assessment as per guidelines are compulsory	

Course Title	**Bioinformatics (Practical)**	Practical Credits	**02**
Course Code	**BOT C18-P**	Contact Hours	**48 Hours**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Practical Content

1. Retrieval of Nucleic acid and amino acid sequences Data from NCBI
2. Retrieval of Protein structure from PDB
3. Sequence similarity search by BLAST/FASTA and phylogenetic tree construction
4. Multiple sequence alignments by Clustal W and
5. Protein structure visualization, retrieval of structural PDB files from PDB database.
6. Retrieval and Preparation of ligand and Proteins from data banks/libraries and for molecular docking

GENERAL PATTERN OF THEORY QUESTION PAPER

(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions: 10 marks

Part-B

12. Question number 07- 11 carries 05 Marks each. Answer any 04 questions: 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions: 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub-questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.

SCHEME OF PRACTICAL EXAMINATION

BIOINFORMATICS

Time =03 hrs **Marks =25**

1. Molecular docking / Multiple sequence alignments (A) 04 marks
2. Retrieval of Nucleic acid / Amino acid sequences (B) 04 marks
3. Sequence similarity search Or Download structural PDB files from PDB database (C) 04 marks
4. Phylogenetic tree construction and analysis by downloading the data (D) 03 marks
5. Viva-voce 05 marks
6. Practical Record + Lab. visit report 05 marks

Pedagogy: Teaching and learning, Seminar, Assignments, etc

Formative Assessment for Practical	
Assessment Occasion/type	**Marks**
Attendance	05
Test	05
Field visit	05
Submission	10
Total	**25Marks**
Formative Assessment as per guidelines are compulsory	

References	
1	Arthur M. Lesk. (2003). Introduction to Bioinformatics, Oxford University Press, Indian edition.
2	Des Higgins and Willie Taylor. (2000). Bioinformatics, Sequence, structure and databanks. A practical approach. Oxford University Press, Indian edition, Second impression, New Delhi.
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5	Rastogi, S.C., Mediratta, N. and Rastogi. P. (2004). Bioinformatics, methods and applications, genomics, proteomics and drug discovery, Prentice hall of India, pvt. Ltd., New Delhi.
6	Baxevanis, A. D. and Ouellettee, B. F. F. (2002). Bioinformatics: A Practical Guide to the analysis of Genes and Proteins. (2nd Ed.), New York, John Wiley & Sons, Inc. Publications.
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Internship for graduate Programme (As Per UGC & AICTE)

Course title	Internship Discipline specific
No of contact hours	90
No credits	2
Method of evaluation	Presentations/Report submission/Activity etc.,

- Internship shall be Discipline Specific of 90 hours (2 credits) with a duration 4-6 weeks.
- Internship may be full-time/part-time (full-time during semester holidays and part-time in the academic session)
- Internship mentor/supervisor shall avail work allotment during 6th semester for a maximum of 20hours.
- The student should submit the final internship report (90 hours of Internship) to the mentor for completion of the internship.
- The detailed guidelines and formats shall be formulated by the universities separately as prescribed in accordance to UGC and AICTE guidelines.

The Syllabus is approved in the meeting of Faculty of Science & Technology held on 6.11.2023.

DEAN
Faculty of Science & Technology
Gulbarga University, Kalaburagi-585 106.

CBCS Question Paper Pattern for UG Semester DSC