



ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.

ಜ್ಞಾನ ಗಂಗಾ, ಕಲಬುರಗಿ-585 106, ಕರ್ನಾಟಕ, ಭಾರತ

(ಕರ್ನಾಟಕ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳ ಅಧಿನಿಯಮ 1976ರ ಅಡಿಯಲ್ಲಿ 10-09-1980 ರಂದು ಸ್ಥಾಪಿಸಲಾದ ವಿಶ್ವವಿದ್ಯಾಲಯ ಮತ್ತು 2000ರ ಅಧಿನಿಯಮದ ಅಡಿಯಲ್ಲಿ ಬದಲಾಯಿಸಿದಂತೆ)
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ವಿದ್ಯಾಮಂಡಲ



ಕ್ರ.ಸಂ.ಗುವಿಕ/ವಿಮವಿ/ಬಿಟಿಎಸ್/2023-24/ 417

ದಿನಾಂಕ: 09-11-2023

ಅಧಿಸೂಚನೆ

ವಿಷಯ: ಸ್ನಾತಕ ಪದವಿ ಕೋರ್ಸಿನ ಸಸ್ಯಶಾಸ್ತ್ರ ವಿಷಯದ ಐದನೇ ಹಾಗೂ ಆರನೇ ಸೆಮಿಸ್ಟರ್ ಪಠ್ಯಕ್ರಮ ಅನುಮೋದಿಸಿ 2023-24ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಜಾರಿಗೊಳಿಸಿದ ಬಗ್ಗೆ.

- ಉಲ್ಲೇಖ:1. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ ಇಡಿ 104 ಯುಎನ್ಇ 2023 ಬೆಂಗಳೂರು, ದಿನಾಂಕ:20.07.2023
2. ಸಸ್ಯಶಾಸ್ತ್ರ ವಿಷಯದ ಸ್ನಾತಕ ಅಧ್ಯಯನ ಮಂಡಳಿಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 21.09.2023.
3. ವಿಜ್ಞಾನ ನಿಕಾಯಗಳ ಸಮಿತಿ ಸಭೆಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 06.11.2023
4. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಅನುಮೋದನೆ ದಿನಾಂಕ: 08.11.2023

ಸರ್ಕಾರದ ನಿರ್ದೇಶನದಂತೆ, 2023-24ನೇ ಶೈಕ್ಷಣಿಕ ಪ್ರಸಕ್ತ ಸಾಲಿನಿಂದ ಜಾರಿಗೊಳಿಸಿರುವ ಸ್ನಾತಕ ಪದವಿ ಐದನೇ ಮತ್ತು ಆರನೇ ಸೆಮಿಸ್ಟರ್ ಪಠ್ಯಕ್ರಮವನ್ನು ಜಾರಿಗೊಳಿಸಬೇಕಾಗಿರುವ ಪ್ರಯುಕ್ತ ಸಸ್ಯಶಾಸ್ತ್ರ ವಿಷಯದ ಅಧ್ಯಯನ ಮಂಡಳಿಯು ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿ ಶಿಫಾರಸ್ಸು ಮಾಡಿರುವುದರಿಂದ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ವಿಜ್ಞಾನ ನಿಕಾಯದ ಸಭೆಯಲ್ಲಿ ಒಪ್ಪಿಗೆ ಪಡೆದಿರುವಂತೆ, ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಘಟನೋತ್ತರ ಅನುಮೋದನೆಯನ್ನು ನಿರೀಕ್ಷಿಸಿ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ಪ್ರಸ್ತುತ ಸ್ನಾತಕ ಪದವಿ ಕೋರ್ಸಿನ ಸಸ್ಯಶಾಸ್ತ್ರ ವಿಷಯದ ಐದನೇ ಮತ್ತು ಆರನೇ ಸೆಮಿಸ್ಟರ್ 2023-24ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ ಜಾರಿಗೊಳಿಸಲಾಗಿದೆ.

ಈ ಮಾಹಿತಿಯನ್ನು ಸಂಬಂಧಪಟ್ಟ ಶಿಕ್ಷಕರ ಹಾಗೂ ವಿದ್ಯಾರ್ಥಿಗಳ ಗಮನಕ್ಕೆ ತರಲು ಸೂಚಿಸಲಾಗಿದೆ. ಪಠ್ಯಕ್ರಮದ ವಿವರಗಳನ್ನು ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ಸೈಟ್ www.gug.ac.in ದಿಂದ ಪಡೆಯಬಹುದಾಗಿದೆ.

ಕುಲಸಚಿವರು

ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.

ಗೆ,

1. ಮುಖ್ಯಸ್ಥರು, ಸಸ್ಯಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ವಿಭಾಗ, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.
2. ಎಲ್ಲಾ ಪದವಿ ಕಾಲೇಜುಗಳ ಪ್ರಾಂಶುಪಾಲರುಗಳಿಗೆ.

ಪ್ರತಿಗಳು:

1. ಡೀನರು, ವಿಜ್ಞಾನ ನಿಕಾಯ, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
2. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ
3. ನಿರ್ದೇಶಕರು, ಪಿಎಂಇಬಿ ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
4. ಗ್ರಂಥಪಾಲಕರು, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
5. ವಿಜ್ಞಾನ ನಿಕಾಯದ ಎಲ್ಲಾ ಅಧ್ಯಯನ ವಿಭಾಗಗಳ ಮುಖ್ಯಸ್ಥರಿಗೆ ಗು.ವಿ. ಕಲಬುರಗಿ
6. ಸಂಯೋಜಕರು, ಟಾಸ್ಕಫೋರ್ಸ್ ಸಮಿತಿ, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
7. ವಿಶೇಷಾಧಿಕಾರಿಗಳು, ಆಡಳಿತ, ವಿದ್ಯಾಮಂಡಲ, ಪರೀಕ್ಷಾ, ಅಭಿವೃದ್ಧಿ ಗು.ವಿ. ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
8. ಮುಖ್ಯಸ್ಥರು, ಗಣಕ ಕೇಂದ್ರ, ಗು.ವಿ. ಕಲಬುರಗಿ ರವರಿಗೆ ವೆಬ್‌ಸೈಟ್‌ನಲ್ಲಿ ಪ್ರತ್ಯೇಕ ಪೋರ್ಟಲ್‌ನಲ್ಲಿ ಪ್ರಕಟಿಸಲು ಸೂಚಿಸಲಾಗಿದೆ.
9. ನೋಡಲ್ ಅಧಿಕಾರಿಗಳು, UUCMS, ಗು.ವಿ.ಕಲಬುರಗಿ ಇವರ ಮಾಹಿತಿಗಾಗಿ
10. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ/ಕುಲಸಚಿವರ ಆಪ್ತ ಸಹಾಯಕರ ಗು.ವಿ. ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.



GULBARGA UNIVERSITY

KALABURAGI

Proposed Curriculum Framework of

BOTANY

(V and VI SEMESTER)

For

UNDER GRADUATE PROGRAMME

To

GULBARGA UNIVERSITY

CHAIRMAN

DEPARTMENT OF STUDIES AND RESEARCH IN BOTANY

2023-24 Onwards

Paper Code:	Paper Title:		
Duration of Exam	2 Hours	Max Marks	60
Instruction:	Answer all the sections		

Section-A

.....	15 Marks
I. Answer any Five of the following questions (5x3=15)	
1. 2. 3. 4. 5. 6. 7.	

Section-B

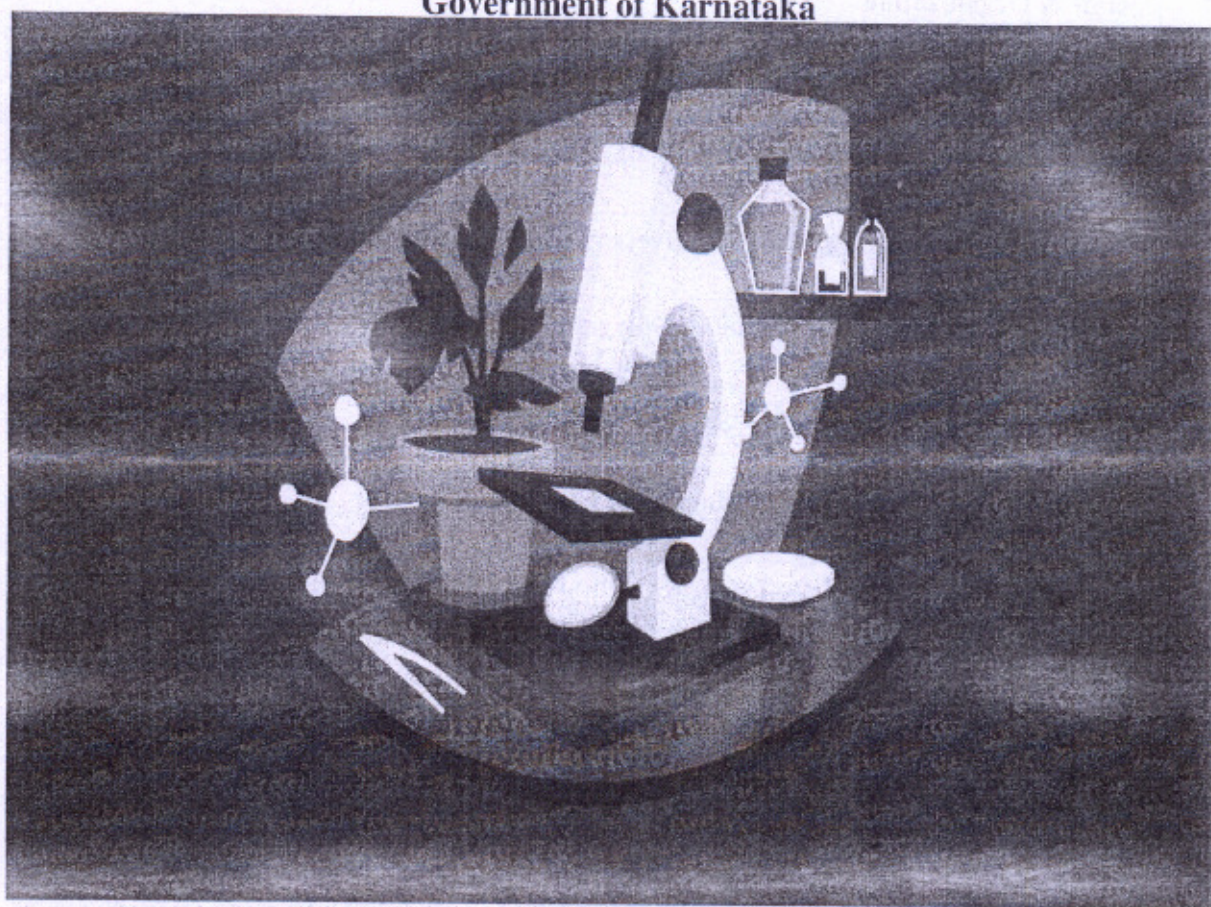
.....	25 Marks
II. Answer any FIVE of the following questions (5X5=25)	
8. 9. 10. 11. 12. 13. 14.	

Section-C

.....	20 Marks
III. Answer any TWO of the following questions (2X10=20)	
15. 16. 17. 18.	



Government of Karnataka



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

5th Semester Model Syllabus for B.Sc. in BOTANY

Submitted to:

Vice Chairman

Karnataka State Higher Education Council
30, Prasanna Kumar Block, Bengaluru City University
Campus, Bengaluru, Karnataka- 560009

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

Model Curriculum of B.Sc. in BOTANY
5th Semester

Karnataka State Higher Education Council

Karnataka State Higher Education Council
Listing of Courses from V and VI Semesters for the Undergraduate Program in BOTANY

Sem. No.	Course Category	Course Code	Course Title	Credits Assigned	Instructional hours per week		Duration of Exam (Hrs.)	Exam/ Evaluation Pattern (Marks)				
					Theory	Practical		IA	Exam	Total		
BOTANY AS SINGLE MAJOR IN THIRD YEAR												
V	DSC	BOT C9-T	Plant Morphology and Taxonomy	4	4		2	40	60	100		
		BOT C10-P	Plant Morphology and Taxonomy	2		4	3	25	25	50		
		BOT C11-T	Genetics and Plant Breeding	3	3		2	40	60	100		
		BOT C12-P	Genetics and Plant Breeding	2		4	3	25	25	50		
		BOT C13-T	Cell Biology	3	3		2	40	60	100		
		BOT C14-P	Cell Biology	2		4	3	25	25	50		
		DSE	BOT E1-T	A. Algal and Fungal Biotechnology B. Bio fertilisers C. Biofuels	3	3		2	40	60	100	
			Vocational	BOT V1-T	A. Landscaping and gardening B. Mushroom Cultivation Technology C. Community Forestry	3	3		2	40	60	100
				DSC	BOT C15-T	Plant Physiology and Biochemistry	4	4		2	40	60
		VI	DSC	BOT C16-P	Plant Physiology and Biochemistry	2		4	3	25	25	50
BOT C17-T	Bioinformatics and computational biology			3	3		2	40	60	100		
BOT C18-P	Bioinformatics and computational biology			2		4	3	25	25	50		
BOT C19-T	Plant Biotechnology			3	3		2	40	60	100		
BOT C20-P	Plant Biotechnology			2		4	3	25	25	50		
DSE	BOT E2-T			A. Herbal Drug Technology B. Techniques in Plant Biology C. Floriculture	3	3		2	40	60	100	
	Vocational			BOT V2-T	A. Plant Quarantine B. Plant Diversity and Human Welfare C.	3	3		2	40	60	100
				DSC	BOT V1-T	A. Landscaping and gardening B. Mushroom Cultivation Technology C. Community Forestry	3	3		2	40	60

BOTANY AND ANOTHER SUBJECT AS DOUBLE MAJORS IN THIRD YEAR

V	DSC	BOT C9-T	Plant Morphology and Taxonomy	4	4		2	40	60	100
		BOT C10-P	Plant Morphology and Taxonomy	2		4	3	25	25	50
	BOT C11-T	Genetics and Plant Breeding	4	4		2	40	60	100	
	BOT C12-P	Genetics and Plant Breeding	2		4	3	25	25	50	
VI	DSC	BOT C13-T	Cell Biology	4	4		2	40	60	100
		BOT C14-P	Cell Biology	2		4	3	25	25	50
		BOT C15-T	Plant Physiology and Biochemistry	4	4		2	40	60	100
		BOT C16-P	Plant Physiology and Biochemistry	2		4	3	25	25	50

Open Electives for non-BOTANY Students are also to designed and contents drafted for the first three semesters with multiple options.

Prof. B. Thimme Gowda, KSHEC.

Note:

1. If any Elective or Vocational course involves theory-cum-practical (2+1 credit), then IA to Exam Marks will be in the ratio of 50:50. The practical part is to be evaluated as part of IA. Semester end examination is only in theory component and questions from practical part, if any.
2. C11, C12, C13 and C14- paper model syllabus given below is designed for single major therefore C11 & C13 consists of 3 credits and C12, C14 contains the related practical syllabus respectively. University BOS who choose double major will have to include 4 credit syllabus (one extra unit) for C11 and C13 papers along with the practical experiments in their respective practical papers (C12, C14)



Government of Karnataka
BOTANY Curriculum

Plant Morphology and Taxonomy (Theory)

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	Plant Morphology and Taxonomy (Theory)		
Course Code:	DSC – BOT-C9 - T	No. of Credits	04
Contact hours	60 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	60 Hrs
Unit 1:	15 hrs
<p>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.</p> <p>Introduction to Taxonomy: History, objectives, scope and relevance of Taxonomy</p> <p>Systems of classification: Artificial, Natural and Phylogenetic; brief account of Linnaeus', Bentham & Hooker's, Engler and Prantl's system and APG IV System (2016).-Merits and demerits of classification.</p> <p>Taxonomic literatures: Floras, Monograph. Revisions, Journals.</p> <p>Herbaria and Botanical gardens: Important herbaria and botanical gardens of the world and India. Technique of Herbarium Preparation and roles botanical gardens.</p> <p>Virtual herbarium; E-flora; Documentation.</p>	
Unit 2:	15 hrs
<p>Plant identification: Taxonomic dichotomous keys; intended (yolked) and bracketed keys. (brief account only).</p> <p>Plant descriptions: Common Terminologies used for description of vegetative and reproductive parts of the following families.</p>	

<p>Study of the diagnostic features of Angiosperm families (Any 15 from the listed): Annonaceae, Brassicaceae, Malvaceae, Rutaceae, Anacardiaceae, Fabaceae (with sub Families), Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae / Zingiberaceae, Liliaceae / Commelinaceae, Arecaceae and Cyperaceae / Poaceae.</p> <p>Plant Taxonomic Evidences: from palynology embryology, cytology, phytochemistry and molecular data. Field inventory.</p>	
<p>Unit 3:</p>	<p>15 hrs</p>
<p>Taxonomic Hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concepts (biological, morphological, evolutionary). Modes of speciation. Problems with species concepts. Rank less system of phylogenetic systematics</p> <p>Botanical Nomenclature: Principles and rules (ICN); Latest code –brief account, 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.</p>	
<p>Unit 4:</p>	<p>15 hrs</p>
<p>Biometrics, Numerical Taxonomy; Phenetics and Cladistics: Characters; Variations; OTUs, character weighting and coding; Cluster analysis; Phenograms, cladograms (definitions and differences).</p> <p>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).</p> <p>Origin and evolution of angiosperms; Co-evolution of angiosperms and animals; Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).</p> <p>Molecular taxonomy: Respect to DNA sequences of chloroplast genes (<i>atpB</i>, <i>rbcL</i>, ITS, <i>trnL</i> etc) and one nuclear gene (nuclear ribosomal 18s DNA).</p>	

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
<i>Formative Assessment as per guidelines are compulsory</i>	

Program Name	B.Sc. in BOTANY		Semester	V
Course Title	Plant Morphology and Taxonomy (Practical)		Practical Credits	02
Course Code	DSC – BOT - C10 - P		Contact Hours	4 Hours per week
Formative Assessment	25 Marks	Summative Assessment	25 Marks	
Practical Content				
<p>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.</p> <p>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 diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification) and identify up to species using the flora. 26 hrs</p> <p>2. Construction of plant phylogenetic trees using various loci (<i>atpB</i>, <i>rbcL</i>, ITS, <i>trnL</i> etc) with various phylogenetic methods (Neighbour Joining, Maximum Likelihood etc). 06 hrs</p> <p>3. 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, <i>Luffa</i>, <i>Asfoetida</i>, Cumin, Coriander, Coffee, Rubber, Tapioca, Ricinus, Ginger, Turmeric, Coir, Arecanut, Rice, Wheat, Ragi, Sugarcane <i>Annona muricata</i> <i>Catharanthus roses</i>, <i>Rauvolfia serpentina</i>, <i>Justicia adhatoda</i>, <i>Vitex nigundo</i> and <i>Leucas aspera</i> 16 hrs</p> <p>4. Field visit: Local or outside area/ Botanical garden/ tribal settlements minimum 3 to 5 days.</p> <p>5. 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).</p>				

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

Formative Assessment for Practical	
Assessment Occasion/ type	Marks
Attendance	05
Test	05
Field visit (3 to 5 days)	05
Submission (Record book, Tour report and Herbarium)	10
Total	25 Marks
<i>Formative Assessment as per guidelines are compulsory</i>	

SCHEME OF PRACTICAL EXAMINATION

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

- | | |
|--|---------|
| 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. Write the floral diagram and floral formula of the given specimen D | 2 Marks |
| 4. Identification of Specimen/slides E, F and G | 6 Marks |
| 5. Viva Voce | 2 Marks |
| 6. Submission (Journal / Record + Study Tour Report) | 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. Viva
- Q6. Submission (Journal/ Record + Study Tour Report)

Note: Same Scheme may be used for IA (Formative Assessment) examination

References	
1	Baker. H.G. 1970. <i>Plant and Civilization</i> , Wadsworth Publishing Company.
2	Colton C.M. 1997. <i>Ethnobotany – Principles and applications</i> . John Wiley and sons –Chichester
3	Cotton, C.M. 1996. <i>Ethnobotany – Principles and Applications</i> . Wiley and Sons
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7	Heywood - <i>Plant taxonomy</i> - Edward Arnold London.
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11	Lawrence - <i>Taxonomy of Vascular Plants</i> - Oxford & I B H, New Delhi.
12	Manilal, K.S. and M.S. Muktesh Kumar 1998. <i>A Handbook on Taxonomy Training</i> . DST, New Delhi.
13	Manilal, K.S. and A.K. Pandey, 1996. <i>Taxonomy and Plant Conservation</i> . C.B.S. Publishers & Distributors, New Delhi.
14	Manilal, K.S. 2003. <i>Van Rheedee's Hortus Malabaricus. English Edition</i> , with Annotations and Modern Botanical Nomenclature. (12 Vols.) University of Kerala, Trivandrum.
15	Naik V.N., <i>Taxonomy of Angiosperms</i> , 1991. Tata Mcgraw-Hill Pub. Co. Ltd., New Delhi.
16	Pandey, S. N, and S.P. Misra (2008)- <i>Taxonomy of Angiosperms</i> - Ane Books India, New Delhi.
17	Radford A B, W C Dickison, J M Massey & C R Bell, <i>Vascular Plant Systematics</i> , 1974, Harper & Row Publishers, New York.
18	Singh G.2012. <i>Plant systematics: Theory and Practice</i> . Oxford and IBH, Pvt. Ltd., New Delhi.
19	Singh V. & Jain - <i>Taxonomy of Angiosperms</i> - Rastogi Publications, Meerut.
20	Sivarajan V. V - <i>Introduction to Principles of taxonomy</i> - Oxford & I B H New Delhi.
21	Any local/state/regional flora published by BSI or any other agency.

Genetics and Plant Breeding (Theory)

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	Genetics and Plant Breeding (Theory)		
Course Code:	DSC – BOT-C11 - T	No. of Credits	04
Contact hours	60 Hours	Duration of SEA/Exam	2hours
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 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	45 Hrs
Unit 1:	12hrs
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 codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance. Extrachromosomal Inheritance Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast.	
Unit 2:	12hrs
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: CIB 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 3:	21 hrs
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; Selection methods: For self-pollination, cross pollination and vegetative Propagation in plants; Hybridization: For self, cross and vegetative propagation in plants – Procedure, advantages and limitations.	

<p>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. Crop improvement and breeding Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.</p>
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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
<i>Formative Assessment as per guidelines are compulsory</i>	

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	Genetics and Plant Breeding (Practical)	Practical Credits	02
Course Code	DSC – BOT – C12 - P	Contact Hours	4 Hours per week
Formative Assessment	25 Marks	Summative Assessment	25 Marks

Practical Content

Practical: Plant breeding:

1. Reproductive of biology, self and cross pollinated plants; Vegetative reproduction
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

Practical: Genetics

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

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

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

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

3. 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

(distribution of marks): 25 marks for the Semester end examination 3hrs

- | | |
|--|-----------------------|
| 1. Perform the emasculation / pollen viability / fertility of the given sample A | 5 Marks |
| 2. Calculate the recombinant frequency and state the order of gene from the given data B | 4 Marks |
| 4. Identification of Specimen/slides/ Photographs C, D and E | 6 Marks |
| 5. Viva Voce | 5 Marks |
| 6. Submission (Journal / Record) | 5 Marks |
| | Total 25 marks |

General instructions:

- Q1 Material Cassia// Hibiscus/ etc (A)
 Q2. Mapping using one point / two point test cross data (B)
 Q3. Down's, Klinefelter's and Turner's syndromes, Translocation Ring, Laggards and Inversion Bridge (C, D and E)
 Q5. Viva
 Q6. Submission (Journal/ Record)

Note: Same Scheme may be used for IA (Formative Assessment) examination

References	
1	Acquaah, G. (2007). Principles of Plant Genetics & Breeding. New Jersey, 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.
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	edition. New York, NY: W.H. Freeman and Co.
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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.

Cell Biology (Theory)

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	Cell Biology (Theory)		
Course Code:	DSC-BOT - C13-T	No. of Credits	04
Contact hours	60 Hours	Duration of SEA/Exam	2hours
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	45Hrs
Unit 1:	15hrs
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 2:	15hrs
Structure and functions, active and passive transport, proton pumps associated (Na-K, Calmodulin etc. and their distribution), phagocytosis, pinocytosis, exocytosis. Structural organization, function, marker enzymes of the above 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 3:	15hrs
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	

Pedagogy: Teaching and learning, Seminar, Assignments, etc

Formative Assessment for Theory	
Assessment Occasion/type	Marks
Attendance	10
Test(Objectivetype)	10
Assignments	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines are compulsory</i>	

Course Title	Cell Biology (Practical)	Practical Credits	02
Course Code	DSC-BOT - C14-P	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/ Rhoec/ 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/ Rhoec/ Crinum) 5. Study of Karyotype using camera-lucida / chart. 6. Isolation of cell organelle – Chloroplast.			

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

4. 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

(distribution of marks): 25 marks for the Semester end examination 3hrs

CELL BIOLOGY

Time =03 hrs

Marks =25

- Preparation of squash/ smear of material A, identify, Sketch and label the any two stages with reasons
06 marks
- Find out cell length and breadth of the given material using micrometry 05marks

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|--|----------|
| 3. Identify the slides C & D | 04 marks |
| 4. Viva-voce | 05 marks |
| 5. Submission (Journal/ Record + 5 slides) | 05 marks |
| Total 25 marks | |

General instructions:

- Q1. Give specimen from Onion/ Rhoec/ Crinum plant (A)
 Q2. Give specimen from Onion/ Rhoec leaf (B)
 Q3. Give slide from mitosis (C) meiosis (D)
 Q4. Viva-voce
 Q5. Submission (Journal/ Record + 5 slides)

Note: Same Scheme may be used for IA (Formative Assessment) examination

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.
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4	Becker W. M., Kleinsmith L.J. and Bertni G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San francisco.
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8	Verma, P. S. (2004). Cell Biology,Genetics, Molecular Biology: Evoloution and Ecology. India: S. Chand Limited.