



**KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION**

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ



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NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No. KU/Aca(S&T)/JS/MGJ(Gen)/2023-24/59

Date: 04/09/2023

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2023-24ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಪದವಿಗಳಿಗೆ 5 ಮತ್ತು 6ನೇ ಸೆಮೆಸ್ಟರ್
NEP-2020 ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ
ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 104 ಯುಎನ್ಇ 2023, ದಿ: 20.07.2023.
2. ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 2 ರಿಂದ 7, ದಿ: 31.08.2023.
3. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 04/09/2023

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2023-24ನೇ
ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ಎಲ್ಲ B.A./ BPA (Music) /BVA / BTTM / BSW/ B.Sc./B.Sc. Pulp &
Paper Science/ B.Sc. (H.M)/ BCA/ B.A.S.L.P./ B.Com/ B.Com (CS) / BBA & BA ILRD ಸ್ನಾತಕ ಪದವಿಗಳ 5
ಮತ್ತು 6ನೇ ಸೆಮೆಸ್ಟರ್‌ಗಳಿಗೆ NEP-2020ರ ಮುಂದುವರೆದ ಭಾಗವಾಗಿ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ
ಕೋರ್ಸಿನ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಭಿತ್ತರಿಸಲಾಗಿದೆ. ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ.
ಅಂತರ್ಜಾಲದಿಂದ ಡೌನ್‌ಲೋಡ್ ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತ ವಿದ್ಯಾರ್ಥಿಗಳ ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ
ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕವಿವಿ ಅಧೀನದ/ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ
ಸೂಚಿಸಲಾಗಿದೆ.

ಅಡಕ: ಮೇಲಿನಂತೆ


ಕುಲಸಚಿವರು.

ಗೆ,
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ
ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚಿ ಮೂಲಕ ಬಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. / ವಿದ್ಯಾಮಂಡಳ (ಪಿ.ಜಿ.ಪಿಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ
ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.



KARNATAK UNIVERSITY, DHARWAD

B.Sc. in Botany

Syllabus With Effect From 2023-24

DISCIPLINE SPECIFIC CORE COURSE (DSCC)

FOR SEM V & VI,

SKILL ENHANCEMENT COURSE (SEC) FOR SEM V SEM

AS PER NEP - 2020

KARNATAK UNIVERSITY, DHARWAD

04 – Year B.Sc. (Hons.) Program

SYLLABUS

Subject: Botany

[Effective from 2023-2024]

**DISCIPLINE SPECIFIC CORE COURSE (DSCC-9 to 12),
FOR SEM - V.**

AS PER NEP- 2020

BOTANY AND ANOTHER SUBJECT AS DOUBLE MAJORS IN THIRD YEAR (V SEM) NEP 2020

Sem.	Type of Course	Theory/ Practical	Course Code	Course Title	Instructi onhour/ week	Total hours / sem	Duration of Exam	Marks			Credits
								Formati ve	Summa tive	Total	
V	DSCC-9	Theory	035 BOT 011	Plant Morphology and Taxonomy	04hrs	56	02 hrs	40	60	100	04
	DSCC-10	Practical	035 BOT 012	Plant Morphology and Taxonomy	04 hrs	52	03 hrs	25	25	50	02
	DSCC-11	Theory	035 BOT 013	Genetics and Plant Breeding	04hrs	56	02 hrs	40	60	100	04
	DSCC-12	Practical	035 BOT 014	Genetics and Plant Breeding	04 hrs	52	03 hrs	25	25	50	02
	Other subject										04
	Other subject										04
	Other subject										04
	SEC-3	Practical	035 BOT 061		04hrs	52	03 hrs	25	25	50	02
Total											26

B.SC.: SEMESTER – V
SUBJECT: BOTANY

THE COURSE BOTANY IN V SEMESTER HAS TWO PAPERS (THEORY PAPER- 033 BOT 011 FOR 04 CREDITS AND PRACTICAL PAPER- 033 BOT 012 FOR 02 CREDITS) FOR 06 CREDITS: BOTH THE PAPERS ARE COMPULSORY, DETAILS OF THE COURSES ARE AS

TITLE OF THE COURSE:
PLANT MORPHOLOGY AND TAXONOMY (THEORY)
COURSE CODE: 035 BOT 011
THEORY: DISCIPLINE SPECIFIC CORE COURSE (DSCC-9)

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	PLANT MORPHOLOGY AND TAXONOMY (THEORY)		
Course Code:	035 BOT 011	No. of Credits	04
Contact hours	56 Hours	Duration of Exam	2hours
Formative Assessment Marks	40	Summative Assessment Marks	60

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 1:	16 hrs
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 Linnaeus', Bentham & Hooker's, Engler and Prantl's system and APG IV System (2016).-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 and roles botanical gardens. Virtual herbarium; E-flora; Documentation.	
Unit 2:	12 hrs
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 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.	
Unit 3:	18 hrs
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, Rutaceae, Anacardiaceae, Fabaceae (with sub Families), Myrtaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Liliaceae, Arecaceae and Poaceae.	

Unit 4:	10 hrs
Biometrics, Numerical Taxonomy; Phenetics and Cladistics: Characters; Variations; OTUs, character weighting and coding; Cluster analysis; Phenograms, cladograms (definitions and differences). Origin and evolution of angiosperms; Co-evolution of angiosperms and animals; Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram). Plant Taxonomic Evidences: from palynology embryology, cytology, phytochemistry and molecular data. Field inventory.	

Pedagogy: Teaching and learning, Seminar, Assignments, etc

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

TITLE OF THE COURSE: PLANT MORPHOLOGY AND TAXONOMY (PRACTICAL)
COURSE CODE: 035 BOT 012
PRACTICAL: DISCIPLINE SPECIFIC CORE COURSE (DSCC-10)

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	PLANT MORPHOLOGY AND TAXONOMY (PRACTICAL)		
Course Code:	035 BOT 012	No. of Credits	02
Contact hours	52 Hours	Duration of Exam	3 hours
Formative Assessment Marks	25	Summative Assessment Marks	25

LIST OF EXPERIMENTS TO BE CONDUCTED

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 diagram/s, floral formula/e and systematic position according to Bentham & Hooker’s system of classification) and identify up to species using the flora. 24 hrs
3. Identification of species using the flora 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, Asfoetida, Cumin, Coriander, Coffee, Rubber, Tapioca, Ricinus, Coir, Arecanut, Rice, Wheat, Ragi, Sugarcane *Annona muricata Catharanthus roseus, Rauvolfia serpentina, Justicia adhatoda, Vitex negundo and Leucas aspera* 18 hrs
5. Submission of any 5 economic plant products.

Submission: 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.

Formative Assessment for Practical	
Assessment Occasion/ type	Marks
Test-I	05
Test-II	05
Field visit(Tour report and Herbarium)	10
Submission (any 5 economic plant products)	05
Total	25 Marks
<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

2. 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 MarksNote: 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

- | | |
|---|---------|
| 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 formal 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 (Practical Record/Journal) | 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 (Practical Record/Journal)

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

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, <i>Systematic Botany</i> , 4th Ed, Wiley Estern Ltd., New Delhi, 1988.
5	Eames A. J. - <i>Morphology of Angiosperms</i> - Mc Graw Hill, New York.
6	Hall, B.G. (2011). <i>Phylogenetic Trees Made Easy: A How-To Manual</i> . Sinauer Associates, Inc.USA
7	Heywood - <i>Plant taxonomy</i> - Edward Arnold London.
8	Jeffrey C .J. and A. Churchil - <i>An introduction to taxonomy</i> – London.

9	Jeffrey, C. (1982). An Introduction to <i>Plant Taxonomy</i> . Cambridge University Press, Cambridge
10	Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F., Donogue, M.J., 2002. <i>Plant Systematics: A Phylogenetic approach</i> , 2nd edition. Sinauer Associates, Inc., USA.
11	Lawrence - <i>Taxonomy of Vascular Plants</i> - Oxford & IBH, 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 Rheede'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 & IBH New Delhi.
21	Any local/state/regional flora published by BSI or any other agency.

TITLE OF THE COURSE: GENETICS AND PLANT BREEDING (THEORY)
COURSE CODE: 035 BOT 013
THEORY: DISCIPLINE SPECIFIC CORE COURSE (DSCC-11)

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	GENETICS AND PLANT BREEDING (THEORY)		
Course Code:	035 BOT 013	No. of Credits	04
Contact hours	56 Hours	Duration of Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs):	
<p>After the successful completion of the course, the student will be able to:</p> <p>CO1. Understanding the basics of genetics and plant breeding</p> <p>CO2. Ability to identify, calculate and describe crossing over, allelic generations and frequencies of recombination.</p> <p>CO3. Interpret the results of mating and pollinations.</p> <p>CO4. Classify Plant pollination methods</p> <p>CO5. Recognition of modes of inheritance of traits/ phenotypes and Phenotype-genotype correlation.</p>	
CONTENTS	56 Hours
Unit 1:	16 hrs
<p>Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes;</p> <p>Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance.</p> <p>Extrachromosomal Inheritance Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast.</p>	
Unit 2:	16 hrs
<p>Linkage, crossing over and chromosome mapping.</p> <p>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.</p> <p>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); Role of Transposons in mutation. DNA repair mechanisms.</p> <p>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.</p>	
Unit 3:	12 hrs
<p>Plant Breeding: Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.</p> <p>Methods of crop improvement</p> <p>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;</p> <p>Hybridization: For self, cross and vegetative propagation in plants – Procedure, advantages and limitations.</p>	
Unit 4:	12 hrs
<p>Quantitative inheritance</p> <p>Concept, mechanism, examples of inheritance of Kernel colour in wheat, Monogenic vs polygenic inheritance</p> <p>Inbreeding depression and heterosis. History, genetic basis of inbreeding depression and heterosis; Applications.</p> <p>Crop improvement and breeding Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement..</p>	

Pedagogy: Teaching and learning, Seminar, Assignments, etc

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

TITLE OF THE COURSE: GENETICS AND PLANT BREEDING (PRACTICAL)**COURSE CODE: 035 BOT 014****PRACTICAL: DISCIPLINE SPECIFIC CORE COURSE (DSCC-12)**

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	GENETICS AND PLANT BREEDING (PRACTICAL)		
Course Code:	035 BOT 014	No. of Credits	02
Contact hours	52 Hours	Duration of Exam	3 hours
Formative Assessment Marks	25	Summative Assessment Marks	25

Practical: Plant breeding: 26 hrs

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 26 hrs

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 and 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 and conducting experiments.

Formative Assessment for Practical	
Assessment	Marks
Test-I	10 Marks
Test-II	10 Marks
Plant breeding station visit report	05 Marks
Total	25 Marks
<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

2. 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+5if 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

1. Test the percentage of pollen viability of the given material by hanging drop technique **A** 5 Marks
 2. Calculate the recombinant frequency and state the order of gene from the given data **B** 4 Marks
 3. Solve the genetic problem **C** 4 Marks
 4. Identification of Specimen/slides/ Photographs **D** and **E** 4 Marks
 5. Viva Voce 3 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. Problems on gene interaction (C)

Q4. Down's, Klinefelter's and Turner's syndromes, Translocation Ring, Laggards and Inversion Bridge (D and E)

Q5. Viva Voce

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.
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.

**B.SC. – V SEMESTER
SUBJECT: BOTANY
SKILL ENHANCEMENT COURSE (SEC-3)
CODE: 035 BOT 061**

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	NURSERY AND GARDENING (PRACTICAL)		
Course Code:	035 BOT 061	No. of Credits	02
Contact hours	52 Hours	Duration of Exam	2 hours
Formative Assessment Marks	25	Summative Assessment Marks	25

**Title of the Paper:
Nursery and Gardening
Code: 035 BOT 061**

Course outcomes (COs):

After the completion of this course the learner will be able to:

- CO1. Know tools and techniques of nursery
- CO2. Techniques of vegetative propagation
- CO3. Methods to break seed dormancy
- CO4. Components of manures and fertilizers

NURSERY AND GARDENING

(Credits: 2)

1. Tools used in nursery and gardening techniques
2. Vegetative propagation techniques: Natural propagation methods
3. Vegetative propagation techniques: artificial propagation methods: cuttings, grafting, air layering and ground layering
4. Seed structure and types
5. Methods used to break seed dormancy
6. Types of manures: inorganic and organic
7. Common pests and diseases in nursery plants
8. Visit to commercial nursery

SCHEME OF PRACTICAL EXAMINATION

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

- | | |
|---|-----------------------|
| 1. Perform vegetative propagation method in specimen A | 5 Marks |
| 2. Identify and describe the specimen/tools/photographs of specimen B, C, D, E, and E | 10 Marks |
| 3. Viva voce | 4 Marks |
| 4. Journal | 3 Marks |
| 5. Field visit report | 3 Marks |
| | Total 25 marks |

GENERAL INSTRUCTIONS:

- Q1 Vegetative propagation techniques from practical 3
- Q2. One from practical 1, practical 2, practical 6 and two from practical 7 (one from pest and one from disease)
- Q3. Viva Voce
- Q4. Journal
- Q5. Field visit report

References

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
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5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and
6. Cooperation, National Seed Corporation Ltd., New Delhi.
7. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San
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9. Hartmann and Kester. 2017, Plant Propagation: Principles and Practices. (9th Ed.), Pearson Education, Inc., New York.



KARNATAK UNIVERSITY, DHARWAD

B.Sc. Programme

SYLLABUS

Subject: Botany

[Effective from 2023-2024]

**DISCIPLINE SPECIFIC CORE COURSE (DSCC)
FOR SEM - VI.**

AS PER NEP- 2020

BOTANY AND ANOTHER SUBJECT AS DOUBLE MAJORS IN THIRD YEAR (VI SEM) NEP 2020

Sem.	Type of Course	Theory/ Practical	Course Code	Course Title	Instructi onhour/ week	Total hours / sem	Duration of Exam	Marks			Credits
								Formati ve	Summa tive	Total	
VI	DSCC-13	Theory	036 BOT 011	Cell Biology	04hrs	56	02 hrs	40	60	100	04
	DSCC-14	Practical	036 BOT 012	Cell Biology	04 hrs	52	03 hrs	25	25	50	02
	DSCC-15	Theory	036 BOT 013	Plant Physiology and Biochemistry	04hrs	56	02 hrs	40	60	100	04
	DSCC-16	Practical	036 BOT 014	Plant Physiology and Biochemistry	04 hrs	52	03 hrs	25	25	50	02
	Other subject										04
	Other subject										04
	Other subject										04
	Internship-1			036 BOT 091					50	0	50
Total											26

B.SC.: SEMESTER – VI
Subject: Botany
Theory: Discipline Specific Core Course (DSCC)

THE COURSE BOTANY IN V SEMESTER HAS TWO PAPERS (THEORY PAPER- 033 BOT 011 FOR 04 CREDITS AND PRACTICAL PAPER- 033 BOT 012 FOR 02 CREDITS) FOR 06 CREDITS: BOTH THE PAPERS ARE COMPULSORY, DETAILS OF THE COURSES ARE AS

Title of the Course
CELL BIOLOGY (THEORY)

Course Code: 036 BOT 011

Program Name	B.Sc. in BOTANY	Semester	VI
Course Title	CELL BIOLOGY (THEORY)		
Course Code:	036 BOT 011	No. of Credits	04
Contact hours	56 Hours	Duration of Exam	2hours
Formative Assessment Marks	40	Summative Assessment Marks	60

COURSE OUTCOMES (COs):	
<p>After the successful completion of the course, the student will be able to:</p> <p>CO1. Understanding of Cell metabolism, chemical composition, physiochemical and functional organization of organelle</p> <p>CO2. Contemporary approaches in modern cell and molecular biology.</p> <p>CO3. To study the organization of cell, cell organelles and biomolecules (i.e protein, carbohydrate, lipid and nucleic acid)</p> <p>CO4. To gain knowledge on the activities in which the diverse macro molecules and microscopic structures inhabiting the cellular world of life are engaged.</p> <p>CO5. To understand the various metabolic processes such as respiration, photosynthesis etc. which are important for life.</p>	
CONTENTS	
Unit 1:	18 hrs
Cell wall, distribution, chemical composition, functions and variations in prokaryotic and eukaryotic cells (primary and secondary wall), Glycocalyx, Cell-cell interactions/ Junctions, pit connections chromosome, its morphology, types and ultra structure (nucleosome model). Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases; Structure and replication of DNA.	
Unit 2:	12 hrs
Programmed Cell Death; Biology and elementary knowledge of development and causes of cancer. Structure and functions of cell membrane, active and passive transport, proton pumps associated (Na-K, Ca+ calmodulin etc. and their distribution), phagocytosis, pinocytosis, exocytosis.	
Unit 3:	14 hrs
Structural organization, function, marker enzymes of the cell organelles, biogenesis of mitochondria and chloroplasts, brief account of transport in mitochondria and chloroplasts (Tim/Tom; Tic/Toc) and semi autonomous nature of mitochondria and chloroplast. Nuclear envelope, structure of nuclear pore complex, nuclear lamina, transport across nuclear membrane, Nucleolus, rRNA processing.	
Unit 4:	12 hrs
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 (Objective type)	10
Assignments	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines are compulsory</i>	

**Title of the Course
CELL BIOLOGY (PRACTICAL)**

Course Code: 036 BOT 012

Course Title	CELL BIOLOGY (PRACTICAL)		Practical Credits	02
Course Code	036 BOT 012		Contact Hours	52 Hours
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. 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+5if 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

CELL BIOLOGY

Time =03 hrs

Marks =25

1. Preparation of squash/ smear of material A, identify, Sketch and label the any two stages with reasons. 06marks
 2. Find out cell length and breadth of the given material using micrometry 05marks
 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.
3	De Robertis, E. D. P. and De Robertis R. E. 2009. Cell and Molecular Biology, 8th edition. LippincottWilliams 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 francisco.
5	Reven, F.H., Evert, R.F., Eichhorn, S.E. (1992). Biology of Plants. New York, NY: W.H.Freeman andCompany
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.

Title of the Course:
PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY (THEORY)

Course Code: 036 BOT 013

Program Name	BSc/ BOTANY	Semester	VI
Course Title	PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY (THEORY)		
Course Code:	036 BOT 013	No. of Credits	04
Contact hours	56 Hours	Duration of Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

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 1	16Hrs
<p>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.</p> <p>Transpiration. Types and process. Mechanism of guard cell movement. K⁺ ion mechanism. Antitranspirants.</p> <p>Mechanism of ascent of sap: Vital and physical force theories.</p> <p>Phloem Transport: Transport of organic solutes. Path of transport, vein loading and unloading. Transcellular hypothesis, mass flow hypothesis.</p> <p>Mineral nutrition: A brief account on Micro and macro nutrients.</p>	
UNIT 2	12Hrs
<p>Enzymes - classification, kinetics and mechanism of action.</p> <p>Proteins and amino acids: classification, structure - primary, secondary, tertiary and quaternary.</p> <p>Vitamins - classification, distribution, structure, production, function.</p> <p>Lipids: classification, structure, function and biosynthesis of fatty acids.</p> <p>Secondary plant products: structure, biosynthesis and distribution of terpenes, phenolics and nitrogen containing compounds.</p>	
UNIT 3	14Hrs
<p>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.</p> <p>Respiration: aerobic and anaerobic respiration, Glyoxylate, Oxidative Pentose Phosphate Pathway.</p> <p>Nitrogen metabolism: Biological nitrogen fixation; Nitrate and ammonia assimilation.</p>	

UNIT 4	14Hrs
<p>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.</p> <p>Sensory Photobiology: Biological clocks, photoperiodism, function & structure of phytochromes, phototropin & cryptochromes. Senescence, Ageing & Cell Death (PCD and Autophagosis).Plant Movements.</p>	

Assessment	Marks
Attendance	10 Marks
Test	10 Marks
Seminar	10 Marks
Assignment	10 Marks
Total	40 Marks
<i>Formative Assessment as per guidelines are compulsory</i>	

Title of the Course:
PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY (PRACTICAL)
Course Code: 036 BOT 014

Course Title	PLANT PHYSIOLOGY AND BIOCHEMISTRY (PRACTICAL)		Practical Credits	2
Course Code	036 BOT 014		Contact Hours	52 Hours
Formative Assessment	25 Marks	Summative Assessment	25 Marks	
PRACTICAL CONTENT				
<ol style="list-style-type: none"> 1. Experiment to demonstrate the phenomenon of osmosis by physical and physiological method. 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 using Garrreau's potometer. 5. Experiment to measure the transpiration by using Ganong's photometer. 6. To demonstrate that oxygen is liberated in the process of photosynthesis. 7. Separation of photosynthetic pigments by paper chromatography and measure their Rf values. 8. Experiment to demonstrate the fermentation. 9. To isolate and identify the amino acids from a mixture using paper chromatography. 10. Study of plant movements. 11. Qualitative test for Starch, Protein, Sugars and Lipids. 12. Estimation of TAN (Titratbale acid Number) from <i>Bryophyllum</i> leaves/<i>Aloe vera</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

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+5if necessary)

T

otal: 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 | 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
<i>Formative Assessment as per guidelines are compulsory</i>	

References

1. Fundamentals of Biochemistry 2nd Ed, John Wiley and Sons Inc. Wilson, K. and Walker, J. 1994
2. Jain V 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: Fundamentals and Applications. Agrobotanical Publishers.
5. Malik CP, 2002. Plant Physiology. Kalyani publishers.
6. Mukherjee S, Ghosh AK, 2005. Plant Physiology. New Central Book Agency, Calcutta.
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9. Salisbury F B, Ross C W, 1992. Plant Physiology. CBS publishers and Distributors, New Delhi.
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