NATIONAL EDUCATION POLICY-2020

(NEP-2020)

BOTANY SYLLABUS

of 5th and 6th Semester

****

Submitted

to

Davangere University

Davangere-577 007

SEMESTER - V

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hours)
			IA	SEE	Total	L	T	P		
DSC	21BSCICIBOTL5.1	Plant Morphology and Taxonomy	40	60	100	4	-	-	4	2
	21BSCICIBOTP5.1	Plant Morphology and Taxonomy (Practical)	25	25	50	-	-	4	2	3
	21BSCICIBOTL5.2	Genetics And Plant Breeding	40	60	100	4	-	-	4	2
	21BSCICIBOTP5.2	Genetics And Plant Breeding (Practical)	25	25	50	-	-	4	2	3
SEC-4	-	Employability Skills / Cyber security	25	25	50	2	-	2	3	01

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SEMESTER - VI

Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hours)
			IA	SEE	Total	L	T	P		
DSC	21BSCICIBOTL6.1	Cell Biology	40	60	100	4	-	-	4	2
	21BSCICIBOTP6.1	Cell Biology (Practical)	25	25	50	-	-	4	2	3
	21BSCICIBOTL6.2	Plant Physiology And Biochemistry	40	60	100	4	-	-	4	2
	21BSCICIBOTP6.2	Plant Physiology And Biochemistry (Practical)	25	25	50	-	-	4	2	3
SEC-4	-	Internship	-	-	-	-	-	-	2	

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Davangere University
Department of Studies in Botany
List of Courses from V and VI Semester for the under graduate Program in BOTANY

Sem	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 AND ANOTHER SUBJECT AS DOUBLE MAJOR IN THIRD YEAR										
V	DSC	BOTC9-T	Plant Morphology and Taxonomy	4	4		2	40	60	100
		BOTC10-P	Plant Morphology and Taxonomy	2		4	3	25	25	50
		BOTC11-T	Genetics and Plant Breeding	4	4		2	40	60	100
		BOTC12-P	Genetics and Plant Breeding	2		4	3	25	25	50
VI	DSC	BOTC9-T	Cell Biology	4	4		2	40	60	100
		BOTC10-P	Cell Biology	2		4	3	25	25	50
		BOTC11-T	Plant Physiology and Biochemistry	4	4		2	40	60	100
		BOTC12-P	Plant Physiology and Biochemistry	2		4	3	25	25	50

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)

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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 AssessmentMarks	**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	
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 anddemerits of classification. **Taxonomic literatures:** Floras, Monograph. Revisions, Journals. **Herbaria and Botanical gardens:** Important herbaria and botanical gardens of the worldand India. Technique of Herbarium Preparation and roles botanical gardens. **Virtual herbarium;** E-flora; Documentation.	**15 hrs**
Unit 2	
Plant identification: Taxonomic dichotomous keys; intended (yolked) and bracketed keys.(brief account only). **Plant descriptions**: Common Terminologies used for description of vegetative andreproductive parts of the following families. **Study of the diagnostic features of Angiosperm families (Any 15 from the listed):**	**15 hrs**

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. **Plant Taxonomic Evidences:** from palynology embryology, cytology, phytochemistry andmolecular data. Field inventory.	
Unit 3	
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.	**15 hrs**
Unit 4	
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:** Respect to DNA sequences of chloroplast genes (*atp*B, rbcL, ITS, trnL etc) and one nuclear gene (nuclear ribosomal 18s DNA).	**15 hrs**

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	

Program ame	**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

- 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.
- 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
- Construction of plant phylogenetic trees using various loci (*atp*B, rbcL, ITS, trnL etc) with various phylogenetic methods (Neibour Joining, Maximum Likelihood etc). 06 hrs
- 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 *Annona muricata Catharanthus roses, Rauvolfia serpentaina, Justicia adhatoda, Vitex nigundo* and *Leucas aspera* 16 hrs
- **Field visit**: Local or outside area/ Botanical garden/ tribal settlements minimum 3 to 5 days.
- **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,

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**
Formative Assessment as per guidelines are compulsory	

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

MarksNote: Proportionate weight-age shall be given to each unit based on number of hours prescribed.

V Semester BSc Degree Examination, September 2023
(NEP-2020 Syllabus)
Botany
Paper BOT 5 – Plant Morphology and Taxonomy

Time: 2 Hours **Max. Marks: 60**

Instructions: All parts are compulsory

PART - A

I. Write brief note on **any FIVE** of the following: **(2×5=10)**

1.
2.
3.
4.
5.
6.

PART – B

II. Write short notes on **any FOUR** of the following: **(5×4=20)**

7.
8.
9.
10.
11.

PART –C

III. Answer **any THREE** of the following: **(10×3=30)**

12.
13.
14.
15.

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

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 (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 Economicimportance (G)
Q5. Viva
Q6. Submission (Journal/ Record + Study Tour Report)

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

References

- Baker. H.G. 1970. Plant and Civilization, Wadsworth Publishing Company.
- Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester
- Cotton, C.M. 1996. Ethnobotany – Principles and Applications. Wiley and Sons
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- Manilal, K.S. and A.K. Pandey (1996). *Taxonomy and Plant Conservation.* C.B.S. Publishers &Distributors, New Delhi.
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- Singh G. (2012). *Plant systematics: Theory and Practice*. Oxford and IBH, Pvt. Ltd., New Delhi.
- Singh V., P.C. Pande and D.K. (1998). *Taxonomy of Angiosperms* - Rastogi Publications, Meerut.
- Sivarajan V. V., and N.K.P. Robson (1991). *Introduction to Principles of taxonomy* - Oxford &I B H New Delhi.
- 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	**03**
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.Abilitytoidentify, calculate and describe crossing over, allelic generations and frequencies ofrecombination.

CO3.Interprettheresults of mating and pollinations.

CO4.ClassifyPlantpollination methods

CO5.Recognitiono f modes of inheritance of traits/ phenotypes and phenotype-genotype correlation.

Contents	**45 Hrs**
Unit 1	
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.	**12hrs**
Unit 2	
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.	**12hrs**
Unit 3	
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 vegetativePropagation in plants; Hybridization: For self, cross and vegetative propagation in plants – Procedure, advantagesand limitations.	**21 hrs**
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 andheterosis; Applications. Crop improvement and breeding Role of mutations; Polyploidy; Distant hybridization androle of biotechnology in crop improvement.	

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	

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.
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

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	

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+5if necessary)

Total: 60

MarksNote: Proportionate weight-age shall be given to each unit based on number of hours prescribed.

V Semester BSc Degree Examination, September 2023

(NEP-2020 Syllabus)

Botany

Paper BOT 5 – Genetics and Plant Breeding

Time: 2 Hours **Max. Marks: 60**

Instructions: All parts are compulsory

PART - A

I. Write brief note on **any FIVE** of the following: **(2×5=10)**

1.
2.
3.
4.
5.
6.

PART – B

II. Write short notes on **any FOUR** of the following: **(5×4=20)**

7.
8.
9.
10.
11.

PART –C

III. Answer **any THREE** of the following: **(10×3=30)**

12.
13.
14.
15.

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

SCHEME OF PRACTICAL EXAMINATION

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

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 InversionBridge (C, D and E)
Q5. Viva
Q6. Submission (Journal/ Record)

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

References

- Acquaah, G. (2007). Principles of Plant Genetics &Breeding.NewJearsey, U.S.: Blackwell Publishing.
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- 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	**03**
Contact hours	**45 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, lipidand nucleic acid)

CO4.To gain knowledge on the activities in which the diverse macro molecules and microscopic structuresinhabiting 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	
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 ofprotein kinases. Programmed Cell Death; Biology and elementary knowledge of development and causes of cancer.	**15hrs**
Unit 2	
Structure and functions, active and passive transport, proton pumps associated (Na-K, Cacalmodulin 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	**15hrs**
Unit 3	
Nuclear envelope, structure of nuclear pore complex, nuclear lamina, transport across nuclearmembrane, 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	**15hrs**

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	**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/ 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.

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

MarksNote: Proportionate weight-age shall be given to each unit based on number of hours prescribed.

V Semester BSc Degree Examination, September 2023

(NEP-2020 Syllabus)

Botany

Paper BOT 5 – Cell Biology

Time: 2 Hours **Max. Marks: 60**

Instructions: All parts are compulsory

PART - A

I. Write brief note on **any FIVE** of the following: **(2×5=10)**

1.
2.
3.
4.
5.
6.

PART – B

II. Write short notes on **any FOUR** of the following: **(5×4=20)**

7.
8.
9.
10.
11.

PART –C

III. Answer **any THREE** of the following: **(10×3=30)**

12.
13.
14.
15.

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

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 — 06 marks
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/ Rhoeo/ Crinum plant (A)
Q2. Give specimen from Onion/ Rhoeo 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

- Cooper, G.M., Hausman, R.E. (2009). The Cell: A Molecular Approach, 5th edition. Washington, D.C.:ASM Press & Sunderland, Sinauer Associates, MA
- Karp, G. (2010). Cell Biology, 6th edition. New Jersey, U.S.A.: John Wiley & Sons.
- De Robertis, E. D. P. and De Robertis R. E. (2009). Cell and Molecular Biology, 8th edition. Lippincott Williams and Wilkins, Philadelphia.
- Becker W. M., Kleinsmith L.J. and Bertni G. P. (2009). The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Fransisco.
- Reven, F.H., Evert, R.F., Eichhorn, S.E. (1992). Biology of Plants. New York, NY: W.H.Freeman and Company.
- 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.
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- Verma, P. S. (2004). Cell Biology, Genetics, Molecular Biology: Evolution and Ecology. India: S. Chand Limited.

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	**60Hrs**
UNIT 1	
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.	**15Hrs**
UNIT 2	
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.	**15Hrs**
UNIT 3	
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	**15Hrs**

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

Pedagogy:

Course Title	**Plant Physiology and Biochemistry (Practical)**	Practica lCredits	**2**
Course Code	**BOT C16-P**	Contac tHours	**4 Hours PerWeek**
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+5if necessary)

Total: 60 Marks

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

VI Semester BSc Degree Examination, September 2023

(NEP-2020 Syllabus)

Botany

Paper BOT 6 – Plant Physiology and Plant Biochemistry

Time: 2 Hours **Max. Marks: 60**

Instructions: All parts are compulsory

PART - A

I. Write brief note on **any FIVE** of the following: **(2×5=10)**

1.
2.
3.
4.
5.
6.

PART – B

II. Write short notes on **any FOUR** of the following: **(5×4=20)**

7.
8.
9.
10.
11.

PART –C

III. Answer **any THREE** of the following: **(10×3=30)**

12.
13.
14.
15.

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

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**

References

- Fundamentals of Biochemistry 2nd Ed, John Wiley and Sons Inc. Wilson. K. and Walker, J. 19942 .JainV K, 2008. Fundamentals of Plant Physiology.S Chand andCo.
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- Verma V, 2007.Text Book of Plant Physiology. Ane Books Pvt. Ltd.

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