

Chaudhary Bansi Lal University, Bhiwani

(A State University established under Haryana Act No. 25 of 2014)



Scheme of Examinations & Syllabi

for

Botany

(w.e.f. 2024-25)

in

Undergraduate Programmes

as per NEP 2020

Curriculum and Credit Framework for Undergraduate Programmes
(Multiple Entry-Multiple Exit, Internship and Choice Based Credit System LOCF)
With effect from the session 2024-25 (in phased manner)

DEPARTMENT OF BOTANY

Chaudhary Bansi Lal University, Bhiwani
HARYANA, INDIA

DEPARTMENT OF BOTANY, CHAUDHARY BANSI LAL UNIVERSITY, BHIWANI

Scheme of Examination for Under-Graduate

Programme

Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2024-25(in phased manner)

Subject: Botany

SEMESTER-I

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A & C	CC-1 MCC-1 4 credit	24UN- BOT-101	Diversity of Microbes, Algae, Fungi and Archegoniates	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme C only	MCC-2 4 credit	24UN- BOT-102	Conservation Biology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme A	CC-M1 2 credit	24UN- BOT-103	Plant Diversity	1	1	10	20	30	3 hrs.
			Practical	1	2	5	15	20	4 hrs.
Scheme C only	CC-M1 4 credit	From Available CC-M1/ MCC-1 of 4 credits as per NEP							
Scheme A & C	MDC-1 3 credits	From available pool of Multidisciplinary Courses from a subject of different discipline as per NEP							
Scheme A & C	AEC-1 2 credit	From Available AEC-1 of two credits as per NEP							
	SEC-1 3 credit	From Available SEC-1 of three credits as per NEP							
	VAC-1 2 credit	From Available VAC-1 of two credits as per NEP							

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SEMESTER-2									
Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A & C	CC-2 MCC-3 4 credit	24UN- BOT-201	Cell biology & Genetics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme C.only	DSEC-2 4 credit	24UN- BOT-202	Floriculture	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme A only	CC-M2 2 credit	24UN- BOT-203	Plants for Human Welfare	1	1	10	20	30	3 hrs.
			Practical	1	2	5	15	20	4 hrs.
Scheme C only	CC-M2 4 credit	From Available CC-M2/ MCC-2 of 4 credits as per NEP							
Scheme A & C	MDC-2 3 credits	From available pool of Multidisciplinary Courses from a subject of different discipline as per NEP							
Scheme A & C	AEC-2 2 credit	From Available AEC-2 of two credits as per NEP							
	SEC-2 3 credit	From Available SEC-2 of three credits as per NEP							
	VAC-2 2 credit	From Available VAC-2 of two credits as per NEP							
Internship of 4 credits of 4-6 weeks duration after 2 nd Semester									

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SEMESTER-3

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-3 MCC-4 4 credit	24UN- BOT-301	Gymnosperms & Plant Systematics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	MCC-5 4 credit	24UN- BOT-302	Ecology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme A & C	CC-M3 4 credits	From Available CC-M3/MCC-3 of 4 credits as per NEP							
Scheme B only	CC-M3(V) 4 credits	From Available CC-M3(V) of 4 credits as per NEP							
Scheme A, B & C	MDC-3 3 credits	From available pool of Multidisciplinary Courses from a subject of different discipline as per NEP							
Scheme A, B & C	AEC-3 2 credit	From Available AEC-3 of two credits as per NEP							
	SEC-3 3 credit	From Available SEC-3 of three credits as per NEP							
Scheme C only	VAC-3 2 credits	From Available VAC-3 of two credits as per NEP							
Scheme B only	MCC-3	MCC-2 FROM SCHEME C OF FIRST SEMESTER							

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SEMESTER-4

Remarks	Course	Paper (s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-4 MCC-6 4 credit	24UN- BOT-401	Plant Anatomy & Embryology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	MCC-7 4 credit	24UN- BOT-402	Plant Molecular Biology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	MCC-8 4 credit	24UN- BOT-403	Microbiology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	DSE-1 4 credit	24UN- BOT-404	Plant Tissue Culture	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
	Select one option	24UN- BOT-405	Bioethics, Biosafety and IPR	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme A, B & C	CC-M4(V) 4 credits	From Available CC-M4(V) of 4 credits as per NEP							
	AEC-4 2 credit	From Available AEC-3 of two credits as per NEP							
Scheme C only	VAC-4 2 credits	From Available VAC-4 of two credits as per NEP							
Scheme A & B	VAC-3 2 credits	From Available VAC-3 of two credits as per NEP							
Internship of 4 credits of 4-6 weeks duration after 4th Semester (if not done after second semester)									

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SEMESTER-5

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours /Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-5 MCC-9 4 credit	24UN- BOT-501	Plant Physiology & Biochemistry	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	MCC-10 4 credit	24UN- BOT-502	Reproductive Biology in Plants	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	DSE-2 4 credit	24UN- BOT-503	Evolutionary Biology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
	Select one Option	24UN- BOT-504	Modern Plant Systematics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	DSE-3 4 credit	24UN- BOT-505	Natural Plant Products	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
	Select one Option	24UN- BOT-506	Medicinal Plants and its Applications	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme A & C	CC-M5(V) 4 credits	From Available CC-M5(V) of 4 credits as per NEP							
Scheme A, B & C	Internship 4 credits	Internship#4 credit after 4 th semester							

SEMESTER-6									
Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-6 MCC-11 4 credit	24UN- BOT-601	Economic Botany, Ecology & Plant Tissue Culture	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	MCC-12 4 credit	24UN- BOT-602	Plant Pathology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	DSE-4 4 credit	24UN- BOT-603	Agroforestry	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
	Select one Option	24UN- BOT-604	Post-harvest Technology of Fruits & Vegetables	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme B & C	DSE-5 4 credit	24UN- BOT-605	Plant stress physiology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
	Select one Option	24UN- BOT-606	Plant propagation	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	4 hrs.
Scheme A only	CC-M6 4 credits	From Available CC-M6 of 4 credits as per NEP							
Scheme A only	CC- M7(V) 4 credits	From Available CC-M7(V) of 4 credits as per NEP							
Scheme B only	CC-M5(V) 4 credits	From Available CC-M5(V) of 4 credits as per NEP							
Scheme C only	CC-M6(V) 4 credits	From Available CC-M6(V) of 4 credits as per NEP							
Scheme C only	SEC-4 2 credit	From Available SEC-4 of two credits as per NEP							

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SEMESTER-7 (FOR HONOURS/HONOURS WITH RESEARCH IN BOTANY)									
Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
for Honours in Botany/Honours with Research in Botany (For Scheme B & C)	CC-H1 4 credit	24UN-BOT-701	Algae & Fungi	4	4	30	70	100	3 hrs.
	CC-H2 4 credit	24UN-BOT-702	Bryophytes & Pteridophytes	4	4	30	70	100	3 hrs.
	CC-H3 4 credit	24UN-BOT-703	Cytogenetics & Plant Breeding	4	4	30	70	100	3 hrs..
	DSE-H1 4 credit	24UN-BOT-704	Plant biotechnology	4	4	30	70	100	3 hrs.
	Select one Option	24UN-BOT-705	Basics of Genomics and Proteomics	4	4	30	70	100	3 hrs.
		24UN-BOT-706	Computational Biology	4	4	30	70	100	3 hrs.
	PC-H1 4 credit	24UN-BOT-707	Practical Based on 24UN-BOT-701 TO 704/705/706	4	8	30	70	100	6 hrs.
	CC-HM1 4 credit	From Available Minor of 4 credits as per NEP							

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SEMESTER-8 (FOR HONOURS IN BOTANY)									
Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam duration
Honours in Botany (For Scheme B & C)	CC-H4 4 credit	24UN-BOT-801	Biostaistics	4	4	30	70	100	3 hrs.
	CC-H5 4 credit	24UN-BOT-802	Natural Resources & Biodiversity	4	4	30	70	100	3 hrs.
	CC-H6 4 credit	24UN-BOT-803	Gymnosperm & Ethanobotany	4	4	30	70	100	3 hrs.
	DSE-H2 4 credit	24UN-BOT-804	Molecular Genetics	4	4	30	70	100	3 hrs.
	(Select one Option)	24UN-BOT-805	Plant Morphogenesis	4	4	30	70	100	3 hrs.
	PC-H2 4 credit	24UN-BOT-806	Practical Based on 24UN-BOT-801 TO 804/805	4	8	30	70	100	6 hrs.
	CC-HM2 4 credit	From Available Minor of 4 credits as per NEP							
OR SEMESTER-8 (FOR HONOURS WITH RESEARCH IN BOTANY)									
Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Honours with Research in Botany (For Scheme B & C)	CC-H4 4 credit	24UN- BOT-801	Biostaistics	4	4	30	70	100	3 hrs.
	CC-H5 4 credit	24UN-BOT-802	Natural Resources & Biodiversity	4	4	30	70	100	3 hrs.
	Project/ Dissert ation 12 credit	24UN- BOT-807	Project/ Dissertation	8+4	-	-	-	-	-
	CC-HM2 4 credit	From Available Minor of 4 credits as per NEP							

Pool of MDC, VAC, SEC and VOC Courses for scheme A, B, C & D in the subject of Botany to be offered to the University Pool

Course Type Total Credits	SEM	Course Code	Nomenclature of the Course	Credits	Contact hours per week	Internal Assessment Marks	End term Examination Marks	Total Marks	Examination Hrs.
MDC-1 03 Credits	I	24UN-BOT- MDC101	Fundamentals of Botany	02	02	15	35	50	03
			Practical	01	02	05	15	20	03
MDC-2 03 Credits	II	24UN-BOT- MDC201	Economic Botany	02	02	15	35	50	03
			Practical	01	02	05	15	20	03
MDC-3 03 Credits	III	24UN-BOT- MDC301	Ornamental Plants and Propagation	02	02	15	35	50	03
			Practical	01	02	05	15	20	03
VAC-1	I/II	24UN-BOT- VAC101	Environmental Studies	02	02	15	35	50	03
VAC-3	III	24UN-BOT- VAC301/401	Medicinal Plants in Everyday Life	02	02	15	35	50	03
VAC-4	IV								
SEC-2	II	24UN-BOT- SEC201	Organic Farming	02	02	15	35	50	03
			Practical	01	02	05	15	20	03
SEC-3	III	24UN-BOT- SEC301	Herbal Technology	02	02	15	35	50	03
			Practical	01	02	05	15	20	03
SEC-4	VI	24UN-BOT- SEC601	Floriculture	02	02	15	35	50	03
			Practical	01	02	05	15	20	03
CC-M3 (V)	III	24UN-BOT- VOC301/501	Biofertilizers	03	03	20	50	70	03
CC-M5 (V)	V		Practical	01	02	10	20	30	03
CC-M4 (V)	IV	24UN-BOT- VOC401	Nursery and Gardening	03	03	20	50	70	03
			Practical	01	02	10	20	30	03
CC-M5 (V)	VI	24UN-BOT- VOC601	Mushroom Cultivation	03	03	20	50	70	03
CC-M6 (V)									
CC-M7 (V)			Practical	01	02	10	20	30	03

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Course composition- Theory/ Theory +Tutorial					
Course Credit	Internal Assessment marks		End term exam marks		Total marks
2	15		35		50
3	20		50		70
4	30		70		100
Course composition- Theory + Practical					
Course Credit	Theory		Practical		Total marks
Theory + Practical	Internal Assessment marks	End term exam marks	Internal Assessment marks	End term exam marks	
1+1	10	20	5	15	50
2+1	15	35	5	15	70
2+2	15	35	15	35	100
3+1	20	50	10	20	100
0+4	NA	NA	30	70	100

1. Internal assessment (30%) shall be broadly based on the following defined components of;

- Class participation
- Seminar/Presentation/Assignment/Quiz/class test, etc.
- Mid Term Exam

Total Internal Assessment Marks (Theory)	Class Participation	Seminar/Presentation/Assignment/Quiz/class test, etc.	Mid-Term Exam
10	4	-	6
15	4	4	7
20	5	5	10
30	5	10	15
Total Internal Assessment Marks (Practicum)	Class Participation	Seminar/Demonstration/Viva-Voce/Lab record, etc.	Mid-Term Exam
5	--	5	NA
10	--	10	NA
15	5	10	NA
30	5	10	15

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Syllabus
Subject: Botany
First Semester

Session : 2024-25

Part A - Introduction

Subject	BOTANY		
Semester	1 st		
Name of the Course	Diversity of Microbes, Algae, Fungi and Archegoniates		
Course Code	24UN-BOT-101		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-1/MCC-1		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Students will be able to understand the general characteristics of bacteria, actinobacteria, viruses and fungi. 2: Students will develop a conceptual understanding of Phycology. 3: Students will gain knowledge on the concepts of Bryology. 4: Basic understanding of the biology of pteridophytes will be developed by the students. 5*. Students will gain the knowledge of practical aspects of microorganisms, algae, fungi, lichens, bryophytes, and Pteridophytes.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
THEORY			
Max. Marks: 70 Internal Assessment Marks: 20 End Term Exam Marks: 50	Time: 3 Hours		
PRACTICAL			
Max. Marks: 30 Internal Assessment Marks: 10 End Term Exam Marks: 20	Time: 4 Hours		
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			
Unit	Topics		Contact Hours
I	Diversity of Microbes- (Bacteria and Virus): Biology of Bacteria-Discovery, General characteristics and cell structure, Reproduction modes- vegetative, asexual and recombination (conjugation, transformation and transduction), Economic importance of bacteria,		11

	Discovery, General characters, Nature (Biological status) of viruses, replication & reproduction: Lytic and lysogenic cycle, Structure: DNA virus (T-phage), RNA virus (TMV).	
II	Algae and Fungi: Algae: General characteristics, Classification upto class level (Fritsch), Economic importance of algae, Important features and life-history of Nostoc (Cyanophyceae), Volvox, (Chlorophyceae), Vaucheria (Xanthophyceae), Ectocarpus (Phaeophyceae) and Polysiphonia (Rhodophyceae). Fungi: General characteristics, Classification upto classes (Ainsworth), life cycle of Rhizopus (Zygomycota), Puccinia (Basidiomycota), Collectotrichum (Deutromycotina), Lichens & Mycorrhiza (in brief) Economic importance of Fungi.	11
III	Bryophytes: General characteristics, Classification (upto class), Alternation of generation and economic importance of Bryophyta. Morphology, anatomy and reproduction of Marchantia, and Funaria (Developmental details not to be included).	11
IV	Pteridophytes: General characteristics, classification upto classes (Smith 1955), fossils & fossilization , Fossil Pteridophytes (Rhynia). Structure and reproduction of Selaginella, Pteris. Stelar system and its evolution, Heterospory and seed habit, Apogamy and apospory, Economic importance of Pteridophytes.	12
V*	1. Study of Bacteria from slides/charts/ models. 2. Study of Viruses (TMV & Bacteriophages) from charts/ models. 3. <i>Study of Morphology of algal members:</i> Nostoc, Volvox, Vaucheria, Ectocarpus and Polysiphonia . 4. <i>Study of Morphology fungal members:</i> Rhizopus, , Puccinia , Collectotrichum . 5. <i>Lichens and Mycorrhiza</i> 6. (Photographs / slides/ specimens) 7. <i>Marchantia</i>-morphology of thallus, W.M. rhizoids and scales, V.S. thallus through gemma cup, W.M. gemmae (all temporary slides), V.S. antheridiophore, archegoniophore, L.S. sporophyte (all permanent slides). 8. <i>Funaria</i>- morphology, W.M. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, L.S. capsule and protonema. 9. <i>Selaginella</i>- morphology, W.M. leaf with ligule, T.S. stem, W.M. strobilus, W.M. microsporophyll and megasporophyll (temporary slides), L.S. strobilus (permanent slide). 10. <i>Pteris</i>- morphology, T.S. rachis, V.S. sporophyll, W.M. sporangium, W.M. spores (temporary slides), T.S. rhizome, W.M. prothallus with sex organs and young sporophyte (permanent slide).	30

Suggested Evaluation Methods	
Internal Assessment: > Theory • Class Participation: • Seminar/presentation/assignment/quiz/class test etc.: • Mid-Term Exam: > Practicum • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: • Mid-Term Exam:	End Term Examination:

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Lee, R.E. Phycology, Cambridge University Press, Cambridge.
- Wiley JM, Sherwood LM and Woolverton CJ. Prescott's Microbiology. McGraw Hill International.
- Kumar, H.D. Introductory Phycology. Affiliated East-West Press, Delhi.
- Sahoo, D. Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.
- Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. Biology, Pearson Benjamin Cummings, USA.
- Pelczar, M.J. Microbiology, Tata McGraw-Hill Co, New Delhi.
- Sharma, P.D. Microbiology, latest edition, Rastogi Publication, Meerut.
- Tortora, G.J., Funke, B.R., Case, C.L. Microbiology: An Introduction. Pearson Benjamin Cummings, U.S.A.
- Sethi, I.K. and Walia, S.K. Text book of Fungi & Their Allies, MacMillan Publishers, Pvt. Ltd., Delhi.
- Alexopoulos, C.J., Mims, C.W., Blackwell, M., Introductory Mycology, John Wiley and Sons (Asia), Singapore.
- Kaur I., Uniyal P.L. Text Book of Bryophytes. New Delhi, Delhi: Daya Publishing House (in Press).
- Parihar, N.S. An Introduction to Embryophyta. Vol. II: Pteridophyta. Allahabad, UP: Central Book Depot.
- Parihar, N.S. An Introduction to Embryophyta. Vol. I: Bryophyta. Allahabad, UP: Central Book Depot.
- Schofield, W.B. Introduction to bryology. New York, USA. Macmillan.
- Vashishta, P.C., Sinha, A.K., Kumar, A., Botany For Degree Students Pteridophyta, New Delhi, Delhi: S. Chand Publication. Delhi, India.
- Schofield, W.B. Introduction to bryology. New York, USA. Macmillan.
- Puri, P. Bryophytes. New Delhi, Delhi, Atma Ram and Sons.

Session : 2024-25	
Part A - Introduction	
Subject	BOTANY
Semester	1st
Name of the Course	Conservation Biology
Course Code	24UN-BOT-102
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MCC-2

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Level of the course (As per Annexure-I	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1: Students will comprehend the fundamental principles of biodiversity. 2: Students will acquire a conceptual understanding of the classifications used by the IUCN. 3: Students will acquire knowledge about the principles of conservation laws and international legislation. 4: Students will develop a foundational understanding of international legislation. 5*. Student will learn about the practical approaches to protect and restore the biological communities.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
THEORY			
Max. Marks: 70 Internal Assessment Marks: 20 End Term Exam Marks: 50	Time: 3 Hours		
PRACTICAL			
Max. Marks: 30 Internal Assessment Marks: 10 End Term Exam Marks: 20	Time: 4 Hours		

Part B- Contents of the Course		
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.		
Unit	Topics	Contact hours
I	Biodiversity: Types of Biodiversity; Level of Biodiversity: genetic, species and ecosystem; Patterns of biodiversity; Factors affecting biodiversity: over exploitation, habitat loss and degradation, invasive species, disease, natural calamities, global change. Concept of endemism in plants, endemic plants of Western Ghats.	11
II	IUCN categories: not evaluated; data deficient; least concern; near threatened, vulnerable, endangered, critically endangered, extinct in wild; extinct categories. Principles of conservation; in situ and ex situ conservation; Economics of conservation	11
III	Conservation laws and international legislation. Soil erosion and conservation methods. Conservation of Forests: Afforestation, Reforestation, Monoculture and their effects. Conservation of water: water scarcity, rain water harvesting, watershed management. World Biodiversity hotspots; Wetlands.	11
IV	Categories of Protected areas: IA Strict Nature reserves, IB	12

	Wilderness area; II National Park; III Natural monument or feature; IV Habitat or species management area; V Protected landscape/seascape; VI Protected area with sustainable use of natural resources, Sustainable development goals. Recent conservation approaches in India.	
V*	- To determine the Calcium content of soil samples using titration method. - To estimate available N₂ in a given soil sample. - To determine the role of CO₂ evolution from the given soil sample. - To calculate their phosphorous content of the given soil sample. - To interpret the Annual Forest report with reference to Haryana. - To study the Biosphere reserves of India - National park, wildlife sanctuaries in Haryana.	30

Suggested Evaluation Methods

Internal Assessment: > Theory - Class Participation: - Seminar/presentation/assignment/quiz/class test etc.: - Mid-Term Exam: > Practicum - Class Participation: - Seminar/Demonstration/Viva-voce/Lab records etc. - Mid-Term Exam:	End Term Examination:
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Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Wetlands Through Time By Stephen F. Greb, William A. DiMichele Published by Geological Society of America, 2006
- Introduction to Conservation Genetics: Richard Frankham, Jonathan D. Ballou and David A. Briscoe By Richard Frankham, David Anthony Briscoe, Jonathan D. Ballou, Karina H. Cambridge University Press, 2012
- Plant Conservation Genetics By Robert J. Henry Published by Cambridge University Press, 2012.
- Wetlands By William J. Mitsch, James G. Gosselink Published by John Wiley and Sons, 2007.
- Hunter Jr., M. L. Fundamentals of Conservation Biology. Blackwell Science, Malden, Massachusetts, U.S.A 2021.
- Red Data Books Vols. 1 to 4. Botanical Survey of India, Dehradun
- Benson EE. Plant Conservation Biotechnology. Agrosiences, New Delhi, 2014.
- Gaston KJ. Biodiversity: An Introduction, 2/e. Agrosiences, New Delhi, 2004.
- Megadiversity Conservation: Flora, Fauna and Medicinal Plants of India's Hot Spots By AB Chaudhuri, D. D. Sarkar Published by Daya Books, 2004.
- 2000 IUCN Red List of Threatened Species By Craig Hilton-Taylor, Russell A. Mittermeier, International Union for Conservation of Nature and Natural Resources Species Survival Commission, BirdLife International, Conservation International Published by IUCN, 2000.

- Ex Situ Plant Conservation: Supporting Species Survival in the Wild By Edward O. Guerrant, Kayri Havens, Mike Maunder, Peter H. Raven Published by Island Press, 2004.

Session : 2024-25			
Part A - Introduction			
Subject	BOTANY		
Semester	1 st		
Name of the Course	Plant Diversity		
Course Code	24UN-BOT-103		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M1		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1: The general characteristics of microorganisms, algae, fungi, and lichens will be understandable to students. 2: Students will acquire a conceptual grasp of bryophytes and pteridophytes. 3: Students will acquire knowledge about the fundamental features of gymnosperms. 4: Students will acquire a foundational understanding of angiosperm morphology. 5*. Student will gain the knowledge about the practical aspects related to identification, structure, economic values of microorganisms, algae, fungi, bryophytes, pteridophytes gymnosperms, and angiosperms.		
Credits	Theory	Practical	Total
	1	1	2
Contact Hours	1	2	3
THEORY			
Max. Marks: 30 Internal Assessment Marks: 10 End Term Exam Marks: 20	Time: 3 Hours		
PRACTICAL			
Max. Marks: 20 Internal Assessment Marks: 05 End Term Exam Marks: 15	Time: 4 Hours		
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			
Unit	Topics		Contact Hours
I	General characteristics, morphology and economic importance of viruses,bacteria, algae, fungi and lichens.		4

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II	General characteristics, morphology and economic importance of Bryophytes and Pteridophytes.	4
III	General characteristics, morphology and economic importance of Gymnosperms.	4
IV	General characteristics, morphology and economic importance of Angiosperms.	3
V*	• Identification of some common algae and fungi. • Morphological study of some common Bryophytes. • Morphological study of some common Pteridophytes. • Morphological study of some common Gymnosperms. • Morphological study of some common Angiosperms.	30

Suggested Evaluation Methods

Internal Assessment: ➤ Theory • Class Participation: • Seminar/presentation/assignment/quiz/class test etc.: • Mid-Term Exam: ➤ Practicum • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc. • Mid-Term Exam:	End Term Examination:
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Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Wiley, J.M., Sherwood, L.M. and Woolverton, C.J. (2019) Prescott's Microbiology. 11th Edition. McGraw Hill International.
- Lee, R.E. (2018) Phycology. 5th Edition. Cambridge University Press.
- Ahluwalia, A.S. (2020). Phycology: Principles, Processes and Applications. Daya Publishing House, New Delhi.
- Dube, H.C. (2012). An Introduction to Fungi, Vikas Publishing House Pvt. Ltd., Delhi. 4th edition.
- Mehrotra, R.S. and Aggarwal, Ashok (2013) Fundamentals of Plant Pathology, Tata McGraw-Hill Publishing company Ltd, New Delhi
- Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi, India.
- Sharma, O.P. (2017). Text Book of Pteridophyta, McMillan India Ltd.
- Thakur, A.K. and Bassi, S.K. (2008). Diversity of Microbes and Cryptogams. S. Chand & Co., Delhi.
- Vanderpoorten, A. & Goffinet, B. (2009) Introduction to Bryophytes. Cambridge University Press.
- Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India
- Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Gymnosperms, S. Chand. Delhi, India
- Pandey, B.P. (2001). A Textbook of Botany-Angiosperms, S. Chand. Delhi, India.

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Session : 2024-25			
Part A - Introduction			
Subject	BOTANY		
Semester	1 st		
Name of the Course	Fundamentals of Botany		
Course Code	24UN-BOT-MDC101		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-1		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1: Students will gain a foundational understanding of the biology of microorganisms, algae, fungi and lichens. 2: Students will develop a conceptual understanding of bryophytes and pteridophytes. 3: Students will acquire knowledge about the fundamental characteristics of gymnosperms and the challenges related to their propagation. 4: Students will acquire a basic understanding of angiosperm morphology. 5*. Students will be able to learn the practical aspects of microorganisms, algae, fungi and students will be able to identify the major groups of plants and compare the characteristics of higher plants(angiosperms and gymnosperms)and lower plants (bryophytes and pteridophytes).		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
THEORY			
Max. Marks: 50 Internal Assessment Marks: 15 End Term Exam Marks: 35	Time: 3 Hours		
PRACTICAL			
Max. Marks: 20 Internal Assessment Marks: 05 End Term Exam Marks: 15	Time: 4 Hours		
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			
Unit	Topics	Contact Hours	
I	General characteristics, morphology and economic importance of viruses,bacteria, algae, fungi and lichens.	4	
II	General characteristics, morphology and economic importance ofBryophytes and Pteridophytes.	4	

III	General characteristics, morphology and economic importance of Gymnosperms.	4
IV	General characteristics, morphology and economic importance of Angiosperms.	3
V*	• Cynobacteria & Algae: Study of slides of <i>Nostoc</i> and <i>Volvox</i> through permanent slides. • <i>Penicillium</i>: Asexual stage and sexual structures through permanent slides. • <i>Agaricus</i>: Specimens of button stage and full grown mushroom. • <i>Marchantia</i> & <i>Funaria</i>- morphology of thallus through permanent slides. • <i>Selaginella</i> & <i>Equisetum</i>- morphology specimen study. • <i>Cycas</i> & <i>Pinus</i> - morphology specimen study. • Study of vegetative and floral characters of the one or two members of some important families • Excursion Report: Report on excursion tours with photographs, collection, preservation and preparation of herbarium sheets and specimens related to Archegoniates and Angiosperms. Mounting of a collected, properly dried and pressed specimen of minimum 20 wild plants with herbarium label.	30

Suggested Evaluation Methods

Internal Assessment:

> Theory

- Class Participation:
- Seminar/presentation/assignment/quiz/class test etc.:
- Mid-Term Exam:

> Practicum

- Class Participation:
- Seminar/Demonstration/Viva-voce/Lab records etc.
- Mid-Term Exam:

End Term Examination:

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Wiley, J.M., Sherwood, L.M. and Woolverton, C.J. (2019) Prescott's Microbiology. 11th Edition. McGraw Hill International.
- Lee, R.E. (2018) Phycology. 5th Edition. Cambridge University Press.
- Ahluwalia, A.S. (2020). Phycology: Principles, Processes and Applications. Daya Publishing House, New Delhi.
- Dube, H.C. (2012). An Introduction to Fungi, Vikas Publishing House Pvt. Ltd., Delhi. 4th edition.
- Mehrotra, R.S. and Aggarwal, Ashok (2013) Fundamentals of Plant Pathology, Tata McGraw-Hill Publishing company Ltd, New Delhi
- Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi, India.

- Sharma, O.P. (2017). Text Book of Pteridophyta, McMillan India Ltd.
- Thakur, A.K. and Bassi, S.K. (2008). Diversity of Microbes and Cryptogams. S. Chand & Co., Delhi.
- Vanderpoorten, A. & Goffinet, B. (2009) Introduction to Bryophytes. Cambridge University Press.
- Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India
- Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Gymnosperms, S. Chand. Delhi, India
- Pandey, B.P. (2001). A Textbook of Botany-Angiosperms, S. Chand. Delhi, India.

Second Semester

Session : 2024-25

Part A - Introduction

Subject	BOTANY		
Semester	2 nd		
Name of the Course	Cell biology & Genetics		
Course Code	24UN-BOT-201		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-2/MCC-3		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Students will acquire the knowledge of cell envelope and organelles. 2. Students will acquire knowledge about cell cycles and chromosomal abnormalities. 3.Students will acquire knowledge about genetic inheritance. 4. Students will develop an understanding of extra chromosomal inheritance. 5*. Students will acquire the detail knowledge of cell, cell structure, organelles and also about principles, mechanisms, and applications of genetics, and to prepare them for further study or careers in genetics.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
THEORY			
Max. Marks: 70 Internal Assessment Marks: 20 End Term Exam Marks: 50	Time: 3 Hours		
PRACTICAL			
Max. Marks: 30 Internal Assessment Marks: 10 End Term Exam Marks: 20	Time: 4 Hours		
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			
Unit	Topics		Contact Hours

I	The Cell Envelopes and organelles: Structure and functions of Cell Wall, Plasma Membrane, Golgi Apparatus, Endoplasmic Reticulum, Lysosomes, Peroxisomes and Vacuoles, Chloroplast, Mitochondria, Nucleus and Nucleolus.	11
II	Cell cycle, Chromosome aberrations : Mitosis and Meiosis - Stages and Significance. chromosome morphology, Structural and Numerical aberrations- deletions, duplications, translocations, inversions, aneuploidy, polyploidy, Sex determination in Plants.	12
III	Genetic Inheritance: Mendelism: Laws of Segregation and Independent Assortment; Linkage and crossing over, Allelic and non-allelic gene interactions.	11
IV	Extra-nuclear Inheritance: Presence and function of Mitochondrial and Plastid DNA; Plasmids. Genetic Variations: Mutations - spontaneous and induced, Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents). transition, transversion and frame shift mutation.	11
V*	• Study of the photomicrographs of cell organelles • To study the structure of plant cell through temporary mounts. • Study of mitosis and meiosis (temporary mounts and permanent slides). • Study the structure of nuclear pore complex by photograph (from Gerald Karp). • Study of karyotype from given photograph of somatic metaphase chromosome. • Mendel's laws through seed ratios. • Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4). • Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs.	30

Suggested Evaluation Methods

Internal Assessment:

> Theory

- Class Participation:
- Seminar/presentation/assignment/quiz/class test etc.:
- Mid-Term Exam:

> Practicum

- Class Participation:
- Seminar/Demonstration/Viva-voce/Lab records etc.
- Mid-Term Exam:

End Term Examination:

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Cooper, G.M., Hausman, R.E. The Cell: A Molecular Approach, Sinauer/OUP.
- Iwasa, J, Marshall, W. Karp's Cell Biology, New Jersey, U.S.A.: John Wiley & Sons.
- Majumdar, R., Sisodia, R. Laboratory Manual of Cell Biology, with reference to Plant Cells. New Delhi, Delhi: Prestige Publication.
- Nelson, D.L., Cox, M.M. Lehninger Principles of Biochemistry, New York, NY: W.H. Freeman and Company.

- Reven, F.H., Evert, R.F., Eichhorn, S.E. Biology of Plants. New York, NY: W.H.Freeman and Company.
- Tymoczko, J.L., Berg, J.M., Stryer, L. Biochemistry: A short course, New York, NY: W.H.Freeman and Company.
- Gardner, E.J., Simmons, M.J., Snustad, D.P. Principles of Genetics, John Wiley & sons, India. 8th edition.
- Snustad, D.P. and Simmons, M.J. Principles of Genetics, John Wiley & Sons Inc., India.
- Klug, W.S., Cummings, M.R., Spencer, C.A. Concepts of Genetics. Benjamin Cummings, U.S.A.

Session : 2024-25			
Part A - Introduction			
Subject	BOTANY		
Semester	2 nd		
Name of the Course	Floriculture		
Course Code	24UN-BOT-202		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	DSEC-1		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Students will be able to understand the importance and scope of floriculture, management of nursery and gardens, methods of plant propagation. 2: Students will develop a conceptual understanding of different types of ornamental plants. 3: Students will gain knowledge about the various types of gardens and importance of landscaping. 4: Students will learn about commercial floriculture and cultivation of important cut flowers. 5*. Students will gain the knowledge of practical aspects of floriculture, management of nursery, maintenance of gardens, vase life of cut flowers, various methods used for the propagation of ornamental plants, hydroponics, and disease management.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
THEORY			
Max. Marks: 70 Internal Assessment Marks: 20 End Term Exam Marks: 50	Time: 3 Hours		
PRACTICAL			
Max. Marks: 30 Internal Assessment Marks: 10 End Term Exam Marks: 20	Time: 4 Hours		
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			

Unit	Topics	Contact Hours
I	Introduction: History, importance and scope of floriculture and landscape gardening. Nursery management and routine garden operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators	11
II	Ornamental Plants: Flowering annuals; Herbaceous perennials; Climbing vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai.	11
III	Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (garden wall, fencing, steps, hedge, edging, lawn, flower beds, shrubbery, borders, water garden. Some famous gardens of India. Landscaping of places of public importance: Landscaping highways and educational institutions.	12
IV	Commercial floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life. Cultivation of Important cut flowers- Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Liliun). Diseases and Pests of Ornamental Plants.	12
V*	- To determine the Calcium content of soil samples using titration method. - To estimate available N₂ in a given soil sample. - To determine the role of CO₂ evolution from the given soil sample. - To calculate their phosphorous content of the given soil sample. - To interpret the Annual Forest report with reference to Haryana. - To study the Biosphere reserves of India - National park, wildlife sanctuaries in Haryana.	30

Suggested Evaluation Methods

Internal Assessment: ➤ Theory - Class Participation: - Seminar/presentation/assignment/quiz/class test etc.: - Mid-Term Exam: ➤ Practicum - Class Participation: - Seminar/Demonstration/Viva-voce/Lab records etc. - Mid-Term Exam:	End Term Examination:
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Part C-Learning Resources

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Recommended Books/e-resources/LMS:

- Singh, A.K. & Kumar A. 2023. Plant Propagation and Nursery management. S.K. Kataria and sons.
- Arora, J.S. 2016. Introductory Ornamental Horticulture. Kalyani Publishers. 8th edition.
- Jain, S.M. & Ochatt, S.J. 2009. Protocols for in vitro propagation of ornamental plants: 598 (Methods in Molecular Biology). Humana Press.
- Prasad S & Kumar U. 2003. Commercial Floriculture. Agrobios
- Lauria A & Victor HR. 2001. Floriculture – Fundamentals and Practices Agrobios.

Session : 2024-25			
Part A - Introduction			
Subject	BOTANY		
Semester	2 nd		
Name of the Course	Plants for Human Welfare		
Course Code	B23-BOT-203		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M2		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Students will acquire a foundational understanding of plant diversity. 2: Students will develop a conceptual grasp of plants utilized for human welfare. 3: Students will gain knowledge about the origins of certain cultivated plants. 4: Students will acquire a conceptual understanding of the utilization of fruits, nuts, and other plant components for human welfare. 5*. Students will acquire the knowledge about the economic valuable plants and their products.		
Credits	Theory	Practical	Total
	1	1	2
Contact Hours	1	2	3
THEORY			
Max. Marks: 30	Time: 3 Hours		
Internal Assessment Marks: 10			
End Term Exam Marks: 20			
PRACTICAL			
Max. Marks: 20	Time: 4 Hours		
Internal Assessment Marks: 05			
End Term Exam Marks: 15			
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			
Unit	Topics		Contact Hours

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I	Level of plant diversity, agrobiodiversity. Values and uses of Biodiversity.	3
II	Role of plants in relation to Human Welfare; Economic and ecological Importance of agro and social forestry. Ornamental plants of India.	4
III	Origin of Cultivated Plants Morphology and economic importance of : Food plants - Cereals (Rice, Wheat and Maize). Pulses - Gram, Arhar and Pea.	4
IV	Fruits and nuts: Important fruit crops and their commercial importance. Spices and condiments. Wood and its uses.	4
V*	• Identification and study of some important medicinal plants. • Identification and study of some common ornamental plants. • Identification and study of some important cereals. • Identification and study of some important pulses. • Identification and study of some important spice yielding plants. • Study of different types of woods. • Study of different fruit types.	30

Suggested Evaluation Methods

Internal Assessment: > Theory • Class Participation: • Seminar/presentation/assignment/quiz/class test etc.: • Mid-Term Exam: > Practicum • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc. • Mid-Term Exam:	End Term Examination:
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Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Singh, V., Pande, P.C., Jain, D.K. 2018. Economic Botany, Rastogi Publications.
- Kocchar, S.L. 2016. Economic Botany: A Comprehensive Study, 5 Ed, Cambridge India.
- Wickens, G.E. 2001. Economic Botany: Principles and Practices, Springer.
- Singh, V., Pande, P.C., Jain, D.K. 2018. Economic Botany, Rastogi Publications.
- Daubenmire, R.F. Plants & Environment (2nd Edn.,) John Wiley & Sons., New York 22
- Odum E.P. 2005. Fundamentals of Ecology (5th Edn.,) Saunders & Co., Philadelphia
- S. Sundar Rajan-2007. College Botany Vol-V, Part 1: Taxonomy and Economic Botany Himalaya Publishing House.
- Susil Kumar Mukharjee-2004. College Botany Vol-III. New Central Book agency, London

Session : 2024-25	
Part A – Introduction	
Subject	BOTANY
Semester	2 nd
Name of the Course	Economic Botany

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Course Code	24UN-BOT-MDC201		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-2		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Students will gain a foundational understanding of the origins of significantcultivated plants. 2: Students will develop a conceptual understanding of important plants thatyield vegetables, fiber, and oil. 3: Students will acquire knowledge about the cultivation techniques of essentialplants. 4: Students will gain a conceptual understanding of the processing methodsapplied to economically significant plants. 5*. Students will be able to gain the knowledge of economic values of cereals,legumes, spices, oil & fibre yielding plants.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
THEORY			
Max. Marks: 50 Internal Assessment Marks: 15 End Term Exam Marks: 35	Time: 3 Hours		
PRACTICAL			
Max. Marks: 20 Internal Assessment Marks: 05 End Term Exam Marks: 15	Time: 4 Hours		
Part B- Contents of the Course			
Instructions for Paper- Setter			
1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			
Unit	Topics	Contact Hours	
I	Origin of Cultivated Plants Morphology and economic importance of : Food plants - Cereals (Rice, Wheat and Maize).Pulses - Gram, Arhar and Pea.	7	
II	Vegetables: Potato, Tomato and Onion.Fibers: Cotton Oils: Mustard and Coconut.	7	
III	Morphology and economic importance of the following: Spices: Black pepper, Coriander, Ginger. Cloves, saffron. Medicinal Plants: <i>Cinchona, Atropa</i> , Opium, <i>Cannabis</i> , Neem.	8	
IV	Botanical description and processing of:Beverages: Tea and Coffee. Types of wood.	8	
V*	• Study of economically important plants : Wheat, Rice, Maize, Gram, Pea, Arhar, Black pepper, Ginger, Clove, Tea, Coffee, Cotton, Coconut, Mustard anddifferent types of wood. • Collection and preparation of reports on various crops and economically important plants being cultivated/wildly available in your area.	30	
Suggested Evaluation Methods			

Internal Assessment: > Theory • Class Participation: • Seminar/presentation/assignment/quiz/class test etc.: • Mid-Term Exam: > Practicum • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc. • Mid-Term Exam:	End Term Examination:
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • Singh, V., Pande, P.C., Jain, D.K. 2018. Economic Botany, Rastogi Publications. • Kocchar, S.L. 2016. Economic Botany: A Comprehensive Study, 5 Ed, Cambridge India. • Wickens, G.E. 2001. Economic Botany: Principles and Practices, Springer. • Singh, V., Pande, P.C., Jain, D.K. 2018. Economic Botany, Rastogi Publications. • Daubenmire, R.F. Plants & Environment (2nd Edn.,) John Wiley & Sons., New York 22 • S. Sundar Rajan-2007. College Botany Vol-V, Part 1: Taxonomy and Economic Botany Himalaya PublishingHouse. • Susil Kumar Mukharjee-2004. College Botany Vol-III. New Central Book agency, London	

Session : 2024-25			
Part A - Introduction			
Subject	BOTANY		
Semester	3 rd		
Name of the Course	Ornamental Plants and Propagation		
Course Code	B23-BOT-303		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-3		
Level of the course (As per Annexure-I)	100-109		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Students will acquire an understanding of the history of gardens in India and other countries. 2: Students will develop comprehensive knowledge about different groups of plants used as ornamentals. 3: Students will learn about flower and seed production. 4: Students will gain a deep understanding of vegetative propagation methods for ornamental plants. 5*. Students will be able to learn various types of gardens & their significance, management, and methods of propagation of valuable plants.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
THEORY			
Max. Marks: 50	Time: 3 Hours		
Internal Assessment Marks: 15			
End Term Exam Marks: 35			
PRACTICAL			

Max. Marks: 20

Internal Assessment Marks: 05

End Term Exam Marks: 15

Time: 4 Hours

Part B- Contents of the Course**Instructions for Paper- Setter**

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No.1 will be short answer type covering the entire syllabus and will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	History of gardens in India; terrace gardening; popular gardens of India; Types of gardens: Formal and Informal gardens; Styles of gardens.	7
II	Significance of Shrubs, trees, palms, ferns, cycads, cacti and succulents, climbers, creepers, indoor plants, water plants, bonsai plants as ornaments.	7
III	Flower and seed production; protected cultivation of ornamentals; present position and scope of floriculture in India.	8
IV	Vegetative propagation-principles and practices of clone selection; techniques of cutting, budding, grafting and layering; propagation by specialized stems and roots.	8
V*	• Preparation of nursery beds – flat, raised and sunken beds • Identification and description of various plants grown in ornamental gardens. • Tools, implements and containers used in ornamental gardening. • Planning, designing and establishment of garden features viz. lawn, hedge and edge, rockery etc. • To study propagation by separation and division technique. • Preparation of land for lawn and planting. • To study propagation by cuttings, layering, grafting and budding • Flower arrangement practices. • Preparation of bouquets, garland.	30

Suggested Evaluation Methods**Internal Assessment:****> Theory**

- Class Participation:
- Seminar/presentation/assignment/quiz/class test etc.:
- Mid-Term Exam:

> Practicum

- Class Participation:
- Seminar/Demonstration/Viva-voce/Lab records etc.
- Mid-Term Exam:

End Term Examination:

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Singh, A.K. & Kumar A. 2023. Plant Propagation and Nursery management. S.K. Kataria and sons.
- Arora, J.S. 2016. Introductory Ornamental Horticulture. Kalyani Publishers. 8th edition.
- Sachdeva, P. & Tongbram, V. 2014. A Naturalist's guide to the trees & Shrubs of India. PrakashBooks.
- Jain, S.M. & Ochatt, S.J. 2009. Protocols for in vitro propagation of ornamental plants: 598(Methods in Molecular Biology). Humana Press.
- Sabina, GT and Peter KV. 2008. Ornamental Plants for Gardens. New India Publ. Agency.
- Reddy S, Janakiram B, Balaji T, Kulkarni S & Misra RL. 2007. Hightech Floriculture. Indian Society of Ornamental Horticulture, New Delhi.
- Bhattacharjee SK. 2006. Advances in Ornamental Horticulture. Vols. I-VI. Pointer Publ.
- Krishnamurthy, K.V. 2004. An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
- Prasad S & Kumar U. 2003. Commercial Floriculture. Agrobios
- Lauria A & Victor HR. 2001. Floriculture – Fundamentals and Practices Agrobios.

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