K. C. E. Society's
Moolji Jaitha College
An 'Autonomous College' Affiliated to
K.B.C. North Maharashtra University, Jalgaon.
NAAC Reaccredited Grade - A (CGPA : 3.15 - 3rd Cycle)
UGC honoured "College of Excellence" (2014-2019)
DST(FIST) Assisted College

KNOWLEDGE IS POWER
ESTD. 1945

के. सी. ई. सोसायटीचे
मूळजी जेठा महाविद्यालय
क.ब.चौ. उत्तर महाराष्ट्र विद्यापीठ, जळगाव संलग्नित
'स्वायत्त महाविद्यालय'
नॅकद्वारा पुनर्मानांकित श्रेणी – 'ए' (सी.जी.पी.ए. : ३.१५ – तिसरी फेरी)
विद्यापीठ अनुदान आयोगाद्वारा घोषित 'कॉलेज ऑफ एक्सलन्स' (२०१४-२०१९)
डी.एस.टी. (फीस्ट) अंतर्गत अर्थसहाय्य प्राप्त

Date :- 01/08/2024

NOTIFICATION

Sub :- CBCS Syllabi of B. Sc. in Botany (Sem. I & II)

Ref. :- Decision of the Academic Council at its meeting held on 27/07/2024.

The Syllabi of B. Sc. in Botany (First and Second Semesters) as per **NATIONAL EDUCATION POLICY – 2020 (2024 Pattern)** and approved by the Academic Council as referred above are hereby notified for implementation with effect from the academic year 2024-25.

Copy of the Syllabi Shall be downloaded from the College Website (www.kcesmjcollege.in)

Sd/-
Chairman,
Board of Studies

To :

1) The Head of the Dept., M. J. College, Jalgaon.
2) The office of the COE, M. J. College, Jalgaon.
3) The office of the Registrar, M. J. College, Jalgaon.

Near Samarth Colony, Jalgaon - 425 002. (Maharashtra, India) | Ph. : +91 257 - 2237363, 2234281 | e-mail : mjcollege@kces.in | Website : mjcollege.kces.in
समर्थ कॉलनी जवळ, जळगांव – ४२५ ००२. (महाराष्ट्र, भारत) । दूरध्वनी क्र. : +९१ २५७–२२३७३६३, २२३४२८१ । ई–मेलः mjcollege@kces.in । वेबसाईटः mjcollege.kces.in

Khandesh College Education Society's

Moolji Jaitha College, Jalgaon

An "Autonomous College"

Affiliated to KBC North Maharashtra University, Jalgaon

STRUCTURE AND SYLLABUS

B.Sc. Honours/Honours with Research

(F.Y.B.Sc.Botany)

Under Choice Based Credit System (CBCS)
and
as per NEP-2020 Guidelines

[w.e.f. Academic Year: 2024-25]

Preface

Skilled human resource is a prerequisite in higher education, and it is to be acquired through thorough knowledge of theoretical concepts and hands-on laboratory methods of the subject. The Moolji Jaitha College (Autonomous) has adopted a department-specific model as per the guidelines of UGC, NEP-2020 and the Government of Maharashtra. The Board of Studies in Botany of the college has prepared the syllabus for the first-year undergraduate of Botany. The syllabus cultivates theoretical and practical know-how of different fields of Botany. The contents of the syllabus have been prepared to accommodate the fundamental aspects of various disciplines of Botany and to build the foundation for various applied sectors of Botany. Besides this, in the first year, the students will be enlightened with the skill related to microbial identification and testing, which will enhance students' employability.

The overall curriculum of three / four-year covers all major classical and applied branches of Botany. and also covers papers of student interests like forensic Botany , Food Science, Commercial Forestrey and others. Furthermore, the syllabus is structured to cater to botany's present and future needs in the research field, Industrial Sector, Environmental Sector, Entrepreneurship etc., emphasizing imparting hands-on skills. Hence, the curriculum is endowed with more experiments that shall run hand-in-hand with theory. The detailed syllabus of each paper is appended with a list of suggested readings.

Program Outcomes (PO) for B.Sc. Program:

Upon successful completion of the B.Sc. program, student will be able to:

PO No.	PO
PO 1	Understand the basic concepts and fundamental principles related to various science branches
PO 2	Aquaint the skills in handling scientific instruments and performing in laboratory experiments
PO 3	Relate various scientific phenomena and their relevancies in the day-to-day life.
PO 4	Analyse experimental data critically and systematically to draw the objective conclusions.
PO 5	Develop various skills such as communication, leadership, teamwork, social, research etc., which will help in expressing ideas and views clearly
PO 6	Develop interdisciplinary approach for providing better solutions and sustainable developments.

Program Specific Outcome PSO (B.Sc. Botany):

After completion of this course, students are expected to learn/understand the:

PO No.	PSO
PSO 1	Classify Plant systematics and recognize the importance of herbarium and Virtual herbarium
PSO 2	Classification of families with genetic basis of heterosis
PSO 3	Awareness and appreciation of plants and plant products encountered in everyday life
PSO 4	Apply techniques of harvesting, drying and storage of medicinal herbs
PSO 5	Evaluates the role of microorganisms in industry and in agriculture
PSO6	Examine the internal Anatomy of plant system and organs

Multiple Entries and Multiple Exit options:

The multiple entry and exit options with the award of UG certificate/ UG diploma/ or three-year degree depending upon the number of credits secured;

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	UG Certificate	40	44	2	1
5.0	UG Diploma	80	88	4	2
5.5	Three Year Bachelor's Degree	120	132	6	3
6.0	Bachelor's Degree- Honours **Or** Bachelor's Degree- Honours with Research	160	176	8	4

Credit distribution structure for Three/ Four year Honors/ Honors with Research Degree Programme with Multiple Entry and Exit

F.Y. B.Sc.

Year (Level)	Sem	Subject-I (M-1)	Subject-II (M-2)	Subject-III (M-3)	Open Elective (OE)	VSC, SEC (VSEC)	AEC, VEC, IKS	CC, FP, CEP, OJT, RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
I (4.5)	I	DSC-1(2T) DSC-2(2P)	DSC-1(2T) DSC-2(2P)	DSC-1(2T) DSC-2(2P)	OE-1(2T)	---	AEC-1(2T) (Eng) VEC-1(2T) (ES) IKS(2T)	CC-1(2T)	22	**UG Certificate**
	II	DSC-3(2T) DSC-4(2P)	DSC-3(2T) DSC-4(2P)	DSC-3(2T) DSC-4(2P)	OE-2(2T) OE-3(2P)	---	AEC-2(2T) (Eng) VEC-2(2T) (CI)	CC-2(2T)	22	
	Cum. Cr.	**8**	**8**	**8**	**6**	**---**	**10**	**4**	**44**	
Exit option: Award of UG Certificate with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor.										

S.Y. B.Sc.

Year (Level)	Sem	Subject-I (M-1) Major*		Subject-II (M-2) Minor #	Subject-III (M-3)	Open Elective (OE)	VSC, SEC (VSEC)	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
		Mandatory (DSC)	Elective (DSE)	(MIN)							
2 (5.0)	III	DSC-5(2T) DSC-6(2T) DSC-7(2P)	---	MIN-1(2T) MIN-2(2T) MIN-3(2P)	---	OE-4(2T)	SEC-1(2T)	AEC-3(2T) (MIL)	CC-3(2T) CEP(2)	22	**UG Diploma**
	IV	DSC-8(2T) DSC-9(2T) DSC-10(2P)	---	MIN-4(2T) MIN-5(2P)	---	OE-5(2T)	SEC-2(2T) SEC-2(2P)	AEC-4(2T) (MIL)	CC-4(2T) ۞ FP(2)	22	
	Cum. Cr.	**12**	**---**	**10**	**---**	**4**	**6**	**4**	**8**	**44**	
	Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major & Minor.										

***** Student must choose one subject as a Major subject out of M-1, M-2 and M-3 that he/she has chosen at First year
#Student must choose one subject as a Minor subject out of M-1, M-2 and M-3 that he/she has chosen at First year (Minor must be other than Major)
۞ OJT/Internship/CEP should be completed in the summer vacation after 4th semester

T.Y. B.Sc.

Year (Level)	Sem	Subject-I (M-1) Major		Subject-II (M-2) Minor	Subject-III (M-3)	Open Elective (OE)	VSC, SEC (VSEC)	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
		Mandatory (DSC)	Elective (DSE)	(MIN)							
3 (5.5)	V	DSC-11(2T) DSC-12(2T) DSC-13(2T) DSC-14(2P) DSC-15(2P)	DSE-1A/B (2T) DSE-2A/B (2P)	---	---	---	VSC-1(2T) VSC-2(2P)	---	OJT/Int (4)	22	UG Degree
	VI	DSC-16(2T) DSC-17(2T) DSC-18(2T) DSC-19(2T) DSC-20(2T) IKS DSC-21(2P) DSC-22(2P)	DSE-3A/B (2T) DSE-4A/B (2P)	---	---	---	VSC-3(2T) VSC-4(2P)	---	---	22	
	Cum. Cr.	**24**	**8**	**---**	**---**	**---**	**8**	**---**	**4**	**44**	
	Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor										

Fourth Year B.Sc. (Honours)

Year (Level)	Sem	Major Core Subjects		Research Methodology (RM)	VSC, SEC (VSEC)	OE	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
IV (6.0)	VII	DSC-23(4T) DSC-24(4T) DSC-25(4T) DSC-26(2P)	DSE-5A/B (2T) DSE-6A/B (2P)	RM(4T)	---	---	---	---	22	UG Honours Degree
	VIII	DSC-27(4T) DSC-28(4T) DSC-29(4T) DSC-30(2P)	DSE-7A/B (2T) DSE-8A/B (2P)	---	---	---	---	OJT/Int (4)	22	
	Cum. Cr.	**28**	**8**	**4**	**---**	**---**	**---**	**4**	**44**	
Four Year UG Honors Degree in Major and Minor with 176 credits										

Fourth Year B.Sc. (Honours with Research)

Year (Level)	Sem	Major Core Subjects		Research Methodology (RM)	VSC, SEC (VSEC)	OE	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
IV (6.0)	VII	DSC-23(4T) DSC-24(4T) DSC-26(2P)	DSE-5A/B (2T) DSE-6A/B (2P)	RM(4T)	---	---	---	RP(4)	22	UG Honours with Research Degree
	VIII	DSC-27(4T) DSC-28(4T) DSC-30(2P)	DSE-7A/B (2T) DSE-8A/B (2P)	---	---	---	---	RP(8)	22	
	Cum. Cr.	**20**	**8**	**4**	**---**	**---**	**---**	**12**	**44**	
Four Year UG Honours with Research Degree in Major and Minor with 176 credits										

Sem- Semester, **DSC**- Department Specific Course, **DSE**- Department Specific Elective, **OE/GE**- Open/Generic elective, **VSC**- Vocational Skill Course, **SEC**- Skill Enhancement Course, **VSEC**- Vocation and Skill Enhancement Course, **AEC**- Ability Enhancement Course, **IKS**- Indian Knowledge System, **VEC**- Value Education Course, **T**- Theory, **P**- Practical,**CC**-Co-curricular **RM**- Research Methodology, **OJT**- On Job Training, **FP**- Field Project, **Int**- Internship, **RP**- Research Project, **CEP**- Community Extension Programme, **ENG**- English, **CI**- Constitution of India, **MIL**- Modern Indian Laguage

- Number in bracket indicate credit
- The courses which do not have practical 'P' will be treated as theory 'T'
- If student select subject other than faculty in the subjects M-1, M-2 and M-3, then that subject will be treated as Minor subject, and cannot be selected as Major at second year.

Details of F.Y. B.Sc. (Botany)

Course	Course Type	Course Code	Course Title	Credits	Teaching Hours/ Week			Marks			
					T	P	Total	Internal		External	
								T	P	T	P
Semester I, Level – 4.5											
DSC-1	DSC	BOT-DSC-111	Economic Botany and Plant Resource Utilization	2	2	---	2	20	---	30	---
DSC-2	DSC	BOT-DSC-112	Practical course based on BOT-DSC-111	2	---	4	4	---	20	---	30
OE-1	OE	BOT-OE-111	Mushroom Culture Technology	2	2	---	2	20	---	30	---
Semester II, Level – 4.5											
DSC-3	DSC	BOT-DSC-121	Plant Morphology and Systematics	2	2	---	2	20	---	30	---
DSC-4	DSC	BOT-DSC-122	Practical course based on BOT-DSC-121	2	---	4	4	---	20	---	30
OE-2	OE	BOT-OE-121	Nursery and Gardening	2	2	---	2	20	---	30	---
OE-3	OE	BOT-OE-122	Practical course based on BOT-OE-121	2	---	4	4	---	20	---	30

Examination Pattern

Theory Question Paper Pattern:

- 30 (External) +20 (Internal) for 2 credits
    - External examination will be of 1½ hours duration
    - There shall be 3 questions: Q1 carrying 6 marks and Q2, Q3 carrying 12 marks each. The tentative pattern of question papers shall be as follows;
    - Q1 Attempt any 2 out of 3 sub-questions; each 3 marks
    - Q 2 and Q3 Attempt any 3 out of 4 sub-question; each 4 marks.

Rules of Continuous Internal Evaluation:

The Continuous Internal Evaluation for theory papers shall consist of two methods:

1. Continuous & Comprehensive Evaluation (CCE): CCE will carry a maximum of 30% weightage (30/15 marks) of the total marks for a course. Before the start of the academic session in each semester, the subject teacher should choose any three assessment methods from the following list, with each method carrying 10/5 marks:

i. Individual Assignments
ii. Seminars/Classroom Presentations/Quizzes
iii. Group Discussions/Class Discussion/Group Assignments
iv. Case studies/Case lets
v. Participatory & Industry-Integrated Learning/Field visits
vi. Practical activities/Problem Solving Exercises
vii. Participation in Seminars/Academic Events/Symposia, etc.
viii. Mini Projects/Capstone Projects
ix. Book review/Article review/Article preparation
x. Any other academic activity
xi. Each chosen CCE method shall be based on a particular unit of the syllabus, ensuring that three units of the syllabus are mapped to the CCEs.

2. Internal Assessment Tests (IAT): IAT will carry a maximum of 10% weightage (10/5 marks) of the total marks for a course. IAT shall be conducted at the end of the semester and will assess the remaining

unit of the syllabus that was not covered by the CCEs. The subject teacher is at liberty to decide which units are to be assessed using CCEs and which unit is to be assessed on the basis of IAT. The overall weightage of Continuous Internal Evaluation (CCE + IAT) shall be 40% of the total marks for the course. The remaining 60% of the marks shall be allocated to the semester-end examinations. The subject teachers are required to communicate the chosen CCE methods and the corresponding syllabus units to the students at the beginning of the semester to ensure clarity and proper preparation.

Practical Examination Credit 2: Pattern (30+20)

External Practical Examination (30 marks):

- Practical examination shall be conducted by the respective department at the end of the semester.
- Practical examination will be of 3 hours duration and shall be conducted as per schedule.
- Practical examination shall be conducted for 2 consecutive days for 2 hr/ day where incubation conditionis required.
- There shall be 05 marks for journal and viva-voce. Certified journal is compulsory to appear for practical examination.
- External practical examination of SEC will be of 25 marks and there will be no internal exam for SEC practical.

Internal Practical Examination (20 marks):

- Internal practical examination of 10 marks will be conducted by department as per schedule given.
- For internal practical examination student must produce the laboratory journal of practicals completed along with the completion certificate signed by the concerned teacher and the Head of the department.
- There shall be continuous assessment of 30 marks based on student performance throughout the semester. This assessment can include quizzes, group discussions, presentations and other activities assigned by the faculty during regular practicals. For details refer internal theory examination guidelines.
- Finally 40 (10+30) marks performance of student will be converted into 20 marks.

SEMESTER-I

F.Y. B.Sc. Botany (Major)
Semester-I
BOT-DSC-111: Economic Botany and Plant Resource Utilization

Total Hours: 30 **Credits: 2**

Learning objectives	• To understand core concepts of Economic Botany and relate with environment, communities, and ecosystems. • To develop critical understanding on the evolution of concept of organization of new crops/varieties importance of germplasm diversity. • To develop a basic knowledge of taxonomic diversity and important families of economically usefulplants. • To increase the awareness and importance of plants & plant products encountered in everyday life.	
Course outcomes	After studying this course the students will be able to : • Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems • Develop critical understanding on the evolution of concept of organization of new crops/varieties, importance of germplasm diversity. • Develop a basic knowledge of taxonomic diversity and important families of economically useful plants • Students get awareness and importance of plants and plant products encountered in everyday life.	
Unit	**TopicParticular**	**Hours**
Unit I	**Origin and conservation of Cultivated Plants** **Origin, Importance and domestication:** Origin of Agriculture and ancient economic Botany, Vavilov'sCentres of Origin and diversity of crop plants, domestication, evaluation, bioprospection, Major plant introductions; Crop domestication and loss of genetic diversity; **Germplasm augmentation and conservation:** History and importance of germplasm collection. Overview of:Ecogeographical distribution of diversity. **General account of:** Biotechnology in plant germplasm acquisition, Plant Tissue Culture in disease elimination, in vitro conservation and exchange, cryopreservation.	**7**
Unit II	**Botany, Utilization of Plant Wealth (Cereals, Pulses and Legumes, and Starches)** **Origin, evolution and biosystematics, morphology, and uses of some selected crops:** **Cereals:Wheat, Rice**. **Pluses:** Origin, morphology, uses, Importance to man and ecosystem of pulses (**Pigeon pea, Chickpea**) and **Legumes** (**lab-lab bean, Rice bean**,). Morphology, propagation and uses of **Sugarcane(for sugar), Potato(for starch)**.	7
Unit III	**Botany, Utilization of Plant Wealth (Spices, Beverages, Oil seeds fats and Essential oils)** **Spices:** Listing of important spices **Cloves, Cardamom**,(Their botanical name, family and part used.	**8**

	Origin, distribution, ecology, botany, cultivation practices, processing of economic plant part / product , main chemical constituents, and economic Importance of the Major spices, namely **Turmeric, Capsicum**. **Beverages:Tea and Coffee:** Botanical name, family, botanical description, plant part used, chemical constituents and uses. **Oil seeds and fats:** General description, classification, extraction and uses of **groundnut, coconut.**	
Unit IV	**Botany, Utilization and Processing of Plant Wealth (Medicinal plants, Timber plants).** **Drug-yielding and Medicinal plants:** **Major Medicinal Plants :** Botany, Uses, Cultivation and Processing of major medicinal plants, namely **: GhritKumari (Aloe vera), Gilloi (Tinospora),** **Natural Rubber**: Para rubber: tapping, processing and uses **Timber plants and Fibres:** Introduction, Botanical name, family, common name, plant part used, center of origin, morphology, characteristics and uses of **Teak and Shisam**. General account of the Fibre yielding plants, Extraction, processing, morphology and uses of fibres, with special reference to **Cotton, Coir**.	**8**
References	1. Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture. Jones & Bartlett Publishers. 2. CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow (2016). AushGyanya : Handbook of Medicinal and Aromatic Plant Cultivation. 3. Kochhar, S.L. (2016). Economic Botany: A Comprehensive Study. 5th Edition. Cambridge 4. Samba Murty, AVSS and Subrahmanyam, N.S. (1989). a text book of Economic Botany. Wiley Eastern Ltd., New Delhi 5. Sambamurty, AVSS and Subrahmanyam, N.S. (2008). A Textbook of Modern Economic Botany. 1st Edition, Paperback . CBS Publishers & Distributors Pvt.Ltd.; 1st edition (4 September 2008) 6. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands. 7. Any local/state/regional flora published by BSI or any other agency.	

F.Y. B.Sc. Botany (Major)
Semester-I
BOT-DSC-112: Practical course based on BOT-DSC-111

Total Hours:60 **Credits: 2**

Course Objectives	• To understand the plants of Economic Botany and relate with environment, communities, and ecosystems. • To develop critical understanding on the evolution of concept of new crops/varieties importance of germplasm diversity. • To develop a basic knowledge of taxonomic diversity. • To increase the awareness and importance of plants & plant products encountered in everyday life.
Course Outcomes	After studying this course the students will be able to : • Understand the plants of Economic Botany and relate with environment, communities, and ecosystems. • Develop critical understanding on the evolution of concept of new crops/varieties importance of germplasm diversity. • Develop a basic knowledge of taxonomic diversity. • Aware ofimportance of plants & plant products encountered in everyday life.

Sr. No.	Particulars	Hours
1	Cereals: **Wheat** (habit sketch, L. S/T.S. grain, starch grains, micro-chemical tests)	4
2	**Rice**(habit sketch, study of paddy and grain, starch grains, micro-chemical tests).	4
3	Legumes: C**hick pea** (habit, fruit, seed structure, micro-chemical tests).	4
4	Legumes: P**igeon pea** (habit, fruit, seed structure, micro-chemical tests).	4
5	Sources of sugars and starches: **Sugarcane** (habit sketch; cane juice- micro-chemical tests),	4
6	Sources of sugars and starches: Potato(habit sketch,tuber morphology, T.S. tuber to show localization of starch grains,	4
7	Beverages: **Tea** (plant specimen, tea leaves), **Coffee** (plant specimen, beans).	4
8	Beverages: **Coffee** (plant specimen, beans).	4
9	T.S. Sources of oils and fats: **Coconut**	4
10	T.S. Sources of oils and fats: **Groundnut**.	4
11	**Rubber:** specimen, photograph/model of tapping, samples of rubber products.	4
12	Woods: **Tectona and Shisam**: Specimen.	4
13	Fibre-yielding plants: **Cotton**(specimen, whole mount of seed to show lint and fuzz; whole mount of fibre)	4
14	Fibre-yielding plants **Coir** (specimen, whole mount of seed to show lint and fuzz; whole mount of fibre)	4

15	Drug-yielding plants: Specimens of **Aloe vera and Gilloy**	4
References	• Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture. Jones & Bartlett Publishers. • CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow (2016). AushGyanya : Handbook of Medicinal and Aromatic Plant Cultivation. • Kochhar, S.L. (2016). Economic Botany: A Comprehensive Study. 5th Edition. Cambridge • Samba Murty, AVSS and Subrahmanyam, N.S. (1989). a text book of Economic Botany. Wiley Eastern Ltd., New Delhi • Sambamurty, AVSS and Subrahmanyam, N.S. (2008). A Textbook of Modern Economic Botany. 1st Edition, Paperback . CBS Publishers & Distributors Pvt.Ltd.; 1st edition (4 September 2008) • Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands. • Any local/state/regional flora published by BSI or any other agency.	

F.Y. B.Sc. Botany (Open Elective)
Semester-I
BOT-OE-111-Mushroom Culture Technology

Total Hours: 30 **Credits: 2**

Learning objectives	• To study various types and categories of mushrooms. • To demonstrate various types of mushroom cultivation technologies. • To examine various types of food technologies associated with mushroom industry. • To know the value of economic factors associated with mushroom cultivation • To device new methods and strategies to contribute to mushroom production	
Course outcomes	After successful completion of this course, students are expected to: • Recall various types and categories of mushrooms. • Demonstrate various types of mushroom cultivating technologies. • Examine various types of food technologies associated with mushroom industry. • Value the economic factors associated with mushroom cultivation • Device new methods and strategies to contribute to mushroom production.	
Unit	**TopicParticular**	**Hours**
Unit I	Introduction, History. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus*.	7
Unit II	Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparations of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation- Low cost technology; Composting technology in mushroom production.	8
Unit III	Storage and nutrition: Short-term storage (Refrigeration – up to 24 hours) Long term Storage (canning, pickels, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	**8**
Unit IV	Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.	**7**
References	1. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore. 2. Swaminathan, M. (1990). Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018. 3. Tewari, P. and Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi. 4. Bahl, N. (1984-1988).Hand book of Mushrooms, II Ed, Vol.1 & 2	

SEMESTER-II

F.Y. B.Sc. Botany (Major)
Semester-II
BOT-DSC-121: Plant Morphology and Systematics

Total Hours: 30 **Credits: 2**

Course objectives	• To study vegetative and floral morphology of angiospermic plants • To study the importance of herbarium and botanical garden • To interpret the rules of ICN in botanical nomenclature • To assess terms and concepts related to Phylogenetic Systematic • To generalize the characters of the families according to Bentham & Hooker's system of classification.	
Course outcomes	After successful completion of this course, students are expected to: • Study vegetative and floral morphology of angiospermic plants • Study the importance of herbarium and botanical garden • Interpret the rules of ICN in botanical nomenclature • Assess terms and concepts related to Phylogenetic Systematics • Generalize the characters of the families according to Bentham & Hooker's system of classification.	
Unit	**TopicParticular**	**Hours**
Unit I	Definition and scope of Morphology Root: Definition, General characters and functions Types of root: Tap and Adventitious Stem: Definition, General characters and functions Leaf: Definition, a) Parts of typical leaf. b) Types of leaf: Simple, Compound: Pinnately and Palmately. c) Phyllotaxy: Alternate, Opposite and whorled. d) Venation: Reticulate and parallel. Inflorescence: Definition, Parts of Inflorescence Types of Inflorescence: a) Racemose - Raceme, Spike, Catkin, Spadix, Corymb, Umbel and Capitulum b) Cymose: Solitary, Uniparous, Biparous and Multiparous cyme	7
Unit II	Flower: Definition, Parts of typical flower and their functions a) Insertion of floral leaves on thalamus: Hypogynous, Perigynous and Epigynous b) Symmetry: Actinomorphic, Zygomorphic Calyx: Polysepalous, Gamosepalous Corolla: a) Regular polypetalous - Cruciform, b) Irregular polypetalous - Papilionaceous, c) Regular gamopetalous: Infundibuliform, Androecium: i) Cohesion of Stamen: a) Adelphy: Monadelphous, ii) Adhesion of stamen: Episepalous, Epipetalous, Epiphyllous and Gynoecium: Apocarpous and Syncarpous pistil, Monocarpellary, Bicarpellary and polycarpellary Types of Placentation: Marginal, Basal, Axile, Parietal, Free central and superficial. Fruit: Definition, Parts of typical fruit Types: a) Simple - Loculicidal capsule b) Aggregate - Etaerio of berries c) Composite - Syconus	8

Unit III	**BotanicalNomenclatureandSystemsofClassification** Principles and rules (ICN); Ranks of classification;Generic name, species nameBinomial Nomenclature **Systems of classification**: Natural, Artificial and Phyllogenetic system of classification , Bentham and Hooker's system of classification with reasons for each class	7
Unit IV	**Families of flowering plants:** Systematic position, Distinguishing characters and Economic importance of families: Malvaceae, Solanaceae, Euphorbiaceae and Cannaceae. **Field inventory:** Importance of Herbarium; Steps involved in herbarium Preparation, botanical gardens : Royal Botanical Garden(Kew), Indian Botanical Garden (Kolkata)	8
References	1. Singh,(2012).*PlantSystematics:*TheoryandPracticeOxford&I BHPvt.Ltd.,NewDelhi.3rdedition. 2. Jeffrey,C.(1982).AnIntroductionto*PlantTaxonomy.*Cambridg eUniversityPress,Cambridge. 3. Judd,W.S.,Campbell,C.S.,Kellogg,E.A.,Stevens,P.F.(2002).Plant Systematics-APhylogeneticApproach.SinauerAssociatesInc.,U.S.A.2nd edition. 4. Radford, A.E. (1986). Fundamentals of *Plant Systematics*. Harper and Row, NewYork. 5. Sambamurty A.V.S.S. (2005). Taxonomy of Angiosperms. I. K. International Pvt.Ltd., New Delhi. Singh, V., Pande, P. C. & Jain, D. K. (2008). Taxonomy andEconomicBotany.RastogiPublications,Meerut. 6. Pandey,B.P.(2009). AText book of Botany Angiosperms. S. Chandand Company Ltd.,NewDelhi. 7. Hall, B.G. (2011). *Phylogenetic Trees Made Easy: A How-To Manual*. SinauerAssociates,Inc.USA 8. Anylocal/state/regionalflorapublishedbyBSIoranyotheragency	

F.Y. B.Sc. Botany (Major)
Semester-II
BOT-DSC-122: Practical course based on BOT-DSC-121

TotalHours: 60 **Credits: 2**

Course Objectives	• To study vegetative and floral organs of angiospermic plants • To study the techniques of herbarium • To understand the general method to describe angiospermic plant in the terms of morphology. • To generalize the characters of the families according to Bentham & Hooker's system of classification.
Course Outcomes	After successful completion of this course, students are expected to: • Understand vegetative and floral organs of angiospermic plants • Learn the techniques of herbarium • Understand the general method to describe angiospermic plant in the terms of morphology. • Generalize the characters of the families according to Bentham & Hooker's system of classification.

Sr. No.	Particulars	Hours
1	Study of Root and its type and modification	4
2	Study of Stem Morphology: Underground, Sub aerial, Aerial	4
3	Study of Leaf Morphology (as per theory): Phyllotaxy and Types of leaf.	4
4	Study of types of Inflorescences.	4
5	Study of Flower: Types of Flower and Forms of calyx	4
6	Study of Flower: Forms of Corolla.	
7	Study of types of aestivation and placentation	4
8	Study of types of fruit as per theory	4
9	How to describe angiospermic plant	4
10	Study of vegetative and floral characters of the Family (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Malvaceae,	4
11	Study of vegetative and floral characters of the Family (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Solanaceae	4
12	Study of vegetative and floral characters of the Family (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Euphorbiaceae	4
13	Study of vegetative and floral characters of the Family (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Cannaceae	4

14	Mounting of a properly dried and pressed specimen of any 10 wild plant with Herbarium label (to be submitted in the record book).	4
15	Fieldvisit(localoroutsidedependingonsituation)	4
References	• Singh,(2012).*PlantSystematics:*TheoryandPracticeOxford&IBHPvt.Ltd.,NewDelhi.3rdedition. • Jeffrey,C.(1982).AnIntroductionto*PlantTaxonomy.*CambridgeUniversityPress,Cambridge. • Judd,W.S.,Campbell,C.S.,Kellogg,E.A.,Stevens,P.F.(2002).PlantSystematics-APhylogeneticApproach.SinauerAssociatesInc.,U.S.A. 2ndedition. • Radford, A.E. (1986). Fundamentals of *Plant Systematics*. Harper and Row, NewYork. • Sambamurty A.V.S.S. (2005). Taxonomy of Angiosperms. I. K. International Pvt.Ltd., New Delhi. Singh, V., Pande, P. C. & Jain, D. K. (2008). Taxonomy andEconomicBotany.RastogiPublications,Meerut. • Pandey,B.P.(2009).ATextbookofBotanyAngiosperms..S.ChandandCompanyLtd.,NewDelhi. • Hall, B.G. (2011). *Phylogenetic Trees Made Easy: A How-To Manual*. SinauerAssociates,Inc.USA • Anylocal/state/regionalflorapublishedbyBSIoranyotheragency	

F.Y. B.Sc. Botany (Open Elective)
Semester-II
BOT-OE-121: Nursery and Gardening

Total Hours: 30 **Credits: 2**

Course objectives	• To know the concept of nursery andGardening. • To improve the skills for growing horticultural crops and ornamental plants. • To create awareness about homegardening. • To develop different skills regarding the gardening operations among thestudents	
Course outcomes	After successful completion of this course, students are expected to: • Student will be given the concept of nursery andGardening. • The skill of student will be improved for growing horticultural crops and ornamental plants. • They will be made aware with the concept of home gardening • This course will help to develop different skills regarding the gardening operations among thestudents.	
Unit	**TopicParticular**	**Hours**
Unit I	**Nursery:** Definition, objectives and scope, building up of infrastructure for nursery, planning and seasonal activities. Planting: direct seedling and transplant. **Seed structure and types:** Seed dormancy, causes and methods of breaking dormancy, Seed storage: Seed banks, factors affecting seed viability and genetic erosions.	7
Unit II	**Vegetative propagation:** Cutting and Air-layering: selection, techniques of cutting, rooting medium, planting and hardening of plants in green house or glass house. Harvesting, Packing, Storage and Marketing of Nursery stock.	8
Unit III	**Gardening:** Definition, objectives and scope, Different types of gardening: Landscape, home gardening and park, and its Components, suitable plants, soil, manuring and watering. Definition, characters of indoor plants, containers, selection of indoor plants, Potting media, watering tips. Botanical name, cultivation practices, Ornamental value, maintenance and care of Cycads and Palms(Two examples each)	7
Unit IV	**Cultivation practices:** Introduction, study of cultivation of some vegetables: Brinjal and Tomato w.r.t. i)Sowing ii) Transplanting of seedlingiii) Varietiesiv) Mannuaring and irrigationv) Pest, Diseases and control measures vi) Harvestingvii) Storage and Marketing	8

References	1. Bose T.K. and Mukherjee. D. (1972). Gardening in India, Oxford and IBH Publishing Vol 1., NewDelhi. 2. Sandhu, M. K., (1989), Plant Propagation. Wile Eastern Ltd., Bangalore, Madras. 3. .Kumar, N., (1997), Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. 4. .Edmond Musser and Andres, Fundamentals of Horticulture, McGraw Hill Book Co., NewDelhi. 5. Agrawal. P.K. (1993), Hand Book of Seed Technology, Dept. of Agriculture and Cooperations, National Seed Corporation Ltd., NewDelhi. 6. Janick Jules. (1979). Horticultural Science. (3rd Ed.) W. H. Freeman and Co., San Francisco.USA.	

F.Y. B.Sc. Botany (Open Elective)
Semester-II
BOT-OE-122: Practical course based on BOT-OE-121

TotalHours:30 **Credits: 2**

Course Objectives	• To know the tools and techniques of nursery andGardening. • To study the method of seed germination and to break seed dormancy. • To study the different types of instruments used for nursery operations • To improve the skills for growing horticultural crops and ornamental plants. • To create awareness about homegardening. • To develop different skills regarding the gardening operations among thestudents	
Course Outcomes	After successful completion of this course, students are expected to: • Know the tools and techniques of nursery andGardening. • Study the method of seed germination and to break seed dormancy. • Study the different types of instruments used for nursery operations • Improve the skills for growing horticultural crops and ornamental plants. • Create awareness about homegardening. • Develop different skills regarding the gardening operations among thestudents	
Sr. No.	**Particular**	**Hours**
1	Study of germination of dormant & non-dormant seeds (Pea, tomato, maize, bean).	4
2	To determine moisture content & water holding capacity of Garden Soils.	4
3	To determine the pH of the Garden Soils.	4
4	Seed viability test.	4
5	Study of different types of tools & accessories for Nursery.	4
6	Study of different types of Nurseries & their layout.	
7	Study of different components of the garden (Arches, Pergolas, Topiary etc.)	4
8	Study of different types of Gardening	4
9	Study of different methods to break seed dormancy	4
10	Study of different methods of vegetative propagation (Cutting)	4

11	Study of different methods of vegetative propagation (Budding- T-budding)	4
12	Study of different methods of vegetative propagation (Layering) air layering or Gootee	4
13	Study of different methods of vegetative propagation (Grafting)Whip grafting	4
14	Propagation of Vegetable crops, fruit crops and ornamentals	4
15	Visit to the nursery or garden(localoroutsidedependingonsituation)	4
References	• Bose T.K. & Mukherjee, D. 1972. Gardening In India, Oxford & IBH Publishing Co., New Delhi. • Sandhu, M.K. 1989. Plant Propagation, Wile Eastern Ltd., Bangalore, Madras. • Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publications. Nagercoil. • Edmond Musser &andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi. • Agrwal, P.K. 1993. Hand Book Of seed Technology, Dept, Of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi. • Janick Jules.1979.Horticultural Science (3rd Ed), W.H.Freeman and Co. San Franciso, USA	