SCHEME AND SYLLABI

3- Year UG Degree (Bachelor of Science in Botany)
4-Year UG Degree (Bachelor of Science- Honours in Botany)

(Multidisciplinary)

Approved by
Board of Studies
In its meeting held on

29/04/2024

Department of Botany
Faculty of Life Sciences
Chaudhary Devi Lal University, Sirsa
(Haryana)-India
PIN-125055

Course and Credit Scheme of Bachelor of Science in Botany - Multidisciplinary

3- Year UG Degree (Bachelor of Science in Botany)

4- Year UG Degree (Bachelor of Science- Honours in Botany)

Sr. No.	Course Code	Course Title	Credits				Level
Discipline Specific Courses (DSC)			**L**	**T**	**P**	**Total**	
1.	BSC/BOT/MD/1/DSC/101	Diversity of Microbes	3		1	4	100
2.	BSC/BOT/MD/2/DSC/102	Diversity of Archegoniates	3		1	4	100
3.	BSC/BOT /MD/3/DSC/201	Plant taxonomy and anatomy	3		1	4	200
4.	BSC/BOT /MD/4/DSC/202	Ecology and Phytogeography	3		1	4	200
5.	BSC/BOT /MD/5/DSC/301	Plant Biochemistry and Metabolism	3		1	4	300
6.	BSC/BOT /MD/6/DSC/302	Plant Physiology	3		1	4	300

Sr. No.	Course Code	Course Title	Credits				Level
Minor (MIC) Courses in Botany			**L**	**T**	**P**	**Total**	
1	BSC/BOT/MD/1/MIC/101	Plant Diversity	2			2	100
2	BSC/BOT/MD/2/MIC/102	Plant for Human Welfare	2			2	100
3	BSC/BOT/MD/3/MIC/201	Fundamentals of Cell Biology and Genetics	3		1	4	200
4	BSC/BOT/MD/4/MIC/202	Plant Stress Biology	3		1	4	200
5	BSC/BOT/MD/5/MIC/301	Plant Biotechnology and Genetic Engineering	3		1	4	300
6	BSC/BOT/MD/6/MIC/302	Natural Resources Management	3		1	4	300
7	BSC/BOT/MD/6/MIC/303	Economic Botany	3		1	4	300
Multidisciplinary Courses (MDC) in Botany			**L**	**T**	**P**	**Total**	**Level**
1	CDLU/MDC/1/101	Fundamental of Botany	2		1	3	100
2	CDLU/MDC/2/102	Biodiversity and its Conservation	2		1	3	100
3	CDLU/MDC/3/201	Medicinal Botany	2		1	3	200
Skill Enhancement Courses (SEC) in Botany			**L**	**T**	**P**	**Total**	**Level**
1	CDLU/SEC/1/101	Mushroom Cultivation	2		1	3	100
2	CDLU/SEC/2/102	Organic Farming	2		1	3	100
3	CDLU/SEC/3/201	Soil Health Assessment	2		1	3	200
4	BSC/BOT/MD/5/SEC/301	Internship*	4			4	300
5	BSC/BOT/HWR//8/SEC/401	Research Project/Dissertation*				12	400

Table: 2 Semester wise Course code and Title along with credit details

Bachelor of Science (Botany) – Multidisciplinary

3- Year UG Degree (Bachelor of Science in Botany)

4- Year UG Degree (Bachelor of Science- Honours/Honours with research in Botany)

Course Code	Course Title	Credits				Marks
Semester I						
		L	**T**	**P**	**Total**	
BSC/BOT/MD/1/DSC/101	Diversity of Microbes	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
	Minor Courses (MIC)/Skill enhanced Courses (SEC) *(Select one for each from any Science discipline)*					
BSC/BOT/MD/1/MIC/101	Plant Diversity	2			2	50
CDLU/SEC/1/101	Mushroom Cultivation	2		1	3	75
CDLU/AEC/1/101	Proficiency in English	2			2	50
CDLU/VAC/1/101	**To be selected from the central pool of Multidisciplinary/Value Added Courses**	2			2	50
CDLU/MDC/1/101		3			3	75
Total					**24**	**600**
Semester II						
BSC/BOT/MD/2/DSC/102	Diversity of Archegoniates	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
	Minor Courses (MIC)/Skill enhanced Courses (SEC) *(Select one for each from any Science discipline)*					
BSC/BOT/MD/2/MIC/102	Plant for Human Welfare	2			2	50
CDLU/SEC/2/102	Organic Farming	2		1	3	75
CDLU/AEC/2/102	Prayojanmoolak Hindi	2			2	50
CDLU/VAC/2/102	**To be selected from the central pool of Multidisciplinary/Value Added Courses**	2			2	50
CDLU/MDC/2/102		3			3	75
Total					**24**	**600**
Semester III						
BSC/BOT/MD/3/DSC/201	Plant taxonomy and anatomy	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
	Minor Courses (MIC)/Skill enhanced Courses (SEC) *(Select the one paper each from MIC and SEC)*					
BSC/BOT/MD/3/MIC/202	Fundamental of Cell biology and Genetics	3		1	4	100
CDLU/SEC/3/201	Soil Health Assessment	2		1	3	75
CDLU/AEC/3/201	(Punjabi Bhasha Ate Viakaran)	2			2	50
CDLU/MDC/3/201	**To be selected from the central pool of Multidisciplinary Courses**	3			3	75

Total					**24**	**600**
Semester IV						
BSC/BOT/MD/4/DSC/301	Ecology and Phytogeography	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
	Minor Courses (MIC) *(Select the one paper from MIC)*					
BSC/BOT/MD/4/MIC/202	Plant Stress Biology	3		1	4	100
CDLU/AEC/4/202	Introduction to Sanskrit	2			2	50
CDLU/VAC/4/201	**To be selected from the Central Pool of Value Added Courses**	2			2	50
Total					**20**	**500**
Semester V						
BSC/BOT/MD/5/DSC/301	Plant Biochemistry and metabolism	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
	Minor (MIC)/ Vocational (VOC) Courses *(Select the one paper from MIC)*					
BSC/ZOO/MD/5/MIC/301	Plant Biotechnology and Genetic Engineering	3		1	4	100
BSC/ZOO/MD/5/SEC/301	Internship*			4	4	100
Total					**20**	**500**
Semester VI						
BSC/BOT/MD/6/DSC/302	Plant Physiology	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
…….	ZOO/CHE/anyone from Science discipline	3		1	4	100
	Minor (MIC)/ Vocational (VOC) Courses (*Select the two paper from MIC)*					
BSC/BOT/MD/6/MIC/302	Natural Resources Management	3		1	4	100
BSC/BOT/MD/6/MIC/303	Economic Botany	3		1	4	100
Total					**20**	**500**

FIRST SEMESTER

BSC/BOT/MD/1/DSC/101: DIVERSITY OF MICROBES

DURATION: 3+3 HOURS **MAXIMUM MARKS: 100**
Theory: 75 (External 50 + Internal 25), Practical: 25 (External 25+ Internal 00)

Course Objective: To make students to understand life diversity, structural organization and division of labour in Microbes, Algae and Fungi.

Course Learning Outcomes (CLO): After completing the course, the student shall be able to:

CO1: Identifying the characters and classification of Microbes.

CO2: Describe unique characters and recognize life forms of Microbes.

CO3: Describe type study of different Algae.

CO4: Prepare permanent stained preparations for different specimens of Fungi.

UNIT I

1. Introduction to microbial world: Scope of microbes in industry and environment; Microbial nutrition, growth, metabolism, anabolism and catabolism.

2. Viruses: Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication, DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). Economic importance of viruses.

3. Bacteria: Discovery, general characteristics; Types- Archaebacteria, eubacteria, actinomycetes, mycoplasma; Cell structure; Nutritional types; Reproduction-vegetative, asexual and recombination. Economic importance of bacteria.

UNIT II

4. Algae: General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food, flagella, methods of reproduction; Classification. Economic importance of Algae.

Cyanophyta and Xanthophyta: Ecology and occurrence; Range of thallus organization; Cell structure; Reproduction, Morphology and life-cycle of *Nostoc* and *Vaucheria.*

Chlorophyta, Charophyta and Bacillariophyta: General characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Volvox, Oedogonium, Coleochaete, Chara.* General Account of Bacillariophyta.

Phaeophyta and Rhodophyta:

Characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Ectocarpus*, *Fucus* and *Polysiphonia*

UNIT III

Fungi: General characters, Introductory classification; economic importance; and life-history of *Phytophthora* (Mastigomycotina), *Penicillium* (Ascomycotina), *Puccinia* (Basidiomycotina), *Colletotrichum* (Deuteromycotina).

General account of Lichens, types, ecological and economic importance.

UNIT IV (Practical)

1.Electron micrographs/Models of viruses – T-Phage and TMV/ Line drawings/ Photographs of Lytic and Lysogenic Cycle.

2. Types of Bacteria to be observed from temporary/permanent slides/photographs. 3. Gram staining.
4. Conduct a field visit to any one of the ecosystems rich in Algae to experience algal diversity. Submit a report with photographs.

5. Make micro preparations of vegetative and reproductive structures of the types mentioned in the syllabus.

6. Algal Culture: isolation and cultivation of micro- and macro-algae in suitable growth media (Demonstration only).

7. Familiarizing the technique of algal collection preservation.

8.Study of vegetative and reproductive structures of *Nostoc, Volvox*, *Oedogonium, Chara*, *Vaucheria*, *Ectocarpus, Fucus* and *Polysiphonia,Procholoron* through electron micrographs, permanent slides.

Suggested Readings:

1. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.

2. Pelczar, M.J. (2001). Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.

3. Sharma, P.D. (2009). Microbiology, latest edition, Rastogi Publication, Meerut.

4. Anand N, 1989. Culturing and cultivation of BGA. Handbook of Blue Green Algae.

5. Fritsch F E, 1935. The structure and reproduction of the algae, Vol. 1 and II. Uni. Press. Cambridge.

6. Morris I, 1967. An Introduction to the Algae. Hutchinson and Co. London.

7. Robert Edward Lee, 2008. Phycology. Cambridge University Press,

8. Singh V, Pandey P C, Jain D K. A text book of botany.

9. Vashishta B R. Text Book of Algae. New Delhi.

Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will be set unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.

BSC/BOT/MD/1/MIC/101: PLANT DIVERSITY

DURATION: 2 HOURS **MAXIMUM MARKS: 50**
Theory: 50 (External 35 + Internal 15), Practical: 00 (External 00+ Internal 00)

Course Objective: The objective of this course is to familiarize the students with the variability in plants.
Course Learning Outcomes: After completion of this course, learners will be able to:
CO1: The general characteristics of microorganisms, Archegoniate and flowering plants.
CO2: Student will gain the knowledge about the identification, structure, and economic values of microorganisms, algae, fungi, bryophytes, pteridophytes, gymnosperms, and angiosperm

UNIT-I

General characteristics, morphology and economic importance of viruses, bacteria, algae, fungi and lichens.

UNIT-II

General characteristics, morphology and economic importance of Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.

Suggested Readings:

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

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

CDLU/SEC/1/101: MUSHROOM CULTIVATION

DURATION: 3+3 HOURS **MAXIMUM MARKS:75**
Theory: 50 (External 35 + Internal 15), Practical: 25 (External 25+ Internal 00)

Course Objective: The aim of this course is to give the students essential knowledge pertaining about the various aspects of mushrooms cultivation and recognize their adaptation mechanisms. To study basic knowledge in cultivation of mushrooms.

Course Learning Outcomes: After completion of the course, learners will be able to:

CO1: Understands prospects of Mushroom cultivation and composting for Mushroom cultivation & different methods of composting.

CO2: To gain knowledge of diseases and pests affecting Mushroom and their control in Mushroom cultivation.

CO3: Students will acquire practical skills through engaging in laboratory experiments and field activities. These hands-on sessions will enable them to explore and understand the wide-

ranging applications of Mushroom.

UNIT I

Definition, Scope & importance of Mushroom cultivation in India. Composting in Mushroom cultivation, Appropriate materials to prepare different types of compost, Methods of composting – preparation and pasteurization. Selection of types of Mushroom and Sites for cultivation. Mushroom cultivation – methods, Selection of commercially important types of Mushroom.

UNIT II

Disease control and pest Management. Harvesting of Mushroom, Identification of right stage of Mushroom, Methods of harvesting, Packaging storing and grading of Mushroom & post-harvest procedures, Sorting the Mushrooms on the size and quality. Use of spent Mushroom in vermin-composting and in organic farming, Preparation of value added products of Mushroom.

UNIT III (Practical)

1. Design and construction of Mushroom farm: by selection of types of Mushroom and Sites.
2. Mushroom cultivation – methods: Selection of commercially important types of Mushroom, Purpose and process of using spawn and selection of correct spawn.
3. Package of practices of White button Mushroom and Oyster Mushroom.
4. Composting in Mushroom cultivation: to prepare different types of compost by appropriate materials
5. Methods of composting – preparation and pasteurization, determination of quality of compost, Hazards & risks associated with composting and how to control injury to self.
6. Methods of harvesting, using approved cutting techniques for harvesting.
7. Packaging storing and grading of Mushroom & Post harvest procedures.

Suggested Readings

1. Pandey, R.K. and Ghosh, S.K. (1996). A handbook of Mushroom Cultivation. Emkey Publication.

2. Pathak, V.N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.

3. Nita, B. (2000). Handbook of Mushrooms. Vol 1 & 2. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

4. Tewari, P. and Kapoor S.C. (1998). Mushroom Cultivation, Mittal Publication, New Delhi.

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

SECOND SEMESTER

BSC/BOT/MD/1/DSC/102: DIVERSITY OF ARCHEGONIATES

DURATION: 3+3 HOURS **MAXIMUM MARKS: 100**
Theory: 75 (External 50 + Internal 25), Practical: 25 (External 25+ Internal 00)

Course Objective: The aim of course is that to help learners for understanding about archegoniate structure and its life cycle.

Course Learning Outcomes: After completion of the course, learners will be able to:

CO1: To study the different features of bryophytes.

CO2: Gain knowledge of different types of land plants and gymnosperms.

CO3: Develop basic understanding on how to classify the different archegoniate.

CO4: Gain the knowledge of practical aspects of archegoniate.

UNIT I

Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations.
Bryophytes: General characteristics; Adaptations to land habit; Classification; Range of thallus organization.
Type Studies- Bryophytes: Classification, morphology, anatomy and reproduction of *Riccia, Marchantia, Anthoceros, Sphagnum* and *Polytrichum*; Reproduction and evolutionary trends in *Riccia, Marchantia, Anthoceros, Sphagnum* and *Polytrichum*. Ecological and economic importance of bryophytes.

UNIT II

Pteridophytes: General characteristics and Classification.

Type Studies- Pteridophytes: Classification, morphology, anatomy and reproduction of *Psilotum, Lycopodium, Selaginella, Equisetum, Pteris* and *Marsilea*. Apogamy and apospory, heterospory and seed habit, telome theory, stelar evolution; Ecological and economic importance.

UNIT III

Gymnosperms: General characteristics, classification (up to family), morphology, anatomy and reproduction of *Cycas, Pinus, Ginkgo* and *Gnetum*; Ecological and economic importance of Gymnosperms.

UNIT IV (Practical)

1. *Riccia* – Morphology of thallus.
2. *Marchantia*- Morphology of thallus and reproductive parts; vertical and transverse section of thallus; vertical section of Gemma cup, Antheridiophore and Archegoniophore.
3. *Sphagnm*- Morphology of plant; whole mount of leaf.
4. *Polytrichum*- Morphology of vegetative and reproductive parts; Transverse Section of rhizome, whole mount of leaf; Longitudinal Section through antheridial and archegonial heads; L.S. of capsule.
5. *Lycopodium*- Morphology of plant, whole mount of leaf; transverse section of stem; Longitudinal Section of strobilus; morphology of sporophyll.
6. *Selaginella*- Morphology of plant, whole mount of leaf with ligule, transverse section of stem and rhizophore; longitudinal section of strobilus; morphology of sporophyll.
7. *Equisetum*- Morphology of plant, transverse section of internode, longitudinal and transverse section of strobilus, whole mount of sporangiophore and spore.
8. *Pteris*- Morphology of plant, transverse section of rachis, vertical section of leaflets through sorus; whole mount of prothallus with sex (permanent slide).

9. *Marsilea*- Morphology of plant, transverse section of rhizome and petiole; vertical transverse and vertical longitudinal section of sporocarp.

10. *Cycas*- Morphology of plant; morphology and transverse section of coralloid roots; transverse section of leaflets; Longitudinal Section of male and female cone; morphology of microsporophyll and megasporophyll; Longitudinal section of ovule (permanent slide).

***11. Pinus*-** Morphology of plant; transverse section of Needle; longitudinal section of male cone and female cone; whole mount of Microspores.

12. *Ginkgo*- Morphology of plants and reproductive structures (only photographs).

13. *Gnetum*- Morphology of plant; Morphology of male and female strobilus; vertical section of ovule (permanent slide).

Suggested Readings

1. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.
2. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
3. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central Book Depot. Allahabad.
4. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
5. Vanderpoorten, A. & Goffinet, B. (2009) Introduction to Bryophytes. Cambridge University Press.
6. Vashistha, B. R., Sinha, A.K. and Kumar, A. (Latest edition). Botany for Degree Students: Bryophyta. S. Chand Publishing 7361, Ram Nagar, Qutab Road, New Delhi-110055.
Vashistha, B. R., Sinha, A.K. and Kumar, A. (Latest edition). Botany for Degree Students: Gymnosperm. S. Chand Publishing 7361, Ram Nagar, Qutab Road, New Delhi-110055.
8.Vashistha, B. R., Sinha, A.K. and Kumar, A. (Latest edition). Botany for Degree Students: Pteridophytes. S. Chand Publishing 7361, Ram Nagar, Qutab Road, New Delhi-110055.

Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will be set unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.

BSC/BOT/MD/2/MIC/102: PLANTS FOR HUMAN WELFARE

DURATION: 2 HOURS **MAXIMUM MARKS: 50**

Theory: 50 (External 35 + Internal 15), Practical: 00 (External 00+ Internal 00)

Course Objective: The structure of this course is to provide basic understanding of concepts, principles, and way to use plants for human.

Course Learning Outcomes: After completion of the course, learners will be able to:

CO1: Students will acquire a foundational understanding of plant diversity and plants utilized for human welfare.

CO2: Students will acquire the knowledge about the economic valuable plants and their products.

UNIT I

Plant diversity and its scope. Loss of Biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Management of Plant Biodiversity. Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity.

UNIT II

Role of plants in relation to Human Welfare; a) Importance of forestry their utilization and commercial aspects b) Avenue trees, c) Ornamental plants of India. d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses.

Suggested Reading:

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

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

CDLU/SEC/2/102: ORGANIC FARMING

DURATION: 3+3 HOURS **MAXIMUM MARKS: 75**

Theory: 50 (External 35 + Internal 15), Practical: 25 (External 25+ Internal 00)

Course Objective: The aim of this course is to give the students essential knowledge pertaining to the enormous capabilities and potentials of the graduate to attain accomplishment and perform in adequate manner at appropriate situations.

Course Outcomes: After completion of this course, students will be able to:

CO1: To develop undergraduate level student strong competencies in the field of organic farming and its application in an interactive environment for real-world applications.

CO2: To develop strong student skills in the field of organic farming and sustainable agriculture by using new techniques and tools.

CO3: Become trained in the areas of organic farming and ready for handling complex issues of organic farming management for sustainable development in the changing global world.

UNIT I

Introduction to organic and sustainable production practices and principles for vegetable, fruit, field, and forage crops, certification of organic , soil fertility & quality, tillage systems, crop rotation, cover crops, propagation, composting, season extension, and management of weeds, insects, & diseases in organic cropping systems. Principles and practices of organic farming.

UNIT II

Concept of different cropping systems in relation to Organic Farming (Inter cropping etc), Organic Farming (Process), Concept of farming system, Developing organic farms, Important steps & methods Sources of nutrients for Organic Agriculture: Organic Manure, FYM/Rural compost, City compost, Oil cakes, Animal wastes and Vermicomposts. Green Manure – Green Manure with Leguminous crops in crop rotation. In-situ incorporation of crop residues –Benefits, Other Nitrogen contributing plants, Liquid Manure.

Principles of Organic Crop Production will cover the cultural practices and biological processes.

UNIT III (Practical)

1. Soil Characters and types
2. Soil and its physical characters.
3. Soil types: - Alluvial, Laterite, Clay, Loam etc.
4. Physical testing and assessment of soil types, weighment, water movement, etc.
5. Soil Conditioners:
6. Lime, Dolomite, Gypsum, Basis slag, Organic Manures, etc.
7. Use of soil conditioners for better management of soil, dosages by soil types etc.
8. Preparation of FYM/Rural Compost / Different types of composting.
9. Preparation of compost pit at appropriate location
10. Lining of pit with brick, polythene sheet
11. Collection and accumulation of raw materials
12. Aerated/Non aerated pits for quality manure production
13. Collection or rotten manure and post treatment Interaction

14. Preparation of seed bed & raising of seedlings:
15. Wet seedbed, manuring, sowing (broadcasting)
16. Dry seed bed, bed size, manuring, soil treatment, actual sowing in line/broadcasting, weeding, watering, hardening of seedlings, time requirement for seedling growth, uprooting seedlings.
17. Raising seedlings in pots/seed pans:
18. Preparation of potting mixture, its treatment.
19. Seed treatment, making seeds ready for planting in seed pans.
20. Seed sowing, very small seed, medium and large seeds
21. Aftercare-germination till seedlings are ready for planting through hardening.

Suggested Readings

1. Francis, C. (ed.) 2009. Organic farming- The ecological system. Agronomy Monograph 54. ASA-CSSA-SSSA, Madison, WI, USA. Available for purchase online, or digitally from or agronomy.org.
2. Davies and Lennartsson (eds.) 2008. Organic vegetable production: A complete guide. Crowood Press, Wiltshire, UK. Available at the UT Bookstore or online; also available for free electronically through the UT library.
3. Kristiansen, Taji, and Reganold (eds.) 2006. Organic agriculture: A global perspective. Comstock/Cornell University Press, Ithaca, NY
4. Badgley, B., J. Moghtader, E. Quintero, E. Zakem, M. Jahi Chappell, K. Avilés-Vázquez, A. Samulon, and I. Perfecto. 2006. Organic agriculture and the global food supply. Renew. Agric. Food Syst. 22:86-108.
5. Suefert, V., N. Ramankutty and J.A. Foley. 2012. Comparing the yields of organic and conventional agriculture. Nature 485:229-232.
6. Magdoff, F. and H. van Es. 2008. Building Soils for Better Crops. 2 nd edition. Sustainable Agriculture Network, Baltimore, MD, Ch. 1-3.
7. Cavigelli, M.A., S.R. Deming, L.K. Probyn, R.R. Harwood (eds.) 1998. Michigan Field Crop Ecology: Managing biological processes for productivity and environmental quality. Michigan State University Extension Bulletin E-2646, 92 pp.
8. Gaskin, J. et al. 2011. How to convert an inorganic fertilizer recommendation to an organic one. The University of Georgia Cooperative Extension. UGA Cooperative Extension Circular 853. Athens, GA.

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.