DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/B.Sc./CBC & GS/17/2024

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies/Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, **Academic Council at its meeting held on 08 April 2024 has accepted the following Syllabi under the Faculty of Science & Technology as per Choice Based Credit Grading System** as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc. Chemistry (Optional)	Vth & VIth semester
2.	B.Sc. Analytical Chemistry (Optional)	Vth & VIth semester
3.	B.Sc. Polymer Chemistry (Optional)	Vth & VIth semester
4.	B.Sc.Biochemistry (Optional)	Vth & VIth semester
5.	B.Sc.Dairy Science & Technology (Optional)	Vth & VIth semester
6.	B.Sc.Microbiology (Optional)	Vth & VIth semester
7.	B.Sc. Botany (Optional)	Vth & VIth semester
8.	B.Sc. Computer Science (Optional)	Vth & VIth semester
9.	B.Sc. Computer Science (Degree)	Vth & VIth semester
10.	B.Sc.Information Technology (Optional)	Vth & VIth semester
11.	B.Sc.Information Technology (Degree)	Vth & VIth semester
12.	Bachelor of Computer Application (Optional)	Vth & VIth semester
13.	Bachelor of Computer Application (Degree)	Vth & VIth semester

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar.
-431 004.
REF.NO.SU/2024/ 1786-94
Date:- 21.06.2024.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,

Chhatrapati Sambhajinagar - 431004, (M. S.) India

Curriculum

B. Sc. Botany Third Year

Semester V and Semester VI

Choice based Credit and Grading System (CBC & GS)

With Effective from 2024 - 2025

Prof. Dr. ARVIND S. DHABE
Chairman
Board of Studies in Botany,
Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad - 431004

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar
Choice Based Credit System (CBCS) Structure & Curriculum
B.Sc. Botany Three Year Undergraduate Degree Program

Semester V

Course	Course Code	Course Title	Periods (Periods /week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1 A) Discipline Specific Elective	BOT-511	DSE-1A(1) (Theory Paper-IX) Cell Biology & Molecular Biology	45(3/week)	2	50	10	40	20
	BOT-512	DSE-1A(2) (Theory Paper-X) (Select any one paper from A1/B1/C1/D1)	45(3/week)	2	50	10	40	20
	BOT-521	Lab course 7(Based on BOT-511)	45(3/week)	1.5	50	10	40	20
	BOT-522	Lab course 8 (Based on BOT-512 A1/B1/C1/D1)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-3)	SEC-513	SEC-3 Any one skill to be chosen out of two SEC-3(E) , SEC-3 (F)	45(3/week)	2	50	10	40	20
Non-Credit Course	PEV-514	Professional Ethics and Moral Values	45(3/week)	2				
			270	11	250	50	200	100
Total Credits for Semester V : 11 (Theory : 08 ; Laboratory : 03)								

Semester VI

	Course Code	Course Title	Periods (Periods /week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1 B) Discipline Specific Elective	BOT-611	DSE-1B(1) (Theory Paper-XI) Genetics and Evolution	45(3/week)	2	50	10	40	20
	BOT-612	DSE-1B(2) (Theory Paper-XII) (Select any one paper from A2/B2/C2/D2)	45(3/week)	2	50	10	40	20
	BOT-621	Lab course 9(Based on BOT-611)	45(3/week)	1.5	50	10	40	20
	BOT-622	Lab course 10 (Based on BOT-612- A2/B2/C2/D2)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC4)	SEC-613	SEC-4 Any one skill to be chosen out of two SEC-4(G) , SEC-4 (H)	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100
Total Credits for Semester V : 09 (Theory : 06 ; Laboratory : 03)								

Total Credits for three years : Sem I (11.5) + Sem II (11.5) + Sem III (15) + Sem IV (15) + Sem V (09) + Sem VI (09) = 71 Credits

B.Sc. III Year Botany CBC & GS
Semester -V
(Theory and Practical syllabus)

B.Sc. III Year Botany (Theory) Semester -V
Course code: Bot-511 (Paper-IX)
(Cell Biology & Molecular Biology)

(45L) **Credit: 2**

Unit-1: Cell Biology:

1. Structure of Prokaryotic cell (Bacterial cell) and Eukaryotic cell (plant cell) (02)
2. Cell wall and Plasma membrane: Structure and functions of cell wall & plasma membrane (02)
3. Cell organelles: Structure and functions of Golgi complex, Mitochondria, Chloroplast, Ribosomes, Endoplasmic reticulum, Lysosomes. (06)
4. Nucleus: Ultra structure, (nuclear membrane, nucleolus, chromatin material, nucleoplasm), Functions of nucleus. (02)

Unit-2: Cell division: (08)

1. Cell cycle -G1 phase, S phase, G2 phase and M phase
2. Mitosis – definition, process and significance.
3. Meiosis-definition, process and significance.

Unit-3: Chromosome: (07)

1. Definition, morphology-size, shape, number, Ultra structure – chromatid, chromonema, chromomere, centromere, kinetochore, secondary constriction, Satellite, telomere, heterochromatin, euchromatin, Nucleosome model (Woodblock 1973), chemical composition, Functions of chromosome,
2. Giant chromosomes: polytene and lampbrush chromosome. (02)
3. Chromosomal aberrations: (04)
    a) Structural: deletion, duplication, inversion and translocation
    b) Numerical: – euploidy and aneuploidy

Unit-4: Molecular Biology

1. **Nucleic acids:**
    a. DNA as genetic material (08)
    b. DNA: Definition, structure, chemical composition, Watson and Crick's model,
    c. Z - DNA, B - DNA, functions of DNA
    d. Replications of DNA: conservative, semi conservative and dispersive.
    e. RNA: Structure, types and functions
2. Transcription in prokaryotes and Eukaryotes (02)
3. Translation in prokaryotes (02)

Unit-5. Continuous internal assessments (CIA): Tutorials and assignments (05)

Internal assessments lectures should be used to assess students' credibility and knowledge of above topic. Conduct two internal tests of five marks and average it for five marks and assessment /tutorials for 5 marks. In assessment you are free to use different assessment method.

B.Sc. III Botany (practical) Semester -V
Lab course VII: Bot-521
Based on Bot-511, Theory paper-IX
(Cell Biology & Molecular Biology)

45L **credits:1.5**

Unit-1

1. Study of the cell structure from onion leaf or *Tradescantia* leaf
2. Preparation of cytological (AA,FAA etc.) fixatives and stains (acetocarmine, aceto-orcein).
3. Study of electron micrographs of viruses, bacteria and cyanobacteria
4. Study of electron micrographs of eukaryotic cell and different cell organelles
5. Preparation of slides for the study of mitosis (root tips of onion)
6. Preparation of slides for the study of meiosis (*Rhoeo*, *Aloe* or onion flower buds)
7. Preparation of ideogram from the given micrograph of karyotype
8. Observation of giant chromosomes in *Chironomous* larvae
9. Preparation of wool models of mitosis, meiosis, cell structure, Chromosome, DNA and RNA.

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Continuous internal assessments (CIA):

Seven (07) marks for internal practical examination and three (03) marks for record book/ submission of collection and field survey report/ excursion report.

B.Sc. III Year (Theory)
Semester V, Elective Course Code: BOT-512 (A)
Paper X (A) (Diversity of Angiosperm-I)
Credit 02 **45 Lectures**

Unit: 1Biodiversity

1. Definition, concept, Origen and evolution

2. **Types of biodiversity** (05

Species, genetic, ecological, agricultural diversity, Biodiversity statan in India; endemism and its types, hot spots of biodiversity in India; IUCN categories of threatened species, threats to biodiversity, Climate change and its consequences with examples

3. Conservation of biodiversity (07

Major cases for loss of biodiversity, listing of threatened ecosystems; Conservation *ex- situ* Botanic Garden, Seed bank, Cryobank, Gen bank; in-tc: Establishment, aims and objectives of Wild Life Sanctuaries, National Packs, Mangroves, Reserve forest. Biodiversity Act, 2002

Unit-2 Taxonomy: (04)

Study of classification of angiosperms with special reference to Bentham and Hacker's system. Study of diversity of following families with reference to the APG IV system of classification. Study of families: (26)

(Refhttps:acaderaic.oup.com/botlinnean/article/18R1/1/1/2416499)

1. *Nymphaeaceae*
2. *Magnoliaceae*
3. *Amaryllidaceae*
4. *Papaveraceac*
5. *Amaranthaceae*
6. *Portulacacae*
7. *Cucurbitaceae*
8. *Euphorbiaceae*
9. *Rhamnaceae*
10. *Brassicaceae*
11. *Myrtaceae*

Continuous Internal Assessment (CIA): - Tutorials and Assignments.

Nete: Internal assessment lectures should be used to assess student's credibility and knowledge of the above topics Conduct two internal tests of five marks and average it for 5 marks and Assessments Tutorial for 5 marks. In assessment you are free to use different assessment methods.

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B. Se. III Year (Practical), Semester-V
Lab Course VIII, BOT 522(A) (Based on BOT 512(A), Theory Paper-X-A)
45 Lectures **Credits:1.5**

Unit: 1 1.

1. Study of Herbarium
2. Analytical Characters of floral features of closely related species
3. Preparation and use of indented and bracketed keys

4. Study of following families with suitable example available in your areas.
(Ref: https://academic.oup.com/botlinnean/article/181/L/1/2416499)

1. *Nymphaeaceae*
2. *Magnoliaceae*
3. *Amaryllidaceae*
4. *Papaveraceac*
5. *Amaranthaceae*
6. *Portulacacae*
7. *Cucurbitaceae*
8. *Euphorbiaceae*
9. *Rhamnaceae*
10. *Brassicaceae*
11. *Myrtaceae*

4. Studies of various pollen grains (acetolysis method).

Continuous Internal Assessment (CIA):

07 - marks for intenal practical exarnination and 03- marks for Record Book/Submission of collection and field survey report/ excursion report

. **Note: Students should undertake Botanical excursion, field visits to ecologically dilerent areas for plant study and submission of list and soft /hord copy photographs of wild plants at the time of practical examination.**

**********XXX**********

B. Sc. III Year (Theory) Semester -V

Paper: XVI (B)
Elective Course Code Bot. -512 (B) (Plant Breeding and Seed Technology)
(45L) Credits 02

Unit -1
Plant Breeding:

1. Introduction, history, aims and objectives (02)
2. Domestication, plant introduction and acclimatization (02)
3. Hybridization – history, hybridization procedure. (03)
4. Selection methods -mass selection, pure line selection and clonal selection (04)
5 . Hybridization in self-pollinating plants (03)
6. Hybridization in cross pollinating plants (03)
7. Heterosis and hybrid vigour (02)
8. Mutation in crop improvement (02)
9. Hybridization programme in Jowar and Cotton (06)
10. Experimental designs and biometrical techniques in plant breeding - Randomized block design (03)

Unit -2
Seed Technology:

1. Seed technology -history, aims and objectives (01)
2. Morphology and anatomy of seed (monocot and dicot seed) (02)
3. Stages of seed multiplication - (04)

a. Nucleus seed
b. Breeders seed
c. Foundation seed
d. Certified seed
e. Registered seed
f. Truthful seed

4. Seed certification process (02)
5. Stage wise multiplication of foundation and certified seed in Jowar (02)
6. Seed processing – drying, cleaning, dressing, bagging, tagging, storage and marketing (02)
7. New techniques in seed technology (02)

Continuous Internal Assessment (CIA):

Tutorials and Assignments Note: Internal assessment lectures should be used to assess student's credibility and knowledge of the above topics. Conduct two internal tests of five marks and avcrage it for 5 marks and AssessmenuTutorials for 5 marks. In assessment you are free to use different assessment methods.

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B. Sc. III Year (Practical)
Semester -V
Paper: XVIII (B) 522, (Based on BOT-512-B Theory Paper-X (B))
(Plant Breeding and Seed Technology)
(45 Lectures) Credits 1.5

Unit -1

Plant breeding:

1. Study of floral biology of jawar and cotton
2. Demonstration of male sterility in jowar
3. Artificial emasculation and pollination in jowar and cotton
4. Demonstration of hybridization techniques in jowar and cotton
5. Designing of field experiments
6. Visit to plant breeding centre

Seed technology:

1. Study of morphology and anatomy of monocot, dicot, endospermic and non Endospermic seeds
2. Study of seed germination – observation of normal and abnormal seedlings, germination percentage
3. Blotter test
4. Method of breaking seed dormancy
5. Study of various seed processes – drying, cleaning, dressing, bagging, tapping and marketing
6. Preparation of seed certification tag
7. Viability test (Tetrazolium test)
8. Visit to various seed farms and research centers.

Continuous Internal Assessment (CIA):

07 marks for internal practical examination and
03 marks for Record Book/Submission of collection and field survey report/ excursion report.

Note: Students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft /hard copy photographs of wild plants at the time of practical examination.

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B. Sc. III Year(Theory) Semester – V
Elective Course CodeBot-512(C)
Paper X (C) (Mycology and Plant Pathology)

Lectures;45 **Total Credits**:2

Unit-1: Applied Mycology Credit-0.4

1. Importance of mycology in agriculture, fungi in human affairs, Mushroom cultivation (03)
2. Mycorrhizal association-Definition, type, method to study arbuscular mycorrhizal fungi.(3)

Unit-2 Fundamentals of plant pathology: Credit-0.6

1. Plant pathology – history, scope, importance, and advancement of plant pathology, Classification of plant diseases on the basis of causal organism and symptoms (04)
2. Field and laboratory diagnosis of plant disease-Koch postulates (02)
3. Seed pathology -concept and importance of seed pathology, seed borne pathogens, methods to study seed borne pathogens (02)
4. Study of air borne pathogens: methods and applications (02)

Unit-3 Plant diseases: Credit-1.0

Study of the following diseases with respect to symptoms, causal organism, disease cycle and disease management:

1) **Cereals** :(a). Black stem rust of wheat (b). Grain smut of jowar (c).Ergot of bajra (05)
2) **Pulses:** (a). Wilt of pigeon pea (b). Rust of gram (04)
3) **Vegetables:** (a). Late blight of potato (b). Black rot of onion (*Aspergillus*) (04)
4) **Oil seeds:** (a). Tikka disease of groundnut (b). Charcoal rot of soyabean (05)
5) **Cash crops:** (a).Red rot of sugarcane (b). Downy mildew of grapes (06)
   (c). Angular leaf spot of cotton (d). Citrus canker
6) **Ornamentals**: (a). Powdery mildew of rose (01)
7) **Weeds** :(a) . Rust of Euphorbia (01)
8) **Fruits:** (a). Black spot of pomegranate (b). Anthracnose of mango (02)

Continuous Internal Assessment (CIA): Tutorials and Assignments (05)

Note: Internal assessment lectures should be used to assess student's credibility and knowledge of the above topics. Conduct two internal tests of five marks and average it for 5 marks and Assessment/Tutorials for 5 marks. In assessment you are free to use different assessment methods.

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B. Sc. III Year (Practical) Semester – V
Lab Course VIII Bot-522(C) Based on Bot 512(C)
Theory Paper X (C)
(Mycology and Plant Pathology)

Lectures: 45 **Total Credits:1.5**

1. Study of Koch's postulates – isolation, inoculation and disease development
2. Study the techniques of root staining for AMF colonization
3. Demonstration of Mushroom cultivation
4. Study of symptoms, causal organism of black stem rust of wheat, grain smut of jowar and ergot of bajra
5. Study of symptoms, causal organism of Wilt of pigeon pea and rust of green gram
6. Study of symptoms, causal organism of Late blight of potato, black rot of onion (*Aspergillus*) And Yellow vein mosaic of bhendi
7. Study of symptoms, causal organism of tikka disease of groundnut and charcoal rot of soyabean
8. Study of symptoms, causal organism of red rot of sugarcane and downy mildew of grapes
9. Study of symptoms, causal organism of angular leaf spot of cotton and citrus canker
10. Study of symptoms, causal organism of Powdery mildew of rose
11. Study of symptoms, causal organism of Rust of Euphorbia
12. Study of symptoms and causal organism of black spot of pomegranate
13. Internal Assessment

Continuous Internal Assessment (CIA): 07 marks for internal practical examination and 03 marks for Record Book/Submission of collection and field survey report/excursion report.

Note: students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft/hard copy photographs of wild plants at the time of practical examination.

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B. Sc. III Year (Theory) Semester – V
Elective Course Code: Bot-512(D) Paper. D (Biotechnology)
Lectures:45 **Total Credits:2**

Unit- 1 Credit-1
Biotechnology: (10)
1. **Introduction:**
a. Definition, scope and multidisciplinary nature
b. Biotechnology in India
2. DNA structure, replication and recombination:
a. Structure of DNA
b. Replication of DNA, Role of DNA polymerase
c. Denaturation and renaturation of DNA
d. Recombination

Unit -2
3. Recombinant DNA technology: (10)
a. Introduction, principles and procedure
b. Enzymes involved in recombinant DNA technology
c. Vectors
d. Southern and Northern blotting technique
e. Techniques in gene mapping
f. DNA fingerprinting
g. PCR
h. DNA sequencing
i. Genomics and DNA libraries

Unit-3
4. Genetic engineering: **(10)**
a. Introduction to transgenic plants
b. Reporter genes
c. Indirect methods of gene transfer
d. Direct methods for gene transfer in plants
d. Role of agriculture in crop biotechnology
e. Achievements in plant biotechnology

Unit- 4 **Credit- 1**
1. Plant tissue culture: (10)
a. Principles of tissue culture
b. Terminology in tissue culture
c. Cellular differentiation and totipotency
d. Organogenesis and embryogenesis
e. Protoplast isolation and culture
f. Suspension culture
g. Meristem culture
h. Another culture
i. Applications of tissue culture
2. Research projects: **(05)**
a. Human genome project

b. Plant genome project
c. DBT Ministry of Science and Technology.

Continuous Internal Assessment (CIA): Tutorials and Assignments (05)

Note: Internal assessment lectures should be used to assess student's credibility and knowledge of the above topics. Conduct two internal tests of five marks and average it for 5 marks and Assessment/Tutorials for 5 marks. In assessment you are free to use different assessment methods.

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Recommended Books

1. Dubey, R. C. (2005). A text book of Biotechnology. S. Chand & Co. New Delhi, India
2. Kumaresan, V. (2005). Biotechnology. Saras Publication, New Delhi, India.
3. Bhojwani, S.S. &Razdan, M.I. Plant Tissue Culture: Theory and Practise, Elsevier 4. Rajdan, M.K. An
   Introduction to Plant Tissue Culture, Latest Ed., Oxford & IBH
5. Jha, T.B.& Ghosh, B. Plant Tissue Culture, 2003, Universities Press
6. Singh, B.D. Biotechnology Latest ed., Kalyani Publishers.
7. Mascarenhas, A.F. Handbook of Plant Tissue Culture, ICAR
8. Kar, D.K.& Halder, S. Plant Breeding, Biometry & Biotechnology, 2010, New Central Book Agency .
9. Gupta, P.K. Biotechnology & Genomes, latest Ed., Rastogi Publications
10. Slatter, A., Scott, N. & Fowler, N. Plant Biotechnology, 2003, Oxford University Press

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B. Sc. III Year (Practical) Semester – V
Lab Course VIII Bot-522(D)
Based on Bot 512(D) Theory Paper XD (Biotechnology)
Lectures: 45 **Total Credits:1.5**

1. Principle and working of instruments in biotechnology laboratory - Autoclave / Pressure Cooker, Centrifuge, Hot plate, Water bath, Laminar Air flow, Oven, Microscope, pH Meter, Refrigerator, Magnetic Stirrer, Shaker, Agarose Gel Electrophoresis, Green House etc.
2. Sterilization of glasswares
3. Preparation of sterile media, M.S. medium, B5 medium, White medium
4. Demonstration of callus culture
5. Demonstration of meristem culture
6. Demonstration of anther culture
7. Demonstration of suspension culture
8. Demonstration of PCR
9. Demonstration of DNA sequencer

Continuous Internal Assessment (CIA): 07 marks for internal practical examination and 03 marks for Record Book/Submission of collection and field survey report/excursion report.

Note: students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft/hard copy photographs of wild plants at the time of practical examination.

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B. Sc. III Year (Theory) Semester V
BOT-513 Skill Enhancement Course -3 (E) SEC (3)
Vermicomposting and Biofertilizers

L-45 Credits:02

A. Theory (1 credit) Total Hours 15

Unit 1: (5 hours)
Vermicomposting: Introduction and Scope, Types of Earthworm & Classification Epigeic Endogenic, Diageic, Life history of Earthworms (Earthworm Species *Eisenia foetida*)

Unit 2.
Vermicompost: Objectives, Production: Establishment of Vermicomposting and Verm wash unit, Different Methods at Vermicomposting: Small- and large-scale Bed method, Pit method, Harvesting the Compost, Storing and packing of Vermicompost (5 hours)

Unit 3
Biofertilizers -Definition, importance and advantages Sources of Biofertilizers-Bacteria, Cyanobacteria, Mycorrhiza and PSM. Outlines of production technology of bio fertilizers-isolation, selection of strain, preparation of mother culture, starter culture, mass culturing

B. Practical: (1 Credit) Total hours 15

Laboratory exercises (Any 5) (3 hours for each practical)

1. Study of eternal morphology of Earthworm- *Eisenia foetida*
2. Study of habit and habitat of Earhworm-*Eisenia fretida*
3. Establishment of vermicomposting unit Pit method
4, Establishment of vermicomposting unit Bed method
5. Vermicompost production, harvesting and packaging
6. Study of equipment for production of bie-fertilizers
7. Visit to research centres and firms making Biofertilizers

Recommended Books:
1. The Textbook of Vermicompost, Verm wash and Bio pesticides Keshav singh and et al Publisher: Biotech Books

2. The Book Hand Book of Biofertilizers &Vermiculture Publisher Engincers India Research Institute

3. Handbook of Organic Farming and Organic Foods with Vermicomposting Necm Publisher: Engineers India Research Institute

4.A textbook of Biotechnology: R. C. Dubey

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B.Sc. III Year (Theory) Semester V

BOT-513 Skill Enhancement Course -3 (F) SEC-3) F: Ethnobotany

Lectures :45 Credit: 2

A. Theory (1 Credit)

Unit 1:

Ethnobotany Introduction, concept, scope and objective interdisciplinary science; Tribal's of India, and their life styles

Unit 2: Methodology of Ethnobotanical studies: Field work, Herbarium, Ancient Literature Ethnobotany as Archaeological findings

Unit:3

Role of Ethnobotany In Community: (5 Hour))

i Food plants: Vegetables, Fruits and Seeds (7Hours

ii Spices-Clove, Black pepper, Cumin, Coriander, Cinnamon

iii Beverage-Tea and Coffee

iv Timber and Gum-Teak, Neem, Babul, Sisam.

v Medicinal Plants Significance of the following plants in ethno botanical practices (along with their habitat and morphology)- *Ocimum sanctum, Vtiex negundo, Withania somnifera Asparags racemosus, Curcuma longa, Aloe vera, Adhathoda vasica*

b. PRACTICAL: (1 Credit) Total Hours: 15

Laboratory Exercises (Any 5) (3 Hours for each Practical

1. To study the locally available plants used by the natives to cure the arthritis

2 To study the locally available plants used by the natives to cure the jaundice

3. To study the locally available plants used by the natives to cure the Diabetes

4. To study the locally available plants used by the natives to cure Fever

5. To study morphology and medicinal uses of *Aloe vera* (Korphad)

6. To study morphology and medicinal use of, *Withania somnifera* (Ashwagandha)

7. To study morphology and medicinal uses of *Asparagus racemosus* (Shatavari) R

8. To morphology and medicinal uses of *Adhathoda vasica* (Adulsa)

Suggested Readings:

1.S.K. Jain, Manual of Ethaobotany, Scientific Publishers, Jodhpur, 1995

2.S.K. Jain (ed.) Glimpses of Indian. Ethno botany, Oxford and I B H, New Dethi-1981 Lone et al Palaeoethnobotany

3. S.K. Jain (ed.) 1989. Methods and approaches in Ethnobotany. Socicty of Ethno botanirts, Lucknow, Indis

4.S.K. Jain, 1990. Contributions of Indian Ethno botany, scientific publishers, Jodhpur.

5. Colton C.M. 1997, Ethnobotany-Principles and applications, John Wilcy and sons Chichester

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B.Sc. III Year Botany CBC & GS
Semester -VI
(Theory and Practical syllabus)

Curriculum for Sem. VI
B.Sc. III Botany (Theory) Semester -VI
Elective course code: Bot-611 (Paper-XI)
(Genetics and Evolution)

45 L **Credit: 2**

Unit: 1

1. Mentalism: **(04)**

i. Introduction -G.J. Mendel
ii. Mendelian principles –Law of Dominance, law of segregation, law of independent assortment, back cross and test cross

2. Interaction of genes: **(08)**

i. Allelic interaction: incomplete dominance, co dominance, lethal genes
ii. and blood group inheritance
iii. Non allelic and non epistatic -comb shapes in fowls
iv. Non allelic and epistatic:
    a. Complementary genes or duplicate recessive epistasis (9:7)
    b. Supplementary genes or recessive epistasis (9:3:4)
    c. Dominant epistatic genes or dominant epistasis (12:3:1)
    d. Duplicate genes or duplicate dominant epistasis (15:1)

Unit: 2

1. Sex determination: **(04)**

i. Chromosomal theory of sex determination
ii. Mechanism of sex determination in man (xx -xy), Drosophila (xx and xy), birds (zz-zw), grasshopper (xx-xo) and genic balance theory in Drosophila
iii. Sex determination in plants – *Melandrium*

2. Sex linked inheritance: X, XY and Y linked inheritance: **(07)**

i. Colourblindness and haemophilia in man
ii. Holandric genes
iii. White eye colour in Drosophila,
iv. Gynandromorphs,

3. Linkage:

i. History & concepts
ii. Complete linkage and complete linkage, Bridges experiments
iii. Linkage maps based on two or three factors
iv. Crossing over concept and significance

Unit:3

1. Structure and function of gene: **(05)**

i. Fine structure of gene (Seymour Benzer)
ii. One gene one enzyme hypothesis
iii. Genes and related diseases – phenylketonuria, and alkaptonuria
iv. Detection of genetic diseases –amniocentesis, Genetic counselling

2. Quantitative inheritance **(04)**

i. Multiple factor hypothesis
ii. Character of multiple genes
iii. Example of Quantitative inheritance; kernel colour in wheat, comb length in maize
iv. Significance of Quantitative inheritance

Unit:4

Evolution

1. Emergence of evolutionary thoughts **(03)**

i. Lamarckism. Darwinism, Neo Darwinism

ii. Concepts of variation, adaptation, struggle, fitness, natural selection

2. Population genetics **(06)**

i. Population, gene pool, gene frequency
ii. Hardy Weinberg law
iii. Migration and random genetic drift
iv. Adaptive radiation and modification
v. Isolating pattern and mechanism
vi. Convergent evolution: sexual selection; co evolution

3. Speciation **(04)**

i. Definition and type
ii. Allopetric, sympatric, parapatric, peripatric
iii. Factors affecting speciation.

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Unit-5. Continuous internal assessments (CIA): Tutorials and assignments (05)

Internal assessments lectures should be used to assess students' credibility and knowledge of above topic. Conduct two internal tests of five marks and average it for five marks and assessment /tutorials for 5 marks. In assessment you are free to use different assessment method.

Suggested reading

1. Gardener. J., Simmons. H.J. and Snustad. D.P. 1991. Principles of Genetics (8 Edition). John Wiley & Sons, New York.

2.. Gupta.P.K. 1994. Genetics Rastogi Publications. Shivaji Road, Meerut.

3. Gupta.P.K. 1995. Gytogenetics. Rastogi Publications, Meerut.

4. Harl.D.L. and Jones.E.W. 1998. Genetics: Principles and Analysis (4" Edition) Jones &Barlett Publishers. Massachusctts. USA.

5. Snustad. D. P. and Simmons. M.J. 2000, Principles of Genetics (2ndEdition). John Wiley& Sons Inc., USA.

6. Russcl. P.J. 1998. Genctics (5th Edition). The Benjarnin/Cummings Publishing Co., Inc., USA.

7.Singh B.D. Genetics 2017, Kalyani publication Brian, K. Hall and Benedikt, Hallgrimsson (2008).

8. Strickberger's Evolution, 4th Edition. Joncs and Bartictt Publishers Intenational, London 9. Rastogi Veerbala Evolutionary Biology Stickberger, M. W (1990) Jones and Bartlett, Boston.Evolution

10.Futuyma. D (1997) Evolutionary Biology 3rd edition, Sinaucr Associates.

11. Verma P.S. and Agrawal V.K. (2020) Cell biology,genetics,molecular biology evolution and ecology, S.Chand publication.

B.Sc.III Botany (practical) Semester -VI
Lab course IX: Bot-621
Based on Bot-611, Theory paper-XI
(Genetics and Evolution)

45L **credits:1.5**

1. Quizzes on various related aspects (05 practicals)

2. Working out laws of inheritance by using seed mixtures (03practicals)

3. Problems based on gene interaction (03practicals)

4. Problems based on sex linked inheritance (03practicals)

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Continuous internal assessments (CIA):
Seven (07) marks for internal practical examination and three (03) marks for record book/ submission of collection and field survey report/ excursion report.

B. Sc. III Year (Theory) Semester VI
Elective Coerce Code: BOT-612 (A)
Paper XII A (Diversity of Angiosperm-II)
45 L Credit: 02

Unit: 1

a) **Plant identification**: Construction and use of keys, herbaria and botanical gardens (04)

b.) **Origin of angiosperms:** place and time of origin, probable ancestors: Pteridospermales Angiosperms, Bennettitalean, Caytoninlean and Gnetales- Angiosperms theory. Hutchinson's principles of angiosperms origin. (05

c. Binomial nomenclature: Principles and rules, Shenzhen code 2018 (03)

d. Modern trends in taxonomy: Cytotaxonomy, chemotaxonomy, and molecular systematics und Phylogeny (03)

Unit: 2

a. Taxenony: APG IV system of classification of plants (03

b. Study of diversity of families as per AFG IV system (26)

I. *Lytheraceae*
2. Rutaceac
3. Oleaceae
4. Verbenaceae
5, Asteraceae
6. Combretaceae
7. Cucurbitaceae
8. Anacardiaceae
9. Meliaceae
10. Orchidaceae
11. Papaveraceae

Continuous internal Assessment (CIA): Tutorials and Assignments (5)

Note: Internal assessment lectures should be used to assess student's credibility and knowledge of the above topic. Conduct two internal tests of five marks and average it for 5 marks and Assessment Tutorials far 5 marks. In assessment you are free to use different assessment methods

B. Se. III Year (Practical), Semester-VI

Lab Course X, BOT 622 (A) (Based on BOT 612(A), Theory (Diversity of Angiosperms-II) Paper-XID

45L **Credits:1.5**

. Study of following families with suitable examples available in your area:

1. *Liliaceae*
2, *Orchidaceae*
3. *Arecaceae*
4, *Commelinaceae*
5. *Zngiberaceae*
6. *Poaceae*
7. *Papaveraceae*
8. *Malvaceae*
9. *Apocynaceae*
10. *Solanaceae*
11. *Acanthaceae*

2. Study of different types of stomata and Trichomes.

3. Identification of plants up to species by using flora (Flora of Bombay Presidency/ Flora of Marathwada/Flora of Maharashtra/Keys)

Continuous Internal Assessment (CIA); 07 marks for internal practical examination and 03 marks for Record Book/Submission of collection and field survey report /excursion report

Note: Students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft /hard copy photographs of wild plants at the time of practical examination.

B. Se. III Year (Theory) Semester VI
Elective Course Code: BOT-612(B)
Paper. XII (B) (Economic Botany Botany)

Lectures-45 **Credit: 02**

Unlt-1: Origin, morphology, production data, cultivation practices, improved varieties, harvesting and uses of crop plants (15)

a) Cereals: Rice, Wheat, Jowar, Malze, and Pearl millet

b) Pulses: Mung, Urad, Chick pea and Pigeon pea,

c) Oil seed crops: Soyabean, Groundnut, Sunflower and Safflower

Unit -2: Origin, morphology, production data, cultivation practices, improved verities, harvesting (15) and uses of crop plants.

a) Fibre creps: Jute, Sunhemp and Cotton

b) Horticultural crops: Banana, Orange, Mango, Pomegranate, Sapota and Custard apple,

c) Ornamentals: Rose, Orchids, Gerbera, Geranium and Chrysanthemum.

Unlt-3: Botanical name, Family, Vernacular name of improved verities and economic importance of following (15)

a) **Beverages:** Alcoholic beverages: Gape wines, fruit wines; Non-alcoholic beverages: Tea and Coffee

b) **Forage crops** (in brief): Maize, Sugarcane, Jowar and Lucerne)

c). **Vegetable crops** (in brief: Brinjal, Spinach, Fenugreek, Dill, Potato, Tomato, Guards Cauliflower, Cabbage, Lablab, Cluster bean,

d) **Condiments and Spices** (in brief): Green Cardamom, Black cardamom, Cinnamon, Clove, Nutmeg and Mace, Asafoetida, Black pepper, Garlic, Onion, Ginger, Chilli,

e) **Medicinal plants** (in brief): Ashwagandha, Shatavari, Gulvel, Adulsa, Long pepper, Hirda, Beheda, Amla, Arjun, Safedmusli.

f) Invasive plants (in brie: *Glyricidia Parthenium, lpameca carnea sub.sp.fistulasa*

Continuous Internal Assessment (CIA): Tutorials and Assignments

Note: Internal assessment lectures should be used to assess student's credibility and knowledge of the above topics. Conduct two internal tests of five marks and average it for 5 marks and Assessment or Tutorials for 5 marks. In assessment you are free to use different assessment methods

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B. Se. III Year (Practical),
Semester-VI Lab Course X, BOT 621(B)
(Based on BOT 612(B), Theory Paper-XII) Credits: L.5 (Economic Botany) 451)

Study of morphology, structure, and simple biochemical tests of food storing tissues in Maize, Rice, Jowar, Gram.pigeon pea, Potato

1) Study of histochemical tests of lignin and cellulose (Jute, Cotton, and Sun hemp)

2) Hand section of Groundout, sunflower and staining of oil droplets

3) Study of condiments and spices (Cardamom, Black pepper, and Chilies).

4) Study of horticultural crops (Banana, Sapota, Mango, Citrus and Custard apple)

5) Study of vegetable crops (Brinjal, Tomato, Guards, Onion and Potato)

6) Study of Rose, Gerbera and Marigold.

7 Study of any 4 medicinal plants

8) Study of any 1 harmful plant

Continuous Internal Assessment (CIA): 07 marks for internal practical examination and 03 marks for Record Book/ Submission of collection and field survey report / excursion report.

Note: Students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft/ hard copy photographs of wild plants at the time of practical examination.

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B. Sc. III Year (Theory) Semester – VI
Elective Course Code: Bot-612(C)
Paper XII (C) (Microbiology & Disease Management)
Lectures:45 Total Credits:2

Unit-1 Microbiology **Credit-0.8**

1. Definition, scope, importance and classification of Microorganisms (05)
2. Microbial techniques:

a. Microscopy – simple, compound and electron microscope

b. Micrometry – Principle, ocular and stage micrometry working and uses

c. Common stains used in pathology, with special reference to cotton blue and Gram's Stain

d. Sterilization of glasswares and different culture media (PDA, MRB, CZA, NA) (06)

3. Industrial application of microorganisms - organic acids (Citric acid or glutamic acid), alcohol (ethanol), antibiotics (penicillin) milk products, and bio pesticides (05)

Unit-2 Disease management: **Credit-1.2**

1. Preventive methods: field sanitation, use of clean planting material, crop rotation, trap crops, time of sowing, planting distance and tillage (03)
2. Control methods –

a. Seed treatment: concept, objective, traditional and modern methods of seed treatment (02)

b. Soil sterilization: concept, objectives and methods. (02)

c. Fungicides: Definition, classification and general accounts of application and uses. (06)

i. Sulphur fungicides – Inorganic – sulphur, Organic – Ziram

ii. Copper oxychloride

iii. Mercuric chloride – Agrosan – GN

iv. Heterocyclic nitrogenous compounds – Iprodine

v. Benzene compounds – Dexon

vi. Antibiotics – Streptomycin and Aureofungin

vii.Systemic – Benomyl and propiconazole

d. Pesticides:Nicotin,Neem and pyrethrum (01)

e. Rhodenticides – Zinc phosphoid (01)

f. Nematicides- Nemagon, Propoxar (01)

g. Weedicides- 2,4-D (01)

h. Biological control with special reference to *Trichoderma* & *Rhizobium* (02)

3. Plant quarantine: definition, importance & principle (01)
4. Control measures and environment: pollution due to chemicals, residual effects, toxicity, safe measures, color code, antidote, symptoms of poisoning, precautions in using pesticides (03)
5. Pesticide application equipment's: principle and working –pneumatic air pump, knapsack sprayer, mist blower and duster, types of nozzles (03)
6. Plant disease clinic: Concept, objective and need (01)
7. Recent techniques in plant pathology: Genetically modified organisms (GMO's), B.T.Cotton,

Pheromones,PCR protocol (03)

Continuous Internal Assessment (CIA): Tutorials and Assignments (05)

Note: Internal assessment lectures should be used to assess student's credibility and Knowledge of the above topics. Conduct two internal tests of five marks and average it for 5 marks and Assessment/Tutorials for 5 marks. In assessment you are free to use different Assessment methods.

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B. Sc. III Year (Practical) Semester – VI

Lab Course X, Bot-622(C) Based on Bot. 612(C) Theory Paper XII

(Microbiology and Disease Management)

Lectures:45 **Total Credits:1.5**

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1. Study of fungicides as per theory syllabus
2. Preparation of Bordeaux mixture
3. Study of insecticides as per theory syllabus
4. Study of *Trichoderma* culture
5. Isolation and preparation of *Rhizobium* culture
6. Study of plant protection equipment's –pneumatic air pump, knapsack sprayer, mist blower cum duster
7. Principle and working of autoclave, BOD incubator, laminar air flow, Tilak air sampler
8. Demonstration of aerobiological techniques to study fungal spores by Tilak air sampler
9. Calibration of microscope and measurement of fungal spores
10. Sketching of fungal spore by camera Lucida technique
11. Study of pathogens in fruits from local market
12. Study of fungi from locally available seed samples
13. Preparation of sterile media - nutrient agar, potato dextrose agar, MRB,Czapeak agar
14. Preparation of stains and mounting media - cotton blue, lacto phenol and gram stain
15. Isolation and identification of seed borne pathogen by blotter and agar plate method
16. Detection of soil mycoflora from any crop plant
17. Internal Assessment

Continuous Internal Assessment (CIA): 07 marks for internal practical examination and 03 marks for Record Book/Submission of collection and field survey report/excursion report.

Note: students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft/hard copy photographs of wild plants at the time of practical examination.

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B. Sc. III Year (Theory) Semester- VI

Elective Course Code 612 (D) Paper XX (D)
(Bioinformatics)

(45L) **Credit 02**

Unit- 1

1. Introduction to bioinformatics and its applications (03)
2. Sampling, sample size, sampling techniques (03)
3. Data collection and presentation: (05)
   a. Types of data
   b. Methods of data collection
   c. Data presentation - line chart, bar chart, histogram, polygon, pie diagram
4. Measures of central tendency: (03)
   a. Mean
   b. Median
   c. Mode,
5. Probability, chi-square test, t – test (02)

Unit – 2

1. Introduction to computer basics- general characters, types of computer (03)
2. Hardware-input and output devices, CPU, storage devices (02)
3. Concept of files and folders and directories (01)
1. Introduction and uses of software (07)
   a) Open Broadcaster Software (OBS)
   b) Canva Graphic Design, Adobe Photoshop
   c) Movavi Video Editing Software

Unit – 3

1.Operating System –Windows, (08)
Application software – Page maker, Coral Draw, MS-Word, MS Excel, Power Point Presentation, MS-access, html document
2. Networking technology - LAN, WAN, Internet, Web browsing and servers – Netscape navigator, Internet explorer, search engines like Mozilla Firefox, Brave AI (artificial Intelligence) Google Bard. 3. Introduction to MEDLINE, CCOD and PUBMED for biological information,
Introduction to bioinformatics software – bioperlbio java bioXML (08)

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B. Sc. III Year (Practical) Semester- VI
Lab Course –X Bot 622 (D)(Based on Bot 612),Theory Paper XXII (D)
(Bioinformatics)

(45L) **Credit 1.5**

1. Use of operating system and creation of a job from word processor, spread sheet, presentation and data base
2. Creating files, folders and directories
3. Internet browsing and downloading information with special reference to biological literature
4. Creating an e - mail account, sending and receiving e - mail
5. Graphical presentation of data, adobe Photoshop file format Psd, JPG, PNG and GIF
   a) Open Broadcaster Software (OBS)
   b) Canvas Graphic Design, Adobe Photoshop
   c) Movavi Video Editing Software
6. Computer based statistical techniques
8. Computation of mean, median, and mode
10. Computation of chi- square test, and t - test
11. Students should undertake a visit biotechnology industry, biotechnology research laboratory

Continuous Internal Assessment (CIA): 07 marks for internal practical examination and 03 marks for Record Book/Submission of collection and field survey report/excursion report.

Note: students should undertake Botanical excursion, field visits to ecologically different areas for plant study and submission of list and soft/hard copy photographs of wild plants at the time of practical examination.

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Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar
B. Sc. III Year (Theory) Semester VI

BOT-613 Skill Enhancement Course-4 (G) SEC 4 (G): Horticulture
45L **Credit -02.**

A. Theory (credit-1) Total hours 15

Unit 1: Concept, Objectives, Branches of Horticulture, Carrier opportunities in the horticulture, Soil and its preparation: Physical texture and composition of soil, soil types, soil pH, preparation of beds and preparation of soil mixtures/garden soil.

Fertilizers, Organic Manures and Substrates Fertilizers, Farm Yard Manure (FYM), compost, leaf mold, bone meal, Oilcakes, wood ash, charcoal, peat moss, Sphagnum Moss, shredded bark, Sawdust and wood shavings; Vermiculite and Vermicompost

Potting, Repotting and Transplantation: Types of pots, Plants suitable for pot culture, Potting, Repotting and Transplantation

Pruning: Introduction, objectives, Types and season of pruning, special praning techniques, differential pruning technique, pruning of flowering and fruit plants.

Training: Introduction, systems of pruning-leader and modified leader systems, training of plants requiring support of Structures, training of plants do not require support of Structure and training of ornamental plants. (10 hours)

Unit 2: Introduction to Horticultural Plants Classification of Horticultural crops: classification on the basis of growth habit, shedding of leaves, life span, climatic requirement, use of plant part, ecology Types of Horticultural Plants: Annuals, Perennials, climbers, shrubs and trees (at least two examples with morphology and horticultural use and applications from each type). (5 Hours)

B. Practical: (1 Credit) Total hours 15

Laboratory exercises (Any 5) (3 hours for each practical)

1. Study of tools and implements in Horticulture.
2. Study of soil texture and p
3. Study of fertilizers-organic manures and substrates
4. Preparation of soil mixture for petting and pots.

5. Demonstration of Potting, Repotting and Transplantation
6. Demonstration of Praning and Training techniques.
7. Study of Horticultural Crops
8. Visit to Horticulture University Research station, S

suggested readings:

1. Prasad S (1999) Agros Dictionary of Horticulture. Agrobios, Jodhpur
2. Rao KM (2005) Textbook of Horticulture. McMillan India Lad, New Delhi.
3. Sanders TW (2006) Encyclopedic Dictionary of Horticulture. Bio Green Books, Delhi
4. Sheela VL (2011) Horticulture. MIP Publishers, New Delhi.
5. Kaul GL. (1989) Horticulture crop in India.
6. Arora 15 (2014) Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi
7. Prasad and Kumar 2014: Principles of Horticulture 2nd Edition Agri
8. Jahendra Singh, 2002. Basic Horticulture. Kalyani Publishers, Hyderabad

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar
B.Sc. III Year (Theory) Semester VI B.
BOT-613 Skill Enhancement Course-4 (G) SEC 4 (G): Greenhouse Technology
45L **Credits: 02**

A. THEORY: (1 Credit) Total Hours: 15

Unit 1: Introduction, General scope and classification of greenhouses, construction of greenhouse, Net-poly houses (4 Hours)

Unit 2: Plant selection and Management of Fertilizers, Irrigation in Green Houses (4 Hours)

Unit 3: Management of diseases and pests in in Green Houses (4 Hours)

Unit 4: Applications of Green House Technology, Importance of Greenhouse technology (3 Hours)

B. PRACTICAL: (1 Credit) Total Hours: 15

Laboratory Exercises (Any 5)

1. Study of Green House with the help of Models/Charts. Hours for each Practical)
2. Demonstration of various types of green houses with the help of Models Charts.
3. Study of Green House effect for understanding working principle of Green House.
4. Study of standard requirements for construction of a green house.
5. Study of Green House diseases,
6. Study of Plant selection for Green House,
7. Vegetative Propagation in Green House Plants.
8. Visit to a Green House,

Suggested Readings-

1. Pant V. and Nelson, 1991, Green House Operation and Management, Bali Publication. Now Delhi.

2. Dubey R.C. 2006. A text book of Biotechnology. S.Chand and Company. New Delhi.

3. Prasad S., Kumar U. 2012. Green House Management for Horticultural Crops. Agrobios India.

4. Sheela V.L. 2011. Horticulture.MJP Publishers, Chennai.

5. https://en.wikipedia.org/wiki/Greenhouse.html 6. https://aggie-horticulture.tamu.edu/ornamental/greenhouse-management/greenhouse- structures.html