



CIRCULAR NO.SU./B.Sc.CBC & GS/11/2022

It is hereby inform to all concerned that, on the recommendation of Faculty of Science & Technology Meeting dated 24.08.2022, **the Academic Council at its meeting held on 29 August 2022 has accepted the following Syllabi of B.Sc. Degree under the Choice Based Credit & Grading System along with Rules and Regulation** as appended herewith:-

1.	B.Sc.Computer Science (Optional)	Ist and IInd semester
2.	B.Sc.Computer Application (Optional)	Ist and IInd semester
3.	B.Sc.Computer Application (Degree)	Ist and IInd semester
4.	B.Sc.Computer Science (Degree)	Ist and IInd semester
5.	B.Sc.Horticulture (Optional)	Ist to VIth semester
6.	B.Sc.Botany (Optional)	Ist to VIth semester
7.	B.Sc. Agrochemical & fertilizer (Optional)	Ist to VIth semester
8.	B.Sc.Home Science (Optional)	Ist and IInd semester
9.	B.Sc.Automobile Technology (Degree)	Ist and IInd semester
10.	B.Sc.Workshop Technology (Degree)	Ist and IInd semester
11.	B.Sc.Refrigeration and Air Conditioning (Degree)	Ist and IInd semester
12.	B.Sc.Environmental Science (Optional)	Ist and IInd semester
13.	B.Sc.Biotechnology (Degree)	Ist and IInd semester
14.	B.Sc.Biotechnology (Optional)	Ist and IInd semester
15.	B.Sc.Dairy Sci.& Tech (Optional)	Ist and IInd semester
16.	B.Sc.Zoology (Optional)	Ist to VIth semester
17.	B.Sc.Polymer Chemistry (Optional)	Ist and IInd semester
18.	B.Sc.Fisheries Science (Optional)	Ist and IInd semester
19.	B.Sc.Instrumentation Practice (Optional)	Ist semester
20.	B.Sc.Biochemistry (Optional)	Ist and IInd semester
21.	B.Sc.Non Conventional & Conventional Energy (Degree)	Ist and IInd semester

This is effective from the Academic Year 2022-23 and onwards.

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

University Campus,
Aurangabad-431 004.
Ref.No. SU/B.Sc./2022/8428-35
Date:-29.08.2022.

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[Signature]
**Deputy Registrar,
Academic Section**

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**Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad**

**DSC- Discipline Specific Core course
AECC-Ability Enhancement Compulsory Course
SEC-Skill Enhancement Course**

Syllabus of Horticulture

B.SC. IInd Year

Semester III and IV

Effective from June 2023-24

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS) Curriculum

For

Faculty of Science and Technology

Course Structure and Scheme of Examination

Table 1 to 6

B.Sc. Horticulture (Three Year Undergraduate Degree Program)

B.Sc. Second Year (Undergraduate Diploma)

Table No: 03

Semester III

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional 3 (DSC-3C) Core Courses Note: DSC-1C DSC-2C DSC-3C	HORT -311	Core Course- Principles and Technology of Fruit gardening (Theory Paper No.-V)	45(3/week)	2	50	10	40	20
	HORT -312	Core Course- Orchard Management of Fruit Crops (Theory Paper No.-VI)	45(3/week)	2	50	10	40	20
	HORT -321	Lab Course -3 Principles and Technology of Fruit gardening (Based on HORT -311)	45(3/week)	1.5	50	10	40	20
	HORT -322	Lab Course -4 Orchard Management of Fruit Crops (Based on HORT -312)	45(3/week)	1.5	50	10	40	20
Note: Additionally minimum of two other disciplines except horticulture are must choose from group of other discipline each having 2 Theory papers of 2 credit and 2 practical papers each of 1.5 credit are taken.								
Ability Enhancement Compulsory Course (AECC- 3)	ENG-331	Communication skills in English-III	45(5/week)	3	50	10	40	20
	SL-332	Marathi/Hindi/Urdu/ Sanskrit student can opt any one of these languages (SL-III)	45(4/week)	3	50	10	40	20
Skill Enhancement Course (SEC-1)	HORTSEC- 313	HORTSEC-1 Any one skill to be chosen out of SEC-1(A) Flower Decoration and Event Management or SEC-1(B) Bonsai Culture, Indoor and Outdoor Garden Design & Landscaping	45(3/week)	2	50	10	40	20
Total Credit for Semester III: 15 (Theory: 12; Laboratory: 03)				15	350	70	280	140
Table No: 04								
Semester IV								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
	HORT -411	Core Course-	45(3/week)	2	50	10	40	20

Optional 3 (DSC-3D) Core Courses Note: DSC-1D DSC-2D DSC-3D		Principles and Technology of Fruit gardening (Theory Paper-VII)						
	HORT -412	Core Course- Orchard Management of Fruit Crops (Theory Paper-VIII)	45(3/week)	2	50	10	40	20
	HORT -421	Lab Course -5 Principles and Technology of Fruit gardening (Based on HORT -411)	45(3/week)	1.5	50	10	40	20
	HORT -422	Lab Course -6 Orchard Management of Fruit Crops (Based on HORT -412)	45(3/week)	1.5	50	10	40	20
Note: Additionally minimum of two other disciplines except horticulture are must choose from group of other discipline each having 2 Theory papers of 2 credit and 2 practical papers each of 1.5 credit are taken.								
Ability Enhancement Compulsory Course (AECC- 4)	ENG-431	Communication skills in English-IV	45(5/week)	3	50	10	40	20
	SL-432	Marathi/Hindi/Urdu/ Sanskrit student can opt any one of these languages (SL-IV)	45(4/week)	3	50	10	40	20
Skill Enhancement Course (SEC-2)	HORTSEC- 413	SEC-2 Any one skill to be chosen out of SEC-2(C) Organic Production and its Post- Harvest Management of Horticultural Crops or SEC-2(D) Seed Production in Horticultural Crops	45(3/week)	2	50	10	40	20
Additional Credit	EVS-413	Environmental Studies	45(3/week)	2*	50			
Total Credit for Semester IV: 15 (Theory: 12; Laboratory: 03)			315	15	350	70	280	140

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-III

Name of Subject: Horticulture

Core Courses (Optional 3-DSC-3C)

Course Code: HORT-311

Name of The Paper: Principles and Technology of Fruit gardening. (Theory: Paper No: V)

Total Credit (02)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

Unit I (10 Periods)

- 1) Fruit Gardening- Definition, Importance and scope (02).
- 2) Soil requirement of fruit crops. (02)
- 3) Climatic requirement of fruit crops. (02)
- 4) Climatic zones of Maharashtra/ India. (02)
- 5) Classification of fruit crops. (02)

Unit II (10 Periods)

6. Unfruitfulness of fruit crops. (02)
7. Growth and fruiting habit of fruit crops, fruit bud differentiation, Fruit setting and fruit drops. (03)
8. Planning layout and selection of site for establishing an orchard. (02)
9. Methods and Systems of planting material. , after care of plating, fencing, role of wind brakes and shelter belts, high- density planting in mango, banana, sapta, grapes etc. (03)

Unit III (10 Periods)

- 10) Orchard management practices, Clean cultivation, crop rotation, intercropping , Multistoried cropping (05)
- 11) Role of mulching its merits and demerits (02),
- 12) Inter cultivation operations in fruit crops (03)

Unit IV (10 Periods)

- 13) Irrigation- water requirement of fruit crops. Methods of irrigation- Ring of basin furrow sprinkler and drip irrigation, Rain gun irrigation. (03)
- 14) Role of plant growth regulators on fruit crops (Its types) (02)
- 15) Insect pests and diseases management (05).

Unit V (5 Periods) Tutorials, seminars and Assignments

(05)

- 1. Internal Test 01 (5 Marks)**
- 2. Internal Test 02 (5 Marks)**
- 3. Assignment/Tutorial (5 marks)**

Note:

- i. **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii. **Continuous Internal Assessment (CIA):** Theory (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-III

Name of Subject: Horticulture

Core Courses (Optional 3-DSC-3C)

Course Code: HORT-312

Name of The Paper: Orchard Management of Fruit Crops (Theory: Paper No: VI)

Total Credit (02)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

Unit I (10 Periods)

- 1) Nutritional requirements of fruit crops of and manures in fruit gardening. (05)
- 2) Role of essential nutrients- Macro-micro nutrients. (05)

Unit II (10 Periods)

- 3) Basic principles of manuring in fruit crops, (05)
- 4) Manures, Types of manures, Methods of preparation of manures, FYM, Compost, Urban compost, Vermi compost, green manuring and its role in fruit crops. (05)

Unit III (10 Periods)

- 5) Methods of application of manures. (02)
- 6) Principles and methods of application of fertilizers. (03)
- 7) Role of Bio-fertilizers and liquid fertilizers in fruit crops (05)

Unit IV (10 Periods)

- 8) Training and Pruning-Objects and methods of Training and Pruning (05)
- 9) Special Horticultural practices for inducing Fruiting in fruit crops. (05)
 - 11.1 Bending in Guava
 - 11.2 Notching in fig.
 - 11.3 Girdling in Grape.
 - 11.4 Ringing Mango.
 - 11.5 Root pruning in citrus.

Unit V (5 Periods) Tutorials, seminars and Assignments

(05)

1. Internal Test 01 (5 Marks)
2. Internal Test 02 (5 Marks)
3. Assignment/Tutorial (5 marks)

Note:

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Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-III
Name of Subject: Horticulture
Lab Course No. 3 Course Code: HORT-321
(Practical: Based on paper HORT-311)

Name of The Paper: Principles and Technology of Fruit gardening.
Total Credit (1.5) Marks: 50 Marks (CIA=10 UA=40)
Contact Hours: 30 (Clock Hours) Periods- 45 (50 Minutes of Each)

- 1) Layout of system of planting. (02)
- 2) Digging and filling of pits for fruit tree planation. (01)
- 3) Selection of planting material and transplanting of fruit crops. (01)
- 4) Study of flowering and fruiting habits in fruit trees. (01)
- 5) Intercultural operations in fruit crops. (01)
- 6) Identification, collection of important pest and disease of fruit crops. (02)
- 7) Method of control of pest and disease in fruit crops. (01)
- 8) Preparation and application of plant growth regulators(01)
- 9) Preparation of Bordeaux Mixture and pest. (01)
- 10) Irrigation layout (03)
 - 10.1 Ring and basin.
 - 10.2 Ridges and furrow
 - 10.3 Drip irrigation
 - 10.4Sprinkler.
- 11) Visit to commercial orchard. (01)

Note:

- i. **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii. **Continuous Internal Assessment (CIA): Practical** (10 Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- iii. **Practical examination:** There shall be annual examination and Student Shall Submit record book, Field note book/Tour Report, Assignment or Project work at the time of exam

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-III
Name of Subject: Horticulture
Lab Course No. 4 Course Code: HORT-322
(Practical: Based on paper HORT-312)

Name of The Paper: Orchard Management of Fruit Crops	
Total Credit (1.5)	Marks: 50 Marks (CIA=10 UA=40)
Contact Hours: 30 (Clock Hours)	Periods- 45 (50 Minutes of Each)

- 1) Methods of preparation of FYM (01)
- 2) Methods of preparation of Compost. (01)
- 3) Methods of preparation of green manure. (01)
- 4) Methods of preparation of Vermi-compost. (01)
- 5) Methods of application of Fertilizers. (01)
- 6) Methods of application of Bio-fertilizers. (01)
- 7) Methods of application of Liquid fertilizers. (01)
- 8) Layout methods of preparation of Bio-gas and bio stories. (01)
- 9) Special horticultural practices (05)
 - 1) Bahar treatment
 - 2) Notching in Fig
 - 3) Ringing in Mango
 - 4) Girdling in grape
 - 5) Bending in Guava
 - 6) Root proving in citrus
- 10) Systems of training in Fruit Crops. (01)
- 11) Systems of pruning in grape, Ber, fig and other fruit crops. (01)

Note:

- i. **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii. **Continuous Internal Assessment (CIA): Practical** (10 Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- iii. **Practical examination:** There shall be annual examination and Student Shall Submit record book, Field note book/Tour Report, Assignment or Project work at the time of exam

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Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination

B.Sc. (Three Year Undergraduate Degree Program)

B.Sc. Second Year

Semester-III

Name of Subject: Horticulture

SEC-1 Course

Course Code: HORTSEC-313

Paper No: HORTSEC-1(A)

Name of The Paper: Flower Decoration and Event Management. (Theory+Practical)

Total Credit (02)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

Theory	Credit 1	Total Periods: 15 Hours
Unit I		(05 Periods)
1) Introduction, Scope and Importance of Floriculture specially emphasize on Flower Decoration and Dry decoration		
2) Types of Flower Arrangement: Floral Ornaments – Garlands – Floral crowns – Hair decoration – Rangoli – Floral Bouquets – Button holes – Floral arrangement – Western style –		
3) Principles of Design viz., – Emphasis – Balance – Proportion – Rhythm – Harmony – Unity – Elements of Design viz., – Line – Form – Texture – Colour		
4) Selection of flowers and foliage – Line flowers – Form flowers – Mass flowers – Filler flower – Materials required –		
5) Design rules – Types of floral arrangement –Circular – Triangular – Radiating – Crescent – Horizontal Hogarthian curve		
6) Conditioning – Reconditioning of flowers.		
Unit II		(05 Periods)
7) Japanese floral arrangement – Ikebana – Moribana – Nageire – Jiyu-bana-Zen'eika – Zen'ei-bana-Morimono – Materials required – General rules – for Moribana and Nageire styles of arrangement, Basic styles of Moribana and Nageire , Basic upright and Basic slanting arrangements		
8) Dry flower arrangements. Types and Designs, Material Selection in Dry Flower arrangements.		
9) Economic considerations for flower arrangements.		
10). Exhibition, Marketing of Flower arrangement		
Unit III		(05 Periods)
11) Definition, Scope of Event Management. Introduction to Conventions, Exhibitions, Meetings -- - definition & components. Nature and demand of Conference market. Growth and development of event industry, Economic and social significance.		
12) Typology of planned events, Varieties & importance of events , Key steps to successful events Characteristics and complexities of events Checklist for different events, planning schedule & actions agenda		
13) Conference program designing, timing, supervision, presentation, Catering and hospitality, Transportation, teleconferencing, recording & publishing. Sponsorship , sponsors , organizers, customers & guests. Event planning, Key characteristics, Pre-event responsibilities, legal issues, negotiations .		
14) Events and Tourism, Business tourist, Tourism & Culture, Incentive tours Risk Management, Safety and Global Issues in Event Management		
15) MICE Tourism Tourism Events ---- National & International Scenario International Trade Fairs & Marts ---Germany,China,Singapore,Hongkong,U.K. etc. Events and Tourism Marketing,		

**Practical
Practical Demonstration**

Credit 1

Total Periods: 15

Practical:

Unit IV

(05 Periods)

- 1) Identification and proper selection of flower arrangement tool, containers, flowers and other material and accessories
- 2) Preparation of various types of bouquets
- 3) Preparation of various types of boutonnieres, wreathes, nosegay, etc

Unit V

(05 Periods)

- 4) Practical on Japanese style of flower arrangement- Ikebana, Morribana, Morrimono, Naggire,
- 5) Preparation of various types of garland, Gajra, Venni etc.
- 6) Drying and preservation technique of dry flower
- 7) Preparation of pot pourrie
- 8) Preparation of Greeting card using dry flower arrangement

Unit VI

(05 Periods)

- 9) Preparation of Rangoli by using various types of flowers
- 10) Conditioning – Reconditioning of flowers.
- 11) Exhibition of cut flowers, floral arraignment
- 12) Project assignment on wedding decoration/ ceremony or other occasion/Event
- 13) Visit to nearby floriculture market

Note:

- i) **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two tests will be considered) and 05 Marks for Assignment/tutorials.

Suggested Readings:

- 1) Jean Taylor Creative Flower Arrangements. Random House UK; New edition edition (27 November 1993)
- 2) Purnima Shah. Silence Speaks - A book about Japanese flower arrangements (Ikebana) . Buddha Bamboo; 1ST edition (2016)
- 3) Stella Coe. Art of Japanese Flower Arrangement .
- 4) Fiona Barnett . Flower Arranging: A Complete Guide to Creative Floral Arrangements . Southwater publisher
- 5) Charlene Tarbox . Creative Haven Beautiful Flower Arrangements Coloring Book. Dover Publications Inc.; Clr Csm edition
- 6) Event Management in leisure & tourism – David Watt
- 7) Conferences – Tomy Rogers

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-III

Name of Subject: Horticulture

SEC-1 Course

Course Code: HORTSEC-313

Paper No: HORTSEC-1(B)

Name of The Paper: Bonsai Culture, Indoor and Outdoor Garden Designing & Landscaping
(Theory+Practical)

Total Credit (02)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

Theory	Credit 1	Total Periods: 15 Hours
Unit I (05 Periods)		
1) Introduction: History of Bonsai culture and Terrarium, Scope and importance of Bonsai Culture and terrarium, Nomenclature System of Horticulture Crops used in Bonsai. Botanical Classification system.		
2) Propagation of horticulture Crops Especially for Bonsai Culture and terrarium		
3) Selection of Plants for Bonsai culture and terrarium		
4) Types and Classification of the Bonsai- Upright (formal and informal) – Winding – Winding – Oblique – Gnarled – Semi-cascade-cascade – Clasped to stone etc.		
5) Bonsai System and Techniques		
Unit II (05 Periods)		
6) Selection of Container, tools and accessories for Bonsai and Terrarium		
7) Principle of Bonsai Culture and Terrarium culture		
8) Bonsai and terrarium culture soil and climate management		
9) Bonsai and terrarium management practices and Plant care: Media – Potting and Re-potting – Training – Pruning and Pinching (Shoot, leaf and root) – Watering – manuring – Defoliation –		
10) Marketing and exhibition of Bonsai Culture and Terrarium		
Unit III (05 Periods)		
11) Introduction: Importance – History and development of gardening – Hindu style – Buddhist garden – Moghul garden – Japanese garden – British garden.		
12) Garden Plant components : Arboretum – Shrubbery — Topiary – Edge – Hedge – Terrace garden, Flowering annuals and herbaceous perennials – Climbers and creepers – Ornamental palms – Ferns.		
13) Garden Non plant components : Rock garden – Water garden- Fountain- Statue- Arches- Pergola- Urns- Tubs.		
14) Landscaping: Principles of landscaping – Lawn and lawn maintenance – Principles, planning and execution of private garden – Public garden and factory garden.		
15) Indoor gardening: Decorative plants – Bonsai –Decoration with indoor plants for conference hall, living room, dining hall and verandah flower arrangement.		
Practical	Credit 1	Total Periods: 15
Practical Demonstration:		
Unit IV (05 Periods)		
1) Selection of Plants and planting materials for Bonsai and terrarium		
2) Identification of tools and equipments for bonsai and terrarium		

- 3) Bonsai and Terrarium planting, potting, depotting and repotting
- 4) Bonsai management practices and care techniques
- 5) Terrarium management practices and care techniques

Unit V (05) Periods)

- 6) Bonsai and Terrarium plant protection care and practices
- 7) Preparation of various types of bonsai
- 8) Bonsai and Terrarium exhibition and marketing strategies
- 9) Identifying of important ornamental trees 2. Identifying of important shrubs 3. Identifying of important climbers and creepers 4. Identifying of important edge and hedge plants 5. Identifying of important ferns, cacti and succulents
- 10) Practising in lawn making

Unit VI (05) Periods)

- 11) Practising in lawn maintenance
- 12) Practising in planning and layout of home gardens
- 13) Practising in planning an layout of public gardens
- 14) Acquiring knowledge about the flowering annuals with reference to raising nursery, pricking, tipping and disbudding and preparation of main field and transplanting
- 15) Visit to botanical garden, Park, bonsai garden and terrarium nursery

Note:

- i) **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two tests will be considered) and 05 Marks for Assignment/tutorials.

Suggested Readings:

- 1) Dr. N. Mangadevi, Bonsai-Emesco Books publisher
- 2) Dey.S.C.- Bosnai : An art of miniature plant culture- Ankur publisher
- 3) Paul Lesniewicz., 1994. Bonsai in your home. Sterling publishing Co, New York
- 4) मालती नगरकर, विजय नगरकर बोनसाय वामनवृक्षकला, कॉन्टिनेन्टल प्रकाशन
- 5) डॉ. ए. बी पाटील . बोन्साय

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.Sc. Second Year Semester-IV
Name of Subject: Horticulture
Core Courses (Optional 3-DSC-3D) Course Code: HORT-411
Name of The Paper: Cultivation Technology of Fruit Crops (Theory: Paper No: VII)
Total Credit (02) Marks: 50 Marks (CIA=10 UA=40)
Contact Hours: 30 (Clock Hours) Periods- 45 (50 Minutes of Each)

Methods of cultivation of fruit crops:

History, origin, Area, Importance, scope, value, varieties, propagation methods, soil, climate, planation, after care, Cultural practices, Nutrition, Water requirement, intercropping, Important pest and diseases, harvesting, yield and marketing of following fruit crops.

Unit I (10 Periods)

- | | |
|---|------|
| 1) Mango | (03) |
| 2) Banana | (03) |
| 3) Citrus (Lemmon, Mandarin Orange, Sweet orange) | (04) |

Unit II (10 Periods)

- | | |
|-----------|------|
| 4) Guava | (02) |
| 5) Grapes | (02) |
| 6) Sapota | (02) |
| 7) Papaya | (02) |
| 8) Fig | (02) |

Unit III (10 Periods)

- | | |
|----------------|------|
| 9) Pomegranate | (03) |
| 10) Aonla | (03) |
| 11) Tamarind | (02) |
| 12) Jamun | (02) |

Unit IV (10 Periods)

- | | |
|------------------------------|------|
| 13) Custard apple | (03) |
| 14) Ber. | (02) |
| 15) Strawberry and Pineapple | (02) |
| 16) Apple | (02) |
| 18) Jackfruit, Dragoon fruit | (01) |
| 19) Kiwi ,Pear | (01) |

Unit V (5 Periods) Tutorials, seminars and Assignments (05)

- 1. Internal Test 01 (5 Marks)**
- 2. Internal Test 02 (5 Marks)**
- 3. Assignment/Tutorial (5 marks)**

Note:

- i. **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii. **Continuous Internal Assessment (CIA): Theory (10 Marks):** Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.

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Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination

B.Sc. (Three Year Undergraduate Degree Program)

B.Sc. Second Year

Semester-IV

Name of Subject: Horticulture

Core Courses (Optional 3-DSC-3D)

Course Code: HORT-412

Name of The Paper: Production Technology of Plantation, Spices, Condiments, and medicinal and aromatic plants (Theory: Paper No: VIII)

Total Credit (02)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

Unit I (10 Periods)

- 1) Scope and importance of spices and condiments, plantation crops, medicinal and aromatic plants. (02)
- 2) Study of important Spices and condiments (08)
Ginger, Turmeric, Pepper, Cardamom, Cumin, Cinnamon, Clove, Cumin, Fennel, Nutmeg,

Unit II (10 Periods)

- 3) Study of important Plantation Plants (10)
Coconut, Arecanut, Betel Vine, Cashew, Coffee, Rubber Tree, Oil palm

Unit III (10 Periods)

- 1) Study of important Medicinal Plants (10)
Sarpagandha, Opium, Occimum, Periwinkle, Aloe Vera, Guggal, Medicinal Solanum, Senna, Isabgol, Pipali, Rauvolfia, Stevia, Coleus.

Unit IV (10 Periods)

- 1) Study of important Aromatic Plants (10)
Lemongrass, Indian Basil, Citronella, Kewada, Mint, Palmarosa Grass, Rose Geranium, Pachouli, Davana

Unit V (5 Periods) Tutorials, seminars and Assignments

(05)

1. Internal Test 01 (5 Marks)
2. Internal Test 02 (5 Marks)
3. Assignment/Tutorial (5 marks)

Note:

- i) **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-IV

Name of Subject: Horticulture

Lab Course No. 5

Course Code: HORT-421

(Practical: Based on paper HORT-411)

Name of The Paper: Cultivation Technology of Fruit Crops

Total Credit (1.5)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

-
- 1) Identification of fruit crops and their varieties. (02)
 - 2) Role of Root stocks used in fallowing crops.
 - 2.1 Mango (01)
 - 2.2 Citrus. (01)
 - 2.3 Sapota. (01)
 - 2.4 Grape (01)
 - 2.5 Custard apple. (01)
 - 3) Mango malformation. (01)
 - 4) Paclobutrazol treatment for alternate bearing of mango (01)
 - 5) Banana plantation by rhizome/suckers. (01)
 - 6) Bahar treatment in pomegranate. (01)
 - 7) Plant protection in grape, pomegranate, Ber. (02)
 - 8) Papain extraction from papaya. (01)
 - 9) Visit to various commercial fruit orchard. (01)

Note:

- i. **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii. **Continuous Internal Assessment (CIA): Practical** (10 Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- iii. **Practical examination:** There shall be annual examination and Student Shall Submit record book, Field note book/Tour Report, Assignment or Project work at the time of exam

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Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-IV

Name of Subject: Horticulture

Lab Course No. 6 Course Code: HORT-422

(Practical: Based on paper HORT-412)

Name of The Paper: Production Technology of Plantation, Spices, Condiments and Medicinal and Aromatic plants

Total Credit (1.5)

Marks: 50 Marks (CIA=10 UA=40)

Contact Hours: 30 (Clock Hours)

Periods- 45 (50 Minutes of Each)

-
- 1) Storage of ginger rhizomes (01)
 - 2) Processing of turmeric- Curing, Polishing, and coloring. (01)
 - 3) Production of Coconut nursery Seedlings. (01)
 - 4) Grafting of cashewnut. (01)
 - 5) Training, trailing and lowering of betel vines . (01)
 - 6) Training and pruning in coffee. (01)
 - 7) Processing of coffee. (01)
 - 8) Processing of cashew nuts. (01)
 - 9) Preparation of Value-Added Products of Coconut (01)
 - 10) Drying of stevia plant leaves. (01)
 - 11) Lancing and latex collection of opium crop. (01)
 - 12) Propagation of serpagandha. (01)
 - 13) Estimation of Sennosides from senna
 - 14) Distillation of citronella, Lemon grass and geranium. (01)
 - 15) Visit to plantation, aromatic and medicinal nursery. (01)

Note:

- i. **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii. **Continuous Internal Assessment (CIA): Practical** (10 Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- iii. **Practical examination:** There shall be annual examination and Student Shall Submit record book, Field note book/Tour Report, Assignment or Project work at the time of exam

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.SC. Second Year Semester-IV

Name of Subject: Horticulture
SEC-2 Course Course Code: HORTSEC-413 Paper No: HORTSEC-2(C)
Name of The Paper: Organic Production and Post Harvest Management of Horticultural Crops (Theory+Practical)

Total Credit (02) Marks: 50 Marks (CIA=10 UA=40)
Contact Hours: 30 (Clock Hours) Periods- 45 (50 Minutes of Each)

Theory	Credit 1	Total Periods: 15
Unit I (05 Periods)		
Theory:		
1) Introduction, Importance, Scope and present status of Organic Production in India and Maharashtra		
2) Inputs of organic production of horticultural crops		
3) Organic ways of seed production and their importance		
4) Organic Fertilizer Management techniques		
5) Types of Organic Manures		
6) Organic Production Requirements		
Unit II (05) Periods)		
7) Components of Organic manures		
8) Compost and their composting techniques		
9) Green Manuring- Types, Merits and Demerits, Application methods		
10) Vermicomposting, vermiwash		
11) Recycling of Organic Residues		
12) Biofertilizers- Types, Merits and Demerits, Application methods		
Unit III (05) Periods)		
13) Soil Improvements and Soil Amendments		
14) Organic Weed Management practices;		
15) Organic Diseases and pest Management techniques		
16) Organic Food Quality, Quality Control Standards		
17) Certification Process and Procedure		
18) Certification Agencies, Government Schemes for the promotion of organic production		
Practical	Credit 1	Total Periods: 15
Practical Demonstration:		
Unit IV (05) Periods)		
1) Preparation of standard procedure of FYM and Compost		
2) Preparation of standard procedure Green-manuring		
3) Preparation of standard procedure for Biofertilizer application		
4) Preparation of standard procedure vermicomposting and vermiwash		
Unit V (05) Periods)		
5) Recycling of Organic Residues		
6) Soil Improvements and Soil Amendments		
7) Organic seed treatments		

- 8) Organic Weed Management practices
- 9) Organic Diseases and pest Management techniques

Unit VI (05) Periods)

- 10) Practical on standard food quality control of organic products
- 11) Certification Process and Procedure of organic product
- 12) Packaging, marketing of organic products
- 13) Visit to Organic Unit of Production
- 14) Write a report on organic production of Manures

Note:

- i) **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- ii) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two tests will be considered) and 05 Marks for Assignment/tutorials.

Suggested Readings:

- 1) Gehlot D- Organic farming components and manamgnet, agribios publication
- 2) Amitabhs Singh, H.B. Rakshit- ABC of organic farming-
- 3) S.P Palaniappan, K Annadurai - Organic farming thery and practices- Scientific Publishers Journals Dept
- 4) Dr. Prashant Naikwadi - Sendriya Sheti - सेंद्रिय शेती, Sakal Prakashan
- 5) Arun Dike / Arvind Dabholkar- Sendriya Sheti (सेंद्रिय शेती)- Sendriya Sheti (सेंद्रिय शेती)
- 6) संजय भा. गुंजाळ . सेंद्रिय शेती. गोडवा कृषी प्रकाशन
- 7) रविंद्र काटोले. गांडूळखत निर्मिती ऊदोग गोडवा कृषी प्रकाशन

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. (Three Year Undergraduate Degree Program)
B.Sc. Second Year Semester-IV
Name of Subject: Horticulture
SEC-2 Course Course Code: HORTSEC-413 Paper No: HORTSEC-2(D)
Name of The Paper: Seed Production in Horticultural Crops (Theory+Practical)
Total Credit (02) Marks: 50 Marks
Contact Hours: 30 (Clock Hours) Periods- 45 (50 Minutes of Each)

Theory	Credit 1	Total Periods: 15
Unit I (05 Periods)		
Theory:		
1. Definition of seed and its quality, History and Development of Vegetable Seed Industry in India new seed policies; DUS test, scope of vegetable seed industry in India. 2. Genetical and agronomical principles of seed production; methods of seed production; use of growth regulators and chemicals in vegetable seed production; 3. floral biology, pollination, breeding behavior, seed development and maturation; methods of hybrid seed production. 4. Categories of seed; maintenance of nucleus or breeder seeds, foundation, and certified seed TL seeds. 5. Seed certification, seed standards; Seed act and law enforcement, plant quarantine and quality control. Central seed committee, central seed certification board, state seed, certification agency, central and state seed testing laboratories, Seed law enforcement, Seed control order (1983) and new seed policy (2002), Seed village concept		
Unit II (05 Periods)		
6. Agro-techniques for seed production in solanaceous vegetables, cucurbits, leguminous vegetables, colecrops, bulb crops, leafy vegetables, okra, vegetatively propagated vegetables. 7. Agro-techniques for seed production in Fruit Crops 8. Agro-techniques for seed production in Flower Crops and Ornamental Crops 9. Agro-techniques for seed production in Medicinal, aromatic Plants 10. Agro-techniques for seed production in Spices, Condiments, Plantation Crops		
Unit III (05 Periods)		
11. Seed sampling, seed testing (genetic purity, seed viability, seedling vigour, physical purity) and seed health testing; testing, releasing and notification procedures of varieties, Seed certification, Purity analysis and germination test for seeds, Seed treatment, 12. Floral biology; rouging of off type, handling of seed processing and seed testing equipment; 13. Packaging according to classes of seeds. Modern techniques of packaging. Packaging requirements., Physiological and harvestable maturity for seeds, Threshing and seed extraction methods, Drying principles and methods, Seed processing, packaging (containers/packets), 14. Grading and upgrading equipment's, seed coating and pelleting, Seed storage, and godown storage, cryopreservation of seeds, synthetic seed technology.		

15. visit to seed processing units, seed testing laboratory and seed production farms. Visit of ICAR institute like Directorate of Seed Research, Mau, UP, NRC on Seed Spices, Ajmer, IISR, Calicut, NHRDF, Pune

Practical

Credit 1

Total Periods: 15

Practical Demonstration:

Unit IV (05) Periods)

- 1 Study of seed structure, colour, size, shape and texture of vegetable and spice crop seeds
- 2 Study of varietal characters in different vegetable crops
- 3 Identification of off-types, rogues in different vegetables
- 4 Practicing field counting procedures in broadcast and row crop of open pollinated and hybrid seed field.
- 5 Study of harvest indices, fruit grading and seed extraction techniques

Unit V (05) Periods)

- 6 Seed production planning – calculation of area requirement for different classes of seed and seed production economics
- 7 Seed sampling – equipments – mixing and dividing methods
- 8 Moisture estimation – equipments used – reporting results
- 9 Purity analysis – equipments used – reporting results
10. Visit to varietal and hybrid seed production field , Visit to seed processing unit

Unit VI (05) Periods)

- 11 Seed germination testing – tetrazolium test – evaluation
- 12 Seedling evaluation – seed health test – testing and identification of pathogen / insects
- 13 Visit to seed testing – laboratory
- 14 Seed invigouration techniques – hardening – pelleting
- 15 Seed enhancement techniques – colour and gravity separation
- 16 Practical examination

Reference:

1. Agrawal PK & Dadlani M. (Eds.). 1992. Techniques in Seed Science and Technology. South Asian Publ.
2. Agrawal RL. (Ed.) 1997. Seed Technology. Oxford & IBH.
3. Bendell PE. (Ed.) 1998. Seed Science and Technology: Indian Forestry Species. Allied Publ.
4. Fageria MS, Arya PS & Choudhary AK. 2000. Vegetable Crops: Breeding and Seed Production. Vol. I. Kalyani.
5. George RAT. 1999. Vegetable Seed Production. 2nd Ed. CABI.
6. Kumar JC & Dhaliwal MS. 1990. Techniques of Developing Hybrids in Vegetable Crops. Agro Botanical Publ.
7. More TA, Kale PB & Khule BW. 1996. Vegetable Seed production Technology. Maharashtra State Seed Corp.
8. Rajan S & Baby L Markose. 2007. Propagation of Horticultural Crops. New India Publ. Agency.
9. Singh NP, Singh DK, Singh YK & Kumar V. 2006. Vegetable Seed Production I Technology. International Book Distributing Co.
10. Singh SP. 2001. Seed Production of Commercial Vegetables. Agrotech Publ. Academy.
11. Vegetable Seed Production. Raymond A. T. George. CABI Publishing; 3rd Edition (2013)
12. Seed Production Technology of Vegetables. Asati B. S and Singh Prabhakar. Daya Publishing House (2008)

Model Question Paper of Theory Examination

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology
B.Sc. (Three Year Undergraduate Degree Program)
B.Sc. I/II/III Year Semester I/II/III/IV/V/VI

Name of Subject: Horticulture

Course Code:-----

Paper No: -----

Name of The Paper: -----

Time : 2 hr

Marks

UA: 40

-
- | | | |
|-------------|-----------------------------|----|
| Q.1. | Long Question ----- | 20 |
| | OR | |
| | Long question----- | |
| Q.2. | Long Question ----- | 10 |
| | OR | |
| | Write short notes (any two) | 10 |
| | a) b) | |
| | c) d) | |
| | e) f) | |
| Q.3. | Multiple Choice | 10 |
| | Question 1 to 10 | |

Model Question Paper of Practical Examination

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology

B.Sc. (Three Year Undergraduate Degree Program)

B.Sc. IInd year / III & IV Semester Practical Examination

Name of Subject: Horticulture Course Code: HORT-321 & 421

Paper No: Lab Course No. 3 & Lab Course 5

Paper Name: Principles and Technology of Fruit gardening & Cultivation Technology of fruit Crops

Batch No: Date / / 20 Time 3 hrs Center.....UA Marks: 100

Note: Draw neat and well labeled diagrams wherever necessary

Q1) Layout a plan of system of Plating of given specimen-A	20
Q2) A) Papain extraction from papaya/ Mango malformation management	10
B) Pachlobutrazol Treatment/Bahar Treatment of Given Specimen-B	10
Q3) Draw thetypes of irrigation layout of given specimen C.....	20
Q4) Spotting- 5 spots (Identify and comment on maturity indices)	20
D....., E....., F....., G....., H.....	
Continuous Internal Assessment (CIA)	CIA Marks: 20
A) Record book and Projects	06
B) Viva voice /Internal Examination	14

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS) Curriculum for Faculty of Science and Technology

B.Sc. (Three Year Undergraduate Degree Program)

B.Sc. IInd year / III & IV Semester Practical Examination

Name of Subject: Horticulture Course Code: HORT-322 & 422

Paper No: Lab Course No. 4 & Lab Course 6

Paper Name: Orchard Management of Fruit Crops and Production Technology of Plantation, Spices, Condiments, and medicinal and aromatic plants

Batch No: Date / / 20 Time 3 hrs Center.....UA Marks: 100

Note: Draw neat and well labeled diagrams wherever necessary

Q1) A) Processing of Given Specimen-A.....	20
Q2) A) Prepare the given specimen -Bfor girdling/Ringing/ Bending/Notching	10
B) Demonstrate the method of central leader/Open center system for given specimen-C-----	10
Q3) Layout a plan of Bio Gas/Compost specimen-D-----	20
Q4) Drying/Distillation of given specimen-E -----	20
Continuous Internal Assessment (CIA)	CIA Marks: 20
A) Record book and Projects	06
B) Viva voice /Internal Examination	14