

Bharatiya Vidya Bhavan's

**M. M. College of Arts, N.M. Institute of Science,
H.R.J. College of Commerce. (Bhavan's College)
Autonomous.**

(Affiliated to University of Mumbai)



Syllabus for: T.Y.B.Sc.-Botany

Program: B.Sc.

Course: Horticulture

Applied Component

Program Code: BH. B.Sc. (SEM-V and SEM-VI)

Choice Based Credit System (CBCS)

With effect from academic year 2023-24.

T.Y.B.Sc. Applied Component Horticulture Syllabus
Credit Based and Grading System
To be implemented from the Academic year 2023-24 onwards

SEMESTER V

Course Code	UNIT	TOPICS	Credits	L / Week
BH.USACHO501	HORTICULTURE & GARDENING -I		2	4
	I	INTRODUCTION TO HORTICULTURE	2	1
	II	PROPAGATION PRACTICES		1
	III	MANURES, FERTILIZERS AND DISEASES		1
	IV	GARDEN OPERATIONS FOR HORTICULTURE		1
BH.USACHO5P1	Practicals based on all courses in theory		2	4

SEMESTER VI

Course Code	UNIT	TOPICS	Credits	L / Week
BH.USACHO601	HORTICULTURE & GARDENING -II		2	4
	I	LANDSCAPE GARDENING	2	1
	II	HORTICULTURE PRODUCE		1
	III	COMMERCIAL PRODUCTION		1
	IV	POST HARVEST TECHNOLOGY & ENTREPRENEURSHIP IN HORTICULTURE		1
BH.USACHO6P1	Practicals based on all courses in theory		2	4

**SEMESTER V
THEORY**

Course Code	Title	Credits
BH.USACHO501	HORTICULTURE AND GARDENING –I	2 Credits (60 lectures)
<p>Course Outcome: The student would be able to gain knowledge of:</p> <ul style="list-style-type: none"> • Term <i>horticulture</i>, history of horticulture, the boundaries of horticulture in relation to other applied sciences, the importance of horticulture in society, jobs that require training <i>in</i> horticulture, Research Institutes in Horticulture. • Different Propagation Techniques and Practices. • Different types of manures, Fertilizers and plant diseases. • Garden operations and insight on organic farming. 		
<p>Unit 1 INTRODUCTION TO HORTICULTURE</p> <ul style="list-style-type: none"> • Definition, importance and objectives of Horticulture, branches of Horticulture, Pomology, Olericulture, Landscape Gardening, Nurseries and development • Allied branches – Apiculture – Bee box, honey bee life cycle and role of apiculture in pollination, Sericulture – Silkworm life cycle, different types with host plant, Social Forestry, Exhibition: aims and objectives. • Important Horticulture Research Institutes and Government Schemes for strategy plantations <ul style="list-style-type: none"> o Konkan Krishi Vidyapeeth – Dapoli o National Research Centre for grapes. o Regional Fruit Research centre Pune o Horticulture Training Centre (H.T.C.) – Talegaon. o Central Potato Tuber Research Institute (CPTRI) – Shimla <ul style="list-style-type: none"> • Horticulture Consultancy • Strategy plantation – Lakhibaug Yojana 		15 L
<p>Unit 2 PROPAGATION PRACTICES</p> <ul style="list-style-type: none"> • By Seeds Advantages and disadvantages, method of seed propagation Production of seeds, Handling, Collection and Storage Sowing, Transplanting of seedlings and Hardening Seed treatment to control diseases Seedling diseases and their control. • By specialized Vegetative structures Bulbs, Tubers, Corms, Rhizomes, Root stock, runners, Offsets and suckers. • Artificial methods of plant propagation <ul style="list-style-type: none"> o Cutting– Root cutting, Stem cuttings, and leaf cuttings. Use of PGR’s for rooting. o Layering – Definition, Types: Simple, compound, (Serpentine) Tip, Trench, Mound, Air Layering. o Grafting-Definition, advantages and disadvantages. Types: Splice, Whip/ Tongue, side, veneer, cleft, bark, epicotyls, approach, repair grafting – enarching, bridge and bracing. o Budding – Definition, advantages and disadvantages. Types: Tbudding, 		15 L

shield, patch, ring budding. o Developing new varieties: Technique of Emasculation and bagging, role of polyploidy n production of seedless varieties in plants. <ul style="list-style-type: none"> • Application of Tissue Culture in relation to Horticulture. 	
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UNIT-3 MANURES, FERTILIZERS AND DISEASES <ul style="list-style-type: none"> • Manures: Definition, importance, important manures FYM (compost), oil cakes, green manure, organic manures and vermicompost. • Fertilizers: Definition, Types – Straight, Compound and mixed. Nitrogenous (NH₄)₂ SO₄, Urea, Ca (NO₃)₂, NH₄Cl, Phosphatic (Superphosphate, Bone meal), Potassic (Muriate of potash, K₂SO₄) • Biofertilizers: Bacteria, Cyanobacteria, Mycorrhiza, Sea weeds. • Diseases: Horticultural plant diseases and their control. Fungal diseases-Rust, Smut, Powdery mildew. Bacterial – Citrus canker, Bacterial wilt. Viral – TMV, Leaf curl. • Pests – common pests on horticultural crops – Aphids, beetle, stem borer, caterpillars and rats. • Friends of farmers: Earthworm, snakes and predaceous fungi. 	15 L
UNIT 4 GARDEN OPERATIONS FOR HORTICULTURE <ul style="list-style-type: none"> • Selection of site, Preparation of soils for garden • Mulching, top- dressing, blanching • Sowing, transplanting, tree transplanting, • Irrigation, - Overhead, Surface, Underground • Weeding and pruning, - Principles, Objectives and general technique. • Water management and conservation through horticulture, Dry land Horticulture. • Organic Farming Definition, Scope, Indian scenario, Future scope 	15 L

Practicals

Semester V BH.USACHO5P1		Cr
PRACTICAL		2
	Garden implements and their uses.	
	Different types of pots & Potting medium, Potting and repotting	
	Propagation practices by seed, Vegetative propagation, cutting, layering, budding, grafting.	
	Identification of: Fertilizers – Identification by physical and chemical methods –Urea, Ammonium sulphate, Potassium sulphate, super phosphate. Manures – Identification of plants as green manure – <i>Glyricidia</i> , <i>Crotolaria</i> , <i>Leucaena</i> . Biofertilizers – Identification (material as slides) VAM, <i>Nostoc</i> , <i>Rhizobium</i> .	
	Soil pH, Use of soil testing Kit, electrical conductivity, pH of water, liquid fertilizers.	
	Method of preparing bonsai, Bottle Garden / Terrarium, Hanging baskets, Dish garden. (SHIFTED TO SEM VI)	
	Diseases and pests Fungal – Powdery mildew, Rust, Wilt, Blight, Smut, Bacterial – Canker, Wilt Viral – Leaf curl, yellow vein Mosaic Insects – Sucking, Biting, Chewing, Borers & Ants. NonInsects pests- Nematodes, Rodents.	
	Preparation of natural insecticides – Neem arka, Dashparni arka, Seetaphal powder, Tobacco extracts.	
	Project – Each student should individually present a project related to any topic related to Horticulture. It should be duly certified presented at practical examination. Project presentation college at level compulsory. (SHIFTED TO SEM VI) Project Proposal – Each student should individually present a project proposal related to any topic related to Horticulture. It should be duly certified presented at practical examination. Project presentation college at level compulsory.	
	Horticultural field Visit.	

UNIVERSITY OF MUMBAI
T.Y. B.Sc. BOTANY SEMESTER V (BH.USACHOP5)
APPLIED COMPONENT HORTICULTURE

Time: - 9.00 am-2.00 pm

100 Marks

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Q.1	Demonstrate the propagation technique _____ and _____ using Specimen A and B	20M
Q.2	Identify the given fertilizer C and D with the help of physical and chemical tests.	10M
Q.3	(a) Identify and comment on the natural insecticide E.	10M
	OR	
	(b) Determine the pH of sample E.	10M
	OR	
	(c) Determine the carbon content of the given sample E. Comment on your observation.	10M
Q.4	(a) Identify and comment on the garden implements F, G, and H.	15M
	OR	
Q.4	(b) Identify and comment on the specimens I, J, and K.	15M
Q.5	Project Proposal	20M
Q.6	Horticulture Visit Report	05M
Q.7	Certified Journal	05M

KEY:

A and B	Cutting, layering, budding, grafting.
C and D	Urea, Ammonium sulphate, Potassium sulphate, super phosphate.
E	Identification of Neem arka, Dashparni arka, Seetaphal powder, Tobacco extracts/ Soil pH, Use of soil testing Kit, electrical conductivity, pH of water, liquid fertilizers.
F, G, and H.	Garden implements and their uses.
I, J, and K.	Diseases / pests/ Biofertilizers

**SEMESTER VI
THEORY**

Course Code	Title	Credits
BH.USACHO601	HORTICULTURE AND GARDENING –II	2 Credits (60 lectures)
<p>Course Outcome: The student would be able to gain knowledge on:-</p> <ul style="list-style-type: none"> • Landscape Gardening and Different types of Gardens. • Green house technology and various irrigation techniques and Floriculture business management. • Cultivation practices, harvesting techniques, post-harvest management of commercially important horticultural plants. • Post-harvest handling of horticultural products and entrepreneurship in Horticulture business. 		
<p>Unit 1 LANDSCAPE GARDENING</p> <ul style="list-style-type: none"> • Principles of landscaping & garden design. • Indoor plants & Indoor gardens- Hydroponics, Terrarium/ Bottle Garden, Dish Garden. • Important garden features- Paths & Avenues, Hedges & Edges, Lawn, Flowerbeds, Arches& Pergolas, Fencing, Water bodies, Rock Garden & Plants suitable for different locations & climates. • Lawn- Purpose of preparation of lawn, Method of preparation of lawn & management of lawn & lawn plants. • Soil manipulation for plantation of desirable varieties. • Mughal, Buddist, Botanical Garden, Vertical wall garden & Theme Park • Important Gardens of India—Shalimar (Shrinagar), Vrindavan (Mysore), Veer Jijamata Udyan (Mumbai). 		15 L
<p>Unit 2 - HORTICULTURE PRODUCE</p> <ul style="list-style-type: none"> • High –tech Horticultural production- green house technology- Meaning, types, layout & construction, irrigation systems. Care & attention. Hardening of plants. Space gardens. • Floriculture – Scope & importance, soil and climatic requirement and cultivation practices and Economics of greenhouse production of Gerbera, Carnation, Roses, Orchids. Propagation techniques, packing and marketing, enhancing and delaying period of bloom by special methods. Floral decoration, Florist shop management. 		15 L
<p>UNIT-3 COMMERCIAL PRODUCTION</p> <ul style="list-style-type: none"> • Commercial production of the following – in relation to propagation, post plantation care, harvesting, post-harvest management & varieties. <ul style="list-style-type: none"> ○ Tubers- potato ○ Vegetables- Tomato 		15 L

<ul style="list-style-type: none"> ○ Fruits- Mango, Grapes & Coconut- products like coco peat/ Coir etc. ○ Spices/condiments- chilly ○ Medicinal plants- <i>Aloe vera</i>, <i>Stevia rebaurdina</i> (Madura) ○ Aromatic plant- <i>Citronella</i>, Patchouli ○ Exotic fruit- Dragon fruit. 	
<p>UNIT 4 POST HARVEST TECHNOLOGY & ENTREPRENEURSHIP IN HORTICULTURE</p> <ul style="list-style-type: none"> ● Maturity- Factors responsible for maturity & ripening methods used for delaying ripening. ● Harvest- Time of harvest, harvesting and handling of harvested products ● Storage of fresh produce-Types of storage of fruits & vegetables ○ Fruit & vegetables preservation technology:- ○ Drying (Dehydration) – Natural conditions – Sun drying, Artificial Drying – Hot Air Drying, Vacuum Drying, Osmotically Dried Fruits, Crystallized or Candied Fruits, Fruit Leather, Freeze Drying) ○ Freezing (Cold Air Blast System, Liquid Immersion method, Plate Freezers, Cryogenic Freezing, Dehydro-Freezing, Freeze Drying), ○ Pickling (in Brine, in Vinegar, Indian Pickles) ○ Sugar Concentrates (Jams, Jellies, Fruit juices) ○ Food Preservatives. ● Marketing- grading, packing & transportation. Ways of increasing the market value and shelf life of horticultural produce. ● Horticultural business, management and Entrepreneurship development Horticulture as a business definition and nature, organization, planning and operation of Horticulture farm business. 	15 L

Semester VI BH.USACHO6P1		Cr
PRACTICAL		2
	Preparation of garden layout.	
	List of plants suitable for garden locations- 2-3 plants for each location.	
	Identification of important horticultural plants <ol style="list-style-type: none"> 1. Herbs – foliage any 2 and flowering any 2 2. Shrubs – foliage any 2 flowering any 2 3. Trees – foliage any 2 and flowering any 2 4. Climbers – any 2 5. Lianas – any 2 6. Epiphytes – any 2 7. Creepers –any 2 8. Trailers – any 2 9. Aquatic plants – any 3 (preferably various habitat) 10. Succulents – any 2 11. Weeds –any 10 	
	Method of preparing bonsai, Bottle Garden / Terrarium, Hanging baskets, Dish garden.	

	Flower arrangements –Indian (Gajara, veni, garland, bouquet - Baskets, hand, torch type, table floral arrangement), Japanese and western all type	
	Preparation of Jams, Jellies, Squashes/ Syrups, Pickle, sauces	
	Fruit & vegetable carving & Bio-jewellery	
	Green house plants- Information regarding to soil, temperature, irrigation, fertilizer requirements and propagation methods for <i>Anthurium, Gerbera, Orchids, Tuberose, Carnation, Roses, Capsicum</i>	
	Project – Each student should individually present a project related to any topic related to Horticulture. It should be duly certified presented at practical examination. Project presentation college at level compulsory.	

Visits: To Garden /Parks / Nurseries/ Exhibition / Horticulture industries / Research Station and record of visits should be duly certified and presented at practical examination.

T.Y.B.Sc. BOTANY
Semester VI Practical Examination
Applied Component (BH.USACHO6P1)
2023-2024

Time: 5 Hours

Total Marks:100

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- Q.1** Prepare an appropriate Garden plan for the given area **A** which will include the locations: _____, _____ and _____.
Suggest at least 2 plants names for each location. **15 M**
- Q.2** Prepare Bio-jewelry by using given material **B**. **10M**
OR
- Q.2** Prepare Fruit and Vegetable Carving by using given material **B**. **10M**
OR
- Q.2** Prepare Bonsai, Bottle Garden / Terrarium, Hanging baskets, Dish garden by using given material **B**. **10M**
- Q.3** Use the given material **C** to create a flower arrangement – Ikebana/ Bouquet/Garland /Gajra/Veni/Floral Rangoli. **10M**
- Q.4 a.** Identify the horticultural plants **D,E** and **F**. Comment on their importance. **15M**
- Q.4 b.** Identify the green house plant **G**. Comment on its propagation and requirement for growth. **10M**
- Q.5** Prepare Jam/Jelly/Pickle/Squash/Syrup/Sauce from the given material using appropriate method and proportion. **10M**
- Q.6** Organoleptic Test Report. **05M**
- Q.7** Project Submission. **20M**
- Q.8** Journal. **05M**

A. Preparation of garden layout

D, E & F: Herbs, Shrubs, Trees, Climbers, Lianas, Epiphytes, Creepers, Trailers, Aquatic plants, Succulents, Weeds.

G. Green house plants: *Anthurium*, *Gerbera*, Orchids, Tuberose, Carnation, Roses, *Capsicum*

Modality of Assessment:

Theory Examination Pattern:

A) Internal Assessment - 40%

40 marks.

Theory

40 marks

Sr No	Evaluation type	Marks
1	One Assignments/Case study/Project	10
2	One class Test (multiple choice questions / objective)	20
3	Active participation in routine class instructional deliveries (case studies/ seminars/presentation)	05
4	Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05

B) External examination - 60 %

Semester End Theory Assessment - 60% 60 marks

- i. Duration - These examinations shall be of two hours duration.
- ii. Theory question paper pattern-
 1. There shall be **five** questions each of **12** marks. On each unit there will be one question & fifth one will be based on all the four units.
 2. All questions shall be compulsory with internal choice within the questions. Each question will be of **24** marks with options.
 3. Questions may be sub divided into sub questions a, b, c & d only, each carrying **six** marks **OR** a, b, c, d,e & f only each carrying **four** marks and the allocation of marks depends on the weightage of the topic.

Practical Examination Pattern:

(A)Internal Examination:-

There will not be any internal examination/ evaluation for practicals.

(B) External (Semester end practical examination) :-

Sr.No.	Particulars	Marks
1.	Laboratory work	70
2.	Journal	05
3.	Field visit report/ Organoleptic sheet report	05
3.	Project	20

Semester V:

Practical examination will be held at the college / institution at the end of the semester. The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department; failing which the student will not be allowed to appear for the practical examination.

Semester VI

Practical examination will be held at the college / institution at the end of the semester. The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department; failing which the student will not be allowed to appear for the practical examination.

Reference Books:

1. George Acquaah (2018). Horticulture: Principles and Practices. Pearson Education, Inc., Upper Saddle River, New Jersey.
2. R.W. Allard (1999). Principles of plant breeding. John Wiley & Sons, New York.
3. V.L. Chopra (1989). Plant breeding: Theory and Practice. Oxford & IBH Publishing CO. Pvt. Ltd., New Delhi.
4. W.R. Fehr. Principles of cultivar development: theory and technique (Vol. 1). Macmillan Publishing Company, New York.
5. Chahal, G.S. and Gosal, S.S.(2003). Principles and procedures of plant approaches breeding Biotechnological and conventional. Narosa Publishing House, New Delhi.
6. S. Saraswathy and others. Post-harvest management of horticultural crops. Agrobios (India).
7. R.P. Srivastava and Sanjeevkumar. Fruit and vegetable preservation- Principles and Practices. CBS Publishers & Distributors.
8. Palvis Robert (2022). Plant Science for Gardeners: Essentials for Growing Better Plants.