

**Resolution No.: AC/II(23-24).2.RUS4**

**S.P. Mandali's**  
**RAMNARAIN RUIA AUTONOMOUS COLLEGE**  
*(Affiliated to University of Mumbai)*



**Syllabus for: T Y B Sc**  
**Program: B. Sc. (Applied component)**  
**Course Code: Horticulture and gardening**  
**(RUSACHOR)**

(Choice Based Credit System for the academic year 2024-25)

(Horticulture &amp; Gardening)

## GRADUATE ATTRIBUTES

	<b>Description</b>
	<b>A student completing Bachelor's in Science program will be able to:</b>
<b>GA 1</b>	Recall and explain acquired scientific knowledge in a comprehensive manner and apply the skills acquired in their chosen discipline. Interpret scientific ideas and relate its interconnectedness to various fields in science.
<b>GA 2</b>	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences
<b>GA 3</b>	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools
<b>GA 4</b>	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
<b>GA 5</b>	Take complex challenges, work responsibly and independently, as well as in cohesion with a team for completion of a task. Communicate effectively, convincingly and in an articulate manner.
<b>GA 6</b>	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
<b>GA7</b>	Follow ethical practices at work place and be unbiased and critical in interpretation of scientific data. Understand the environmental issues and explore sustainable solutions for it.
<b>GA 8</b>	Keep abreast with current scientific developments in the specific discipline and adapt to technological advancements for better application of scientific knowledge as a lifelong learner

(Horticulture &amp; Gardening)

## PROGRAM OUTCOMES

PO	PO Description
	<b>A student completing Bachelor's in Science with Horticulture and Gardening as Applied component will be able to:</b>
<b>PO 1</b>	Apply horticultural principles and understanding of the composition, fertility of soil to the successful growth and production of horticultural plants.
<b>PO 2</b>	Identify and practice safe use of tools, equipment and supplies in nursery and garden management.
<b>PO 3</b>	Apply an understanding of modern technology and its application to growing plants, with emphasis being placed on hydroponic production of commercially valuable crops
<b>PO 4</b>	Identify common plant pests and diseases and develop strategies to manage them in an environmentally safe and sustainable manner.
<b>PO 5</b>	Disseminate recent agricultural technologies through extension and serve the rural population
<b>PO 6</b>	Demonstrate a fundamental understanding of plant identification, best suited for various garden locations and its application in garden and landscape designing.
<b>PO 7</b>	Create an arrangement illustrating the elements and principles of color theory and floral design
<b>PO 8</b>	Apply fundamental principles for Post harvest management of horticultural produce, as a part of agribusiness initiative.
<b>PO 9</b>	Apply horticultural skills and knowledge to operate various business entities found in the horticultural industry as well as emerging trends

(Horticulture &amp; Gardening)

**COURSE OUTLINE**

YEAR	SEME STER	COURSE CODE/ UNIT	COURSE TITLE	CREDITS
<b>T Y</b>	<b>V</b>	<b>RUSACHOR501</b>	<b>Horticulture and Gardening -I</b>	<b>2</b>
		I	Introduction to horticulture	
		II	Propagation Practices	
		III	Manures, fertilizers and diseases	
		IV	Garden operations for horticulture	
		<b>RUSACHORP 501</b>	<b>Practical based on RUSACHOR 501</b>	<b>2</b>
<b>T Y</b>	<b>VI</b>	<b>RUSACHOR601</b>	<b>Horticulture and Gardening – II</b>	<b>2</b>
		I	Landscape gardening	
		II	Floriculture, Bonsai and IPR	
		III	Commercial production	
		IV	Post-harvest technology & entrepreneurship in horticulture	
		<b>RUSACHORP 601</b>	<b>Practical based RUSACHOR 601</b>	<b>2</b>

(Horticulture &amp; Gardening)

**SEMESTER-V****Course Code: RUSACHOR 501****Course Title: Horticulture and Gardening – I****Academic year 2024 - 2025****COURSE OUTCOMES:**

Upon successful completion of this course, learners will be able to;

<b>COURSE OUTCOME</b>	<b>CO DESCRIPTION</b>
<b>CO 1</b>	Outline the main branches and allied branches of horticulture
<b>CO 2</b>	Discuss the utility of urban/community forestry and community involvement in Horticulture Extension Education and Rural Development.
<b>CO 3</b>	Execute various types of mushroom cultivation methods.
<b>CO 4</b>	Demonstrate the type and application of chemical fertilizers, bio-fertilizers, Green manures and organic fertilizers
<b>CO 5</b>	Suggest different methods of weed control and irrigation methods.
<b>CO 6</b>	Compare different methods of organic farming, natural farming and soilless cultivation techniques.
<b>CO 7</b>	Design a system for soilless cultivation of various plants

**Detailed syllabus**

<b>RUSACHOR 501</b>	<b>Title: Horticulture and Gardening – I</b>	<b>Credits – 2</b>
<b>UNIT I</b>	<b>Introduction To Horticulture</b>	<b>Lectures-15</b>
	Branches of Horticulture: Branches and allied branches Allied branches – <ul style="list-style-type: none"> <li>• Apiculture – Bee box, role of apiculture in pollination, bee attractants and their role in agriculture</li> <li>• Sericulture –different types of silkworm with host plant, role of sericulture in rural development</li> <li>• Social Forestry</li> <li>• Miyawaki forest</li> <li>• Mushroom cultivation: nutritional value, edible and poisonous types, edible mushrooms, Cultivation of <i>Pleurotus</i>, <i>Volvariella</i> and <i>Agaricus</i>, medicinal value of mushrooms, Processing and preservations of mushrooms, economics</li> </ul>	

## (Horticulture &amp; Gardening)

	<p>of spawn and mushroom production and mushroom recipes.</p> <p><b>Horticulture Extension Education and Rural Development:</b></p> <ul style="list-style-type: none"> <li>• Role of Horticulture in rural economy and employment generation</li> <li>• Ministry of Micro, Small &amp; Medium Enterprises ( MSME)</li> <li>• National Horticulture Board( NHB)</li> <li>• KrishiVigyanKendras(KVK),</li> <li>• Horticulture Consultancy</li> </ul>	
<b>UNIT II</b>	<b>Propagation Practices</b>	<b>Lectures-15</b>
	<p><b>Artificial methods of plant propagation</b></p> <ul style="list-style-type: none"> <li>• Budding – Definition advantages and disadvantages. Types: T-budding, shield, patch, ring budding.</li> <li>• Developing new varieties: Technique of Emasculation and bagging, role of polyploidy in production of seedless varieties</li> <li>• Application of Tissue Culture in relation to Horticulture.</li> <li>• Micrografting in horticulture and its applications (Ivy / <i>Chrysanthemum</i>, fruit crops: citrus/ grapes/ mulberry)</li> </ul>	
<b>UNIT III</b>	<b>Manures, Fertilizers And Diseases</b>	<b>Lectures-15</b>
	<p><b>Manures:</b> Definition, importance, important manures FYM(compost), oil cakes, green manure, organic manures and vermicompost.</p> <p><b>Fertilizers:</b> Definition, Types – Straight, Compound and mixed. Nitrogenous (NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub>, Urea, Ca (NO<sub>3</sub>)<sub>2</sub>, NH<sub>4</sub>Cl, Phosphatic (Superphosphate, Bone meal), Potassic (Muriate of potash, K<sub>2</sub>SO<sub>4</sub>)</p> <p><b>Biofertilizers:</b> Bacteria, Cyanobacteria, Mycorrhiza, Sea weeds.</p> <p><b>Horticultural plant diseases</b> and their control. Fungal diseases- Rust, Smut, Powdery mildew, fungal wilt Bacterial – Citrus canker, Bacterial wilt. Viral – TMV, Leaf curl.</p> <p>Pests – common pests on horticultural crops – Aphids, leaf miner, mealy bugs, beetle, stem borer, caterpillars, Giant African snails, nematodes and rats. Scouting for insect and pests</p> <p><b>Fundamentals of plant protection:</b> Physical, chemical, biological, cultural and legal methods of control, non-toxic methods of insect control. IPM Use of transgenic plants in insect control.</p> <p>Friends of farmers: Earthworm, snakes and predaceous fungi.</p>	

## (Horticulture &amp; Gardening)

UNIT IV	Garden Operations and Hi-Tech Horticulture	Lectures-15
	<p><b>Garden Operations :</b> Preparation of soils for garden : Digging Mulching, top- dressing, blanching, seed sowing, transplanting Irrigation - Overhead, Surface, Underground Weeding and pruning- Principles, Objectives and general Technique</p> <p><b>High –tech Horticultural production-</b> Green house technology- Meaning, types, layout &amp; construction, irrigation systems. Care &amp; attention. Hardening of plants <b>Types and roles of pollinators</b>, Hydroponics: Active and passive systems. Advances in hydroponics, Aquaponics Types and techniques</p> <p><b>Organic Farming:</b></p> <ul style="list-style-type: none"> <li>• Definition, Scope, Indian scenario, Future scope.</li> <li>• ZBNF, Traditional organic farming, Concept of Natural Farming(SPNF)</li> </ul>	
<b>PRACTICALS</b>		
<b>RUSACHORP 501</b>	<b>Horticulture and Gardening – I</b>	<b>Credits – 2</b>
1.	Garden implements and their uses, modern farm machinery in agriculture	
2.	Propagation practices by seed, Vegetative propagation, cutting, layering, budding, grafting .	
3.	Micrografting in Horticulture	
4.	Developing new varieties-Technique of Emasculation and bagging( Rose/ <i>Vinca</i> )	
5.	Green house plants- Information regarding to soil, temperature, irrigation, fertilizer requirements and propagation methods for <i>Anthurium</i> , <i>Gerbera</i> , Orchids, Carnation, Tomato, Strawberry	
6.	Soilless cultivation techniques	
7.	Identification of :Fertilizers – Identification by physical and chemical methods – Urea , Ammonium sulphate , Potassium sulphate, super phosphate .	
8.	Manures – Identification of plants as green manure – <i>Gliricidia</i> , <i>Crotolaria</i> , <i>Leucaena</i> Biofertilizers – Identification (material as slides) VAM, <i>Nostoc</i> , <i>Rhizobium</i> .	
9.	Soil pH, Electrical conductivity of soil	
10.	Use of soil testing Kit for organic testing,	
11.	Diseases and pests Fungal – Powdery mildew ,Rust ,Wilt, Blight, Smut, Bacterial – Canker ,Wilt Viral – Leaf curl ,yellow vein Mosaic Insects – Sucking, Biting, Chewing, Borers and Ants, Non Insects pests- Nematodes, Rodents. Collection of insect pest of the greenhouse crops	
12.	Preparation of natural insecticides – Neemarka, Dashparniarka, Seetaphal powder, Tobacco extracts. (internal) Biopesticides: <i>Beauveria</i> / <i>Verticillium</i> / <i>Trichoderma</i>	

*(Horticulture & Gardening)*

13.	Project – Each student should individually <b>initiate</b> a project related to any topic from the syllabus.
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**References:**

- Acquaah G. (2002). Horticulture: Principles and Practices. Blackwell Publ.
- Brown L. (2008). Applied Principles of Horticultural Science. Butterworth –Heinemann.
- Chadha, K. L., (2014) Handbook of Horticulture, Indian Council of Agricultural Research, Kisan Forum Pvt. Ltd.
- Christopher E. P. (2005). Introductory Horticulture. Biotech Books, Delhi.
- Kumar N. (2010). Introduction to Horticulture. Oxford & IBH Publ. Co. Pvt.Ltd.
- Manibhushan Rao, K. (2005) Textbook of Horticulture, McMillan Publication, Second edition
- Singh Jitendra (2011) Basic Horticulture, Kalyani Publishers,
- Singh R. S. (2017). Plant Diseases. Oxford & IBH Publ.



(Horticulture &amp; Gardening)

**MODALITY OF ASSESSMENT****Theory Examination Pattern:****Internal Assessment - 40%: 40 marks.**

Sr No	Evaluation type	Marks
1	Assignment / Field Visit/ Case study/ Survey report/ On-line test/ Participation in academic or Co-curricular activities/ small projects	20
2	One class Test (multiple choice questions )	20

**External examination - 60 %****Semester End Theory Assessment - 60 marks**

- i. Duration - These examinations shall be of **2 hours** duration.
- ii. Paper Pattern:
  1. There shall be **05** questions each of **12** marks and **01** question of **12** marks. On each unit there will be one question & last question will be based on all the **04** units.
  2. All questions shall be compulsory with internal choice within the questions.

Questions	Options	Marks	Questions on
Q.1) A, B, C	Any 2 out of 3	12	Unit I
Q.2) A, B, C	Any 2 out of 3	12	Unit II
Q.3) A, B, C	Any 2 out of 3	12	Unit III
Q.4) A, B, C	Any 2 out of 3	12	Unit IV
Q.5) a, b, c, d, e.	Any 3 out of 5	12	All units

**Practical Examination Pattern:****Internal Examination:**

Heading	Practical
Journal and practical participation	10(5+5)
Assignment/presentation/practical field report	30
<b>Total</b>	<b>40</b>

**External (Semester end practical examination):**

Particulars	Practical
Laboratory work and/or <i>Viva voce</i>	60
<b>Total</b>	<b>60</b>

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**PRACTICAL BOOK/JOURNAL**

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/ Co-ordinator / Incharge of the department; failing which the student will not be allowed to appear for the practical examination.**

**Overall Examination and Marks Distribution Pattern****Semester- V**

Course	501		Total per Course	Grand Total
	Internal	External		
<b>Theory</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>200</b>
<b>Practicals</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>200</b>

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**SEMESTER VI****Course Code: RUSACHOR 601****Course Title: Horticulture and Gardening – II****Academic year 2024- 25****COURSE OUTCOMES:****Upon successful completion of this course, learners will be able to;**

<b>COURSE OUTCOME</b>	<b>CO DESCRIPTION</b>
<b>CO 1</b>	Explain commercial production conditions like soil fertility, irrigation, and pest control in spices, medicinal and aromatic plants, fruit and vegetable production
<b>CO 2</b>	Employ the principles of gardening designing , landscaping and suggest plants suitable for various locations in a garden
<b>CO 3</b>	Analyze the importance of floriculture from aesthetic, social and economic point view and its potential for generating employment
<b>CO 4</b>	Choose appropriate post-harvest technology for horticultural crops
<b>CO 5</b>	Build hobby/business based on horticulture.

**Detailed Syllabus**

<b>RUSACHOR 601</b>	<b>Title: Horticulture and Gardening – II</b>	<b>Credits – 2</b>
<b>UNIT I</b>	<b>Landscape gardening</b>	<b>Lectures- 15</b>
	History and Principles of landscape gardening Gardens types and styles: Softscapes and Hardscapes Garden types. Zen garden , Podium garden, Indoor garden (Terrarium/ Bottle garden, Dishgarden)and Outdoor garden, Vertical garden and Topiary Garden styles- Formal gardens, Informal gardens, Freestyle gardens. Important gardens of India	
	Important garden features- Paths and Avenues, Hedges and Edges, Lawn, Flowerbeds, Arches and Pergolas, Fencing, Water bodies, Rock garden. .Plants suitable for different locations	
	Lawn- Method of preparation of lawn, management of lawn. lawn plants	

## (Horticulture &amp; Gardening)

UNIT II	Floriculture, Bonsai and IPR	Lectures-15
	<p><b>Floriculture</b> – Scope &amp; importance, soil and climatic requirement and cultivation practices and Economics of green house production of <i>Gerbera</i>, Carnation, Roses, Orchids. Propagation techniques, packaging and marketing, Export, enhancing and delaying period of bloom by special methods. Floral decoration-value addition</p> <p>Flower arrangements –Indian , Japanese and western type, dry flower arrangement</p> <p>Bonsai</p> <p>Genetic Resource Management – Germ plasm conservation, role of NBPGR, IPR's – Plant variety protection.</p>	
UNIT III	Commercial production	Lectures-15
	<p><b>Commercial production of the following</b> – in relation to propagation, post plantation care, harvesting, post harvest management &amp; varieties.</p> <ul style="list-style-type: none"> <li>• Rhizomes- Ginger</li> <li>• Vegetables- Spinach, Coriander.</li> <li>• Fruits- Mango, Grapes, Coconut- products like coco peat/ Coir , biodegradable straw, Banana.</li> <li>• Spices/condiments- <i>Cinnamomum zeylanicum</i></li> <li>• Medicinal plants- <i>Moringa pterigosperma</i>, <i>Stevia rebaudina</i> (Madura)</li> <li>• Aromatic plant- <i>Vetiveria zizanooides</i>, Patchouli</li> </ul>	
UNIT IV	Post-Harvest Technology & Entrepreneurship In Horticulture	Lectures-15
	<p>Maturity- Factors responsible for maturity &amp; ripening methods used for delaying ripening</p> <p>Harvest- Time of harvest, harvesting and handling of harvested Products</p> <p>Storage of fresh produce- Types of storage of fruits &amp; vegetables, Fruit &amp; vegetables preservation technology. Increasing shelf life, adulterants</p> <p>Marketing- grading, packing and transportation. Ways of increasing the market value and shelf life of horticultural produce.</p> <p>Horticultural business, management and Entrepreneurship Development, Consultancy Garden maintenance, job prospects in horticulture</p>	

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PRACTICALS		
RUSACHO RP 601	Horticulture and Gardening – II	Credits - 2
1.	Preparation of garden layout Garden design	
2.	List of plants suitable for garden locations- 2-3 plants for each location .	
3.	Identification of important horticultural plants <ol style="list-style-type: none"> <li>1. Herbs – foliage any 2 and flowering any 2</li> <li>2. Shrubs – foliage any 2 flowering any 2</li> <li>3. Trees – foliage any 2 and flowering any 2</li> <li>4. Climbers – any 2</li> <li>5. Lianas – any 2</li> <li>6. Epiphytes – any 2</li> <li>7. Creepers –any 2</li> <li>8. Trailers – any 2</li> <li>9. Aquatic plants – any 3 ( preferably various habitat)</li> <li>10. Succulents – any 2</li> </ol>	
4.	Identification of weeds Survey of weeds in crop fields and other habitats Preparation of herbarium of weeds	
5.	Method of preparing Bonsai, Bottle Garden/Terrarium, Hanging Baskets, Dish Garden	
6.	Flower arrangements –Indian (Gajara , veni, garland , bouquet )	
7.	Flower arrangements : Japanese andwestern type	
8.	Dry flower Technology	
9.	Determine the Maturity index of Fruits/ vegetables	
10.	Preparation of Jams, Jellies, Squashes/ Syrups, Pickle, sauces	
11.	Varieties of banana/ watermelon/ brinjal/ grapes/chilli	
12.	Fruit & vegetable carving & Bio-jewelry (Demonstration)	
	<b>Project – Each student should individually present a project related to Horticulture .It should be duly certified presented at practical examination. Project presentation at college level compulsory.</b>	
	<b>Visits :</b> To Garden /Parks / Nurseries/ Exhibition / Horticulture industries / Research Station and record of visits should be duly certified and presented at practical examination in a field notebook.	

**References:**

- Peter K. V. (2009). Basics of Horticulture. New India Publ. Agency.
- Randhawa G.S. & Mukhopadhyay A. (1986) Floriculture in India, Allied Publishers
- Randhawa G. S. (1973). Ornamental Horticulture in India. Today's &
- Tomorrow's Printers and Publ. Rao K. M. (2005). Textbook of Horticulture. MacMillan India Ltd
- Schilletter J. C. & Richey H. W. (2005). Textbook of General Horticulture. Biotech Books, Delhi.

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- Sharma V. K. (2004). Advances in Horticulture. Deep and Deep Publ.Pvt. Ltd

### MODALITY OF ASSESSMENT

#### Theory Examination Pattern:

**Internal Assessment - 40%: 40 marks.**

Sr No	Evaluation type	Marks
1	Assignment / Field Visit/ Exhibition/ Case study/ survey report/Submission/ On-line test/ Participation in academic or Co-curricular activities	20
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**External examination - 60 %**

#### **Semester End Theory Assessment - 60 marks**

- Duration - These examinations shall be of **2 hours** duration.
- Paper Pattern:
  - There shall be **05** questions each of **12** marks and **01** question of **12** marks. On each unit there will be one question & last question will be based on all the **04** units.
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Q.3) A, B, C	Any 2 out of 3	12	Unit III
Q.4) A, B, C	Any 2 out of 3	12	Unit IV
Q.5) a, b, c, d , e.	Any 3 out of 5	12	All units

#### **Practical Examination Pattern:**

##### **Internal Examination:**

Heading	Practical
Journal and practical participation	10(5+5)
Assignment/presentation/practical field report	30
<b>Total</b>	<b>40</b>

##### **External (Semester end practical examination):**

Particulars	Practical
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**Overall Examination and Marks Distribution Pattern****Semester- VI**

Course	601		Total per Course	Grand Total
	Internal	External		
<b>Theory</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>200</b>
<b>Practicals</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>200</b>

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