Resolution No.: AC/II (20-21).2.RUS18

S.P. Mandali's

RAMNARAIN RUIA AUTONOMOUS COLLEGE

(Affiliated to University of Mumbai)

RUIA COLLEGE
Explore ● Experience ● Excel

Syllabus for: T. Y

Program: B. Sc. (Applied component)

Course Code: Horticulture and gardening

(RUSACHOR)

(Credit Based Semester and Grading System for the academic year 2021–2022)

PROGRAM OUTCOMES

PO	PO Description **A student completing Bachelor's in Science program will be able to:**
PO 1	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.
PO 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences
PO 3	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools
PO 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
PO 5	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.
PO 6	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
PO 7	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.
PO 8	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

PROGRAM SPECIFIC OUTCOMES

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

PROGRAM OUTLINE

YEAR	SEM	COURSE CODE	COURSE TITLE	CREDITS
T Y	**V**	**RUSACHOR501**	**Horticulture and Gardening -I**	**2**
		I	Introduction to horticulture	
		II	Propagation practices	
		III	Manures, fertilizers and diseases	
		IV	Garden operations for horticulture	
		RUSACHORP 501	**Practicals based on all courses in theory**	**2**
T Y	**VI**	**RUSACHOR601**	**Horticulture and Gardening - II**	**2**
		I	Landscape gardening	
		II	Floriculture, Bonsai and IPR	
		III	Commercial production	
		IV	Post-harvest technology & entrepreneurship in horticulture	
		RUSACHORP 601	**Practicals based on all the courses in theory**	**2**

SEMESTER-V

Course Code: RUSACHOR 501
Course Title:Horticulture and Gardening – I
Academic year 2021 - 2022

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

COURSE OUTCOME	CO DESCRIPTION
CO 1	Acquire basic knowledge about the fundamental aspects of horticulture and examine the various branches of horticulture
CO 2	Recall various types and categories of mushrooms, demonstrate various types of mushroom cultivating technologies and other allied fields of horticulture.
CO 3	Reflect upon the utility of urban/community forestry and community involvement in Horticulture Extension Education and Rural Development:
CO 4	Develop understanding about the concept of bio-fertilizers, Green manures and organic fertilizers identify their types and the application of each therein. Compare and contrast each of these with chemical fertilizers.
CO 5	Critically evaluate different soil cultivation practices and irrigation methods.
CO 6	Analyze the different methods of weed control.
CO 7	Demonstrate different methods of organic farming, natural farming and soilless cultivation techniques.

Detailed syllabus

RUSACHOR 501	Title: Horticulture and Gardening – I	Credits – 2
UNIT I	**Introduction To Horticulture**	**Lectures-15**
	Branches of Horticulture: All branches with special reference to Landscaping, Nursery management Allied branches – • Apiculture – Bee box, honey bee life cycle and role of apiculture in pollination, bee attractants and their role in agriculture • Sericulture – Silkworm life cycle, different types with host plant, • Social Forestry • Mushroom cultivation: nutritional value, edible and poisonous types, edible mushrooms, *Pleurotus*, *Volvariella* and *Agaricus*, medicinal value of mushrooms, Processing and preservations of mushrooms, economics	

	of spawn and mushroom production, post harvest technologies and mushroom recipes.	
	Important Horticulture Research Institutes • Konkan Krishi Vidyapeeth – Dapoli • National Research Centre for grapes – Nashik. • Regional Fruit Research centre – Pune • National Institute of post harvest technology – Talegaon • IIHR, Hessargata, Bengaluru. • Central Potato Tuber Research Institute (CPTRI) – Shimla	

	Horticulture Extension Education and Rural Development:
	• Role of Horticulture in rural economy and employment generation
	• Rural Development Objectives
	  • People's participation in forestry programmes.
	  • Motivation of women community, children, youth and voluntary organizations for horticulture extension work.
	• Transfer of technology programmes like lab to land programme (LLP) national demonstration (ND),front line demonstration (FLD) Krishi Vigyan Kendras (KVK), Technology Assessment and Refinement Programme (TARP) etc. of ICAR.	

	Horticulture Consultancy	
UNIT II	**Propagation Practices**	**Lectures-15**
	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 • Cutting– Root cutting, Stem cuttings, and leaf cuttings. Use of PGR's for rooting. • Layering – Definition, Types: Simple,compound, (Serpentine) Tip, Trench, Mound, Air Layering. • Grafting-Definition, advantages and disadvantages. Types: Splice, Whip/ Tongue, side, veneer, cleft, bark, epicotyls, approach, repair grafting – Enarching, bridge and bracing. • Budding – Definition advantages and disadvantages. Types: T- budding, shield, patch, ring budding. • Developing new varieties: Technique of Emasculation and	

	bagging, role of polyploidy n production of seedless varieties in plants.	
	Application of Tissue Culture in relation to Horticulture. *In vitro* micrografting in horticulture and its applications (Ivy / *Chrysnthemum*, fruit crops: citrus/ grapes/ mulberry)	
UNIT III	**Manures, Fertilizers And Diseases**	**Lectures-15**
	Manures: Definition, importance, important manures FYM(compost), oil cakes, green manure, organic manures and vermicompost.	
	Fertilizers: Definition, Types – Straight, Compound and mixed. Nitrogenous $(NH4)_2 SO_4$, Urea, $Ca(NO_3)_2$, NH_4Cl, Phosphatic (Superphosphate, Bone meal), Potassic (Muriate of potash, K_2SO_4	
	Biofertilizers: Bacteria, Cyanobacteria, Mycorrhiza, Sea weeds.	
	Horticultural plant diseases and their control.	
	Fungal diseases- Rust, Smut, Powdery mildew, fungal wilt.	
	Bacterial – Citrus canker, Bacterial wilt.	
	Viral – TMV, Leaf curl.	
	Pests – common pests on horticultural crops – Aphids, leaf miner, mealy bugs, beetle, stem borer, caterpillars, Giant African snails, nematodes and rats.	
	Fundamentals of plant protection: Physical, chemical, biological, cultural and legal methods of control, non-toxic methods of insect control. IPM Use of transgenic plants in insect control.	
	Friends of farmers: Earthworm, snakes and predaceous fungi.	
	Scouting for insect and pests.	
UNIT IV	**Garden Operations and Hi-Tech Horticulture**	**Lectures-15**
	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.	
	High –tech Horticultural production- Green house technology- Meaning, types, layout & construction, irrigation systems. Care & attention. Hardening of plants Hydroponics:Types and techniques **Types and roles of pollinators**	
	Organic Farming: Definition, Scope, Indian scenario, Future scope. Concept of Natural Farming(SPNF)	

PRACTICALS		
RUSACHORP 501	**Horticulture and Gardening – I**	**Credits - 2**
1	Garden implements and their uses.	
2	Different types of pots & Potting medium , Potting and repotting	
3	Propagation practices by seed,	
4	Vegetative propagation, cutting, layering, budding, grafting .	
5	Developing new varieties-Technique of Emasculation and bagging(Rose/*Vinca*)	
6	Green house plants- Information regarding to soil, temperature, irrigation, fertilizer requirements and propagation methods for *Anthurium, Gerbera*, Orchids, Carnation, Roses, Capsicum,Tomato, Strawberry	
7	Soilless cultivation technology	
8	Identification of :Fertilizers – Identification by physical and chemical methods – Urea , Ammonium sulphate , Potassium sulphate, super phosphate .	
9	Manures – Identification of plants as green manure – *Gliricidia, Crotolaria, Leucaena* Biofertilizers – Identification (material as slides) VAM, *Nostoc ,Rhizobium .*	
10	Soil pH, Electrical conductivity of soil	
11	Use of soil testing Kit for organic testing,	
12	Study of mineral nutrient deficiency symptoms in different plants (internal)	
13	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.	
14	Scouting for insect and pests	
15	Collection of insect pest of the greenhouse crops (internal)	
16	Preparation of natural insecticides – Neemarka,Dashparniarka, Seetaphal powder, Tobacco extracts. (internal) Biopesticides: *Beauveria/ Verticillium/ Trichoderma*	
17	Project – Each student should individually **initiate** a project related to any topic from the syllabus.	
	<u>References:</u> • 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.

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
Total	40

External (Semester end practical examination):

Particulars	**Practical**
Laboratory work and/or *Viva voce*	60
Total	**60**

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**		
Theory	**40**	**60**	**100**	**200**
Practicals	**40**	**60**	**100**	**200**

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SEMESTER VI

Course Code: RUSACHOR 601
Course Title: Horticulture and Gardening – II
Academic year 2021 - 22

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

COURSE OUTCOME	CO DESCRIPTION
CO 1	Apply the basic principles and components of gardening and suggest plants suitable for various locations in a garden
CO 2	Reflect upon and apply different landscaping practices and garden design
CO 3	Evaluate the importance of floriculture and conceptualize flower arrangement and bio-aesthetic planning
CO 4	Explain commercial production conditions and develop management plans for soil fertility, irrigation, and pest control in spices, medicinal and aromatic plants, fruit and vegetable production
CO 5	Discuss and evaluate horticulture as a business.
CO 6	Develop competency on post-harvest technology in horticultural crops

Detailed Syllabus

RUSACHOR 601	Title: Horticulture and Gardening – II	Credits – 2
UNIT I	**Landscape gardening**	**Lectures-15**
	History and Principles of landscape gardening Gardens types and styles: Garden types. Indoor garden (Terrarium/ Bottle garden, Dish garden)and Outdoor garden Garden styles- Formal gardens, Informal gardens, Freestyle gardens	
	Vertical garden and Topiary	
	Important garden features- Paths and Avenues, Hedges and Edges, Lawn, Flowerbeds, Arches and Pergolas, Fencing, Water bodies, Rock garden, palms, ferns and cacti succulents. Plants suitable for different locations	
	Lawn- Purpose of preparation of lawn, Method of preparation of	

	lawn& management of lawn & lawn plants.	
	Mughal, Buddhist, Botanical garden, Theme park Important Gardens of India - Shalimar (Shrinagar), Vrindavan(Mysore), Veer JijamataUdyan (Mumbai), Sanjay Gandhi National Park	
UNIT II	**Floriculture, Bonsai and IPR**	**Lectures-15**
	Floriculture – Scope & importance, soil and climatic requirement and cultivation practices and Economics of green house production of *Gerbera*, Carnation, Roses, Orchids. Propagation techniques, packaging and marketing, enhancing and delaying period of bloom by special methods. Floral decoration,	
	Flower arrangements –Indian , Japanese and western type, dry flower arrangement	
	Bonsai	
	Genetic Resource Management – Germ plasm conservation, role of NBPGR, IPR's – Plant variety protection.	
UNIT III	**Commercial production**	**Lectures-15**
	Commercial production of the following – in relation to propagation, post plantation care, harvesting, post harvest management & varieties. • Rhizomes- Ginger • Vegetables- Spinach, Coriander. • Fruits- Mango, Grapes, Coconut- products like coco peat/ Coir , biodegradable straw, Banana. • Spices/condiments- *Cinnamomum zeylanicum* • Medicinal plants- *Moringa pterigosperma*, *Stevia rebaurdina* (Madura) • Aromatic plant-*Vetiveria zizanoides*, Patchouli	
UNIT IV	**Post-Harvest Technology & Entrepreneurship In Horticulture**	**Lectures-15**
	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.	
	Marketing- grading, packing and 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	
PRACTICALS		
RUSACHORP 601	**Horticulture and Gardening – II**	**Credits - 2**
1	Preparation of garden layout	
2	List of plants suitable for garden locations- 2-3 plants for each location .	
3	Identification of important horticultural plants 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	
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 - Baskets , hand ,torch type , table floral arrangement/ Floating rangoli/Biorangoli), Japanese and western type, dry flower arrangement	
7	Preparation of Jams, Jellies, Squashes/ Syrups, Pickle, sauces	
8	Varieties of banana/ watermelon/ brinjal/ grapes/chilli	
9	Drying of vegetables and fruits Gavar/chickoo/carrot/ beetroot/spinach/ lemon grass/ wheat grass/ginger	
10	Fruit & vegetable carving & Bio-jewelry (Demonstration)	
11	**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.**	
	Visits : 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.	
	<u>References:</u> • 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. • Sharma V. K. (2004). Advances in Horticulture. Deep and Deep Publ. Pvt. Ltd.

MODALITY OF ASSESSMENT

Theory Examination Pattern:

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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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Semester End Theory Assessment - 60 marks

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Overall Examination and Marks Distribution Pattern

Semester- VI

Course	601		Total per Course	Grand Total
	Internal	External		
Theory	40	60	100	200
Practicals	40	60	100	200

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