Resolution No.: AC/II(22-23).3.RUS18

S.P. Mandali's

RAMNARAIN RUIA AUTONOMOUS COLLEGE

(Affiliated to University of Mumbai)

RUIA COLLEGE
Explore ● Experience ● Excel

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 2023–2024)

GRADUATE ATTRIBUTES

GA	GA Description A student completing Bachelor's in Science program will be able to:
GA 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.
GA 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences
GA 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
GA 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
GA 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.
GA 6	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
GA 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.
GA 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 OUTCOMES

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

COURSE OUTLINE

YEAR	SEMESTER	COURSE CODE/ UNIT	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	**Practical based on RUSACHOR 501**	**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	**Practical based RUSACHOR 601**	**2**

SEMESTER-V

Course Code: RUSACHOR 501
Course Title:Horticulture and Gardening – I
Academic year 2023 - 2024

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

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

Detailed syllabus

RUSACHOR 501	Title: Horticulture and Gardening – I	Credits – 2
UNIT I	**Introduction To Horticulture**	**Lectures-15**
	Branches of Horticulture: Branches and allied branches Allied branches – • Apiculture – Bee box, role of apiculture in pollination, bee attractants and their role in agriculture • Sericulture –different types of silkworm with host plant, role of sericulture in rural development • Social Forestry • Miyawaki forest • Mushroom cultivation: nutritional value, edible and poisonous types, edible mushrooms, Cultivation of *Pleurotus*, *Volvariella* and *Agaricus*, medicinal value of mushrooms,Processing and preservations of mushrooms, economics	

	of spawn and mushroom production and mushroom recipes.	
	Horticulture Extension Education and Rural Development: • Role of Horticulture in rural economy and employment generation • Ministry of Micro, Small & Medium Enterprises (MSME) • National Horticulture Board(NHB) • KrishiVigyanKendras(KVK), • Horticulture Consultancy	
UNIT II	**Propagation Practices**	**Lectures-15**
	Artificial methods of plant propagation • Budding – Definition advantages and disadvantages. Types: T-budding, shield, patch, ring budding. • Developing new varieties: Technique of Emasculation and bagging, role of polyploidy in production of seedless varieties • Application of Tissue Culture in relation to Horticulture. • 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 $(NH_4)_2SO_4$, 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. Scouting for insect and pests	
	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.	

UNIT IV	Garden Operations and Hi-Tech Horticulture	Lectures-15
	Garden Operations : 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	
	High –tech Horticultural production- Green house technology- Meaning, types, layout & construction, irrigation systems. Care & attention. Hardening of plants **Types and roles of pollinators**, Hydroponics: Active and passive systems. Advances in hydroponics, Aquaponics Types and techniques	
	Organic Farming: • Definition, Scope, Indian scenario, Future scope. • ZBNF, Traditional organic farming, Concept of Natural Farming(SPNF)	
PRACTICALS		
RUSACHORP 501	**Horticulture and Gardening – I**	**Credits – 2**
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/*Vinca*)	
5.	Green house plants- Information regarding to soil, temperature, irrigation, fertilizer requirements and propagation methods for *Anthurium, Gerbera*, 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 – *Gliricidia, Crotolaria, Leucaena* Biofertilizers – Identification (material as slides) VAM, *Nostoc ,Rhizobium .*	
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: *Beauveria/ Verticillium/ Trichoderma*	

13.	Project – Each student should individually **initiate** a project related to any topic from the syllabus.

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 Agriculturalresearch, 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 2023 - 24

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

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

Detailed Syllabus

RUSACHOR 601	Title: Horticulture and Gardening – II	Credits – 2
UNIT I	**Landscape gardening**	**Lectures- 15**
	History and Principles of landscape gardeningGardens 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	

	.	
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, Export, enhancing and delaying period of bloom by special methods. Floral decoration-value addition	
	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. Increasing shelf life, adulterants	
	Marketing- grading, packing and transportation. Ways of increasing the market value and shelf life of horticultural produce.	
	Horticultural business, management and Entrepreneurship Development,Consultancy Garden maintenance, job prospects in horticulture	

PRACTICALS		
RUSACHORP 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 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)	
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)	
	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.	

References:

- Peter K. V. (2009). Basics of Horticulture. New India Publ. Agency.
- Randhawa G.S. & Mukhopadhyay A. (1986)Floriculture in India, AlliedPublishers
- 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:

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
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.
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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
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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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