

HORTICULTURE SYLLABUS FOR CONDUCTING WRITTEN EXAMINATION FOR DIRECT RECRUITMENT OF TEACHING POSTS IN THE CADRE OF ASSISTANT PROFESSORS AT UASM		
Sl. No.	Subject	Content
1.	Major Tropical And Subtropical Fruits	Importance, history, origin, area, distribution, production and culture of major tropical and sub-tropical fruit crops –Botany, taxonomy, varieties and their classification. Climatic influences, soil requirements, propagation and root stocks and problem of multiplication. Establishment of commercial orchards; propagation, planting and after care. Nutrition – disorders; training and pruning. Irrigation and intercropping. Pests, diseases and their management. Vegetative and reproductive phases of fruits and fruiting. Techniques for high productivity. Post-harvest handling. Crops UNIT I: Mango and Banana UNIT II: Citrus and Papaya UNIT III: Grape, Guava, Sapota UNIT IV: Pineapple, and Jackfruit UNIT V: Special problems – Mango-irregular bearing and malformation, Citrus decline and developments done.
2.	Commercial Vegetable Crops	Importance, history, origin, area, distribution, production and culture of commercial vegetable crops. Taxonomy and improved varieties / hybrids. Climatic and soil requirements. Sowing/planting. After care, water and nutrient requirements, fertigation and mulching, interculture, plant protection, intercropping and use of growth regulators. Harvesting and post-harvest technology, seed production, specific problems associated with different crops and prospects of improvement through breeding. UNIT I -Tomato, potato, eggplant, hot and sweet peppers UNIT II- Beans, cowpea UNIT III-Carrot, radish, beetroot and sweet potato UNIT IV-Cabbage, cauliflower, knol-khol UNIT V-Onion, Garlic UNIT VI - Okra, Sweet potato UNIT VII-Leafy vegetables, Amaranthus & palak UNIT VIII-Major Cucurbitaceous vegetables, cucumber, Gherkin, water melon, muskmelon, Bitter gourd, ash gourd and pumpkin.
3.	Production Technology of Major Commercial Flowers	Importance, history, origin, area, distribution and culture of major commercial flower crops. Botany, taxonomy, varieties, classification and crop improvement. Climatic and soil requirements. Propagation, rootstocks and problems of multiplication. Planting and after care. Nutrition, training, pruning, pinching, disbudding, irrigation, intercropping and use of growth regulators. Pests/diseases and their management and physiological disorders. UNIT I-Jasmine, Chrysanthemum UNIT II-Rose, Marigold, Gladiolus UNIT III-Crossandra, Tuberose, Anthuriums UNIT IV-China aster, Alstroemeria, Orchids, Gerbera, Lilums UNIT V-Harvesting,

		grading, storing, packing, marketing, and economics. Vase life of cut flowers.
4.	Major Spices and Plantation Crops	Role of spices and plantation crops in national economy, export potential, IPR issues, classification and varietal wealth. Plant multiplication including in vitro multiplication, systems of cultivation, multitier cropping, photosynthetic efficiencies of crops at different tiers, rainfall, humidity, temperature, light and soil pH on crop growth and productivity, high density planting, nutritional requirements, physiological disorders, role of growth regulators and macro and micro nutrients, water requirements, fertigation, moisture conservation, shade regulation, weed management, training and pruning, crop regulation, maturity indices, harvesting. Cost benefit analysis, organic farming, management of drought, precision farming. Organic certification and quality analysis. Crops Coffee, cocoa and tea Cashew, rubber and oil palm Coconut and arecanut Black pepper, cardamom, turmeric and ginger Clove, cinnamon, nutmeg and seed spices
5.	Post-harvest Technology of Horticultural Produce	Importance of post-harvest handling and management of horticultural produce, present status and future scope pre and post-harvest losses and their causes. Maturity standards/Indices for harvesting. Physico chemical changes during development, ripening and storage. Impact of physiological processes associated with ripening and senescence. Bio-synthesis and sources of ethylene for ripening, Climacteric and non-climacteric fruits. Harvesting, handling, grading, packing and transportation of fresh produce like fruits and vegetables. Pre-cooling methods and storage requirements for fruits, vegetables and flowers. Harvesting, harvesting tools and their design aspects; curing, washing, sorting, grading of fruits, flowers and vegetables for local markets and export packaging of fresh and processed fruit and vegetable products, preservation by use of additives and chemical preservatives. Pre and Post-harvest treatments for extending storage life – use of protective coats, fungicides and chemicals. Control of ripening and senescence by growth regulators control of dormancy, sprouting and discoloration in vegetables.

		Spoilage of fresh and processed horticultural produce; biochemical changes and enzymes associated with spoilage of horticultural produce; principal spoilage organisms, food poisoning and their control measures. Role of microorganisms, enzymes and water activity in food preservation. Cold storage, controlled atmosphere storage and hypobaric storage – equipments used. Preservation by freezing and irradiation. Principles of transport and commercial transport operations. Modes of transportation, types of vehicles, transit requirements for different horticultural produce. Marketing-factors influencing marketing of perishable crops, marketing systems and organizations.
6.	Protected Cultivation of Horticultural Crops	Introduction, history, present status, importance, problems and prospects of protected cultivation. Types and designs of protected structures and their management. Environment control in protected structures. Growing media and sterilization. Soilless cultivation, hydroponics and aeroponics. Irrigation, Fertigation and water management of green house crops. Physiology of green house crops. Vegetable seedlings production under protection. Protected cultivation of crops (media, bed preparation, varieties, planting, irrigation and fertigation, harvesting, specific operation for different crops and economics): rose, carnation, gerbera, orchids, anthurium, lily, chrysanthemum, new ornamentals, growing filler materials like limonium (statice), ligianthus, gypsophila, fern, asparagus, etc. Protected cultivation of crops (media, bed preparation, varieties, planting, irrigation and fertigation, harvesting, specific operation for different crops and economics) capsicum, tomatoes, cucumber and other exotic vegetables Post harvest management of flowers and vegetable (sorting, grading, packing, storage, transportation and marketing). Integrated insect pest and disease management.
7.	Growth and Development of Horticultural Crops	Growth and development- definition, parameters of growth and development, growth dynamics, morphogenesis. Annual, semi-perennial and perennial horticultural crops, environmental impact on growth and development, effect of light, photosynthesis and photoperiodism vernalisation, effect of temperature, heat units, thermoperiodism.

		Assimilate partitioning during growth and development, influence of water and mineral nutrition during growth and development, biosynthesis of auxins, gibberellins, cytokinins, abscissic acid, ethylene, brassinosteroids, growth inhibitors, morphactins, role of plant growth promoters and inhibitors. Developmental physiology and biochemistry during dormancy, bud break, juvenility, vegetative to reproductive interphase, flowering, pollination, fertilization and fruit set, fruit drop, fruit growth, ripening and seed development. Growth and developmental process during stress - manipulation of growth and development, impact of pruning and training, chemical manipulations in horticultural crops, molecular and genetic approaches in plant growth development.
8.	Principles and Practices of Dry-land Horticulture	Definition, importance and limitations of dry land horticulture, present status and future scope. Constraints encountered in dry lands. Agro-climatic features in rain shadow areas, scarce water resources, high temperature, soil erosion, runoff losses etc. Techniques of development and management of dry land horticulture. Watershed development. Soil and water conservation methods - terraces, contour bunds etc; methods of control and impounding of run off water - farm ponds, trenches, macro catch pits etc; in-situ water harvesting methods - micro catchments, different types of tree basins etc. Methods of reducing evapo-transpiration - use of shelter belts, mulches, anti-transpirants, growth regulators etc. Water use efficiency - need-based, economic and conjunctive use of water, micro systems of irrigation etc. Selection of plants/crops having drought resistance/ tolerance characteristics. Special techniques of planting and after care - use of seedling races, root stocks, in situ grafting, deep pitting/planting, canopy reduction etc.
9.	Organic Horticulture	Organic horticulture – definition, synonyms and misnomers, principles, methods, merits and demerits. Organic farming systems, components of organic horticultural systems, different organic inputs, their role in organic horticulture, role of biofertilizers, biodynamics and the recent developments.

		EM (Effective microorganism) technology and its impact in organic horticulture, indigenous practices of organic farming, sustainable soil fertility management, weed management practices in organic farming, biological/natural control of pests and diseases, organic horticulture in quality improvement. GAP - Principles and management, HACCP (Hazard Analysis and Critical Control points) exercise, certification of organic products and systems, agencies involved at national and international levels, standards evolved by different agencies. Constraints in certification, organic horticulture and export, IFOAM (International Federation of Organic Agricultural Movement) and global scenario of organic movement, post-harvest management of organic produce.
10.	Plant Tissue Culture and its Application in Commercial Production of Horticulture Crops	Plant Tissue Culture: principles, practices and its application in Micro propagation , Methods in Micro propagation, aspects of commercial propagation, including problems and prospectus in reference to high value Horticultural crops. Principles of tissue morphogenesis under in vitro conditions Factors influencing in vitro cultures Callus culture - principles and practices of its regeneration in to organs Micro propagation, methods in micro propagation and its relevant in varied horticultural plants. Principles and practices of hardening . Commercial propagation methods in relation to various commercial important horticultural crops.
11.	Propagation and Nursery Management of Fruit Crops	Introduction, life cycles in plants, cellular basis for propagation, sexual propagation, apomixis, polyembryony, chimeras. Principles factors influencing seed germination of horticultural crops, dormancy, hormonal regulation of germination and seedling growth. Seed quality, treatment, packing, storage, certification, testing. Asexual propagation – rooting of cuttings, factors affecting Nutritional. physiological, anatomical and biochemical aspects of root induction in cuttings. Layering – principles and methods. Budding and grafting – selection of elite mother plants, methods. Establishment of bud wood bank, stock, scion and inter stock, relationship – Incompatibility. Rejuvenation through top working – Progeny orchard and scion bank.

		Micro-propagation – principles and concepts, commercial exploitation in horticultural crops. Techniques - in vitro clonal propagation, organogenesis, meristem culture, somatic embryogenesis,. Hardening, packing and transport of micropropagules. Nursery – types, structures, components, planning and layout. Nursery management practices for healthy propagule production.
12.	Minor Tropical and Sub Tropical Fruits	Importance, history, origin, area, distribution, production and culture of minor tropical and sub-tropical fruit crops. Botany and taxonomy. Climatic and soil requirements. Propagation, root stocks and problem of large scale multiplication. Planting and after care. Training, pruning and nutrition. Pests - diseases and their management. Vegetative and reproductive phases, fruit set and fruiting. Developments in crop improvement. Pomegranate, fig, ber, annonanceous fruits Jamun, rose apple, jack fruit, bread fruit, passion fruit West Indian cherry, karonda, wood-apple, bael fruit Avocado, litchi, loquat, strawberry, carambola, rambutan Durian, mangosteen, langsat, bilimbi, tamarind, etc.
13.	Breeding of Fruit Crops	Origin and distribution, taxonomical status - species and cultivars, cytogenetics, genetic resources, blossom biology, breeding systems, breeding objectives, ideotypes, approaches for crop improvement - introduction, selection, hybridization, mutation breeding, polyploidy breeding, rootstock breeding, improvement of quality traits, resistance breeding for biotic and abiotic stresses, biotechnological interventions, achievements and future thrust in the following selected fruit crops. Crops Mango, banana and pineapple Citrus, grapes, guava and sapota Jackfruit, papaya, custard apple, aonla, avocado and ber Mangosteen, litchi, jamun, phalsa, raspberry and nuts Apple, pear, plums, peach, apricot, cherries and strawberry

14.	Canopy Management in Fruit Crops	Canopy management - importance and advantages; factors affecting canopy development. Canopy types and structures with special emphasis on geometry of planting, canopy manipulation for optimum utilization of light. Light interception and distribution in different types of tree canopies. Spacing and utilization of land area - Canopy classification; Canopy management through rootstock and scion. Canopy management through plant growth inhibitors, training and pruning and management practices. Canopy development and management in relation to growth, flowering, fruiting and fruit quality in temperate fruits, grapes, passion fruits, mango, sapota, guava, citrus and ber.
15.	Minor Vegetable Crops	Importance, history, origin, area, distribution, production and culture of minor vegetable crops. Taxonomy and improved varieties. Climatic and soil requirements, sowing/planting. After care, water and, nutrient requirements, interculture, plant protection, intercropping and use of growth regulators. Harvesting and post harvest technology. Seed production. Specific problems and management of each crops and prospects of improvements through breeding. Cluster Bean, Winged Bean, Dolichos, Cowpea Leafy vegetables (Lettuce, Methi, Coriander etc), Cassava, Colocasia, Amorphophallus, Dioscoria Tinda, Chow-chow, Little gourd, Snake gourd, ridge gourd, sponge ground and oriental pickling melon, Broccoli, Brussel sprout Perennial Vegetables (Drum Stick, Chow Chow, Coccinia, Curry Leaf etc)
16.	Breeding of Vegetable Crops	Origin, botany, taxonomy, cytogenetics, male sterility and selfcompatibility in plants-causes and implication in breeding, Genetics basis of plant breeding, Vegetables breeding objectives & breeding methods, Heterosis and hybrid breeding, resistance breeding for biotic and abiotic stress, concept of bio-technology and its application in vegetable breeding, issue of patenting, PPVFR act. Potato and Tomato, Eggplant, Hot Pepper, Sweet Pepper Peas, Beans Amaranth and Lettuce

		Cucumber, Melons, Gourds, Pumpkins and Squashes Cabbage, Cauliflower Carrot, Beetroot, Radish, Sweet Potato and okra
17.	Seed Production Technology of Vegetable Crops	Definition of seed and its quality, new seed policies; DUS test, scope of vegetable seed industry in India. Genetical and agronomical principles of seed production; methods of seed production; use of growth regulators and chemicals in vegetable seed production; floral biology, pollination, breeding behaviour, seed development and maturation; methods of hybrid seed production. Categories of seed; maintenance of nucleus, foundation and certified seed; seed certification, seed standards; seed act and law enforcement, plant quarantine and quality control. Physiological maturity, seed harvesting, extraction, curing, drying, grading, seed processing, seed coating and pelleting, packaging (containers/packets), storage and cryopreservation of seeds, synthetic seed technology. Techniques for seed production in annual vegetables viz., solanaceous vegetables, cucurbits, leguminous vegetables, okra, leafy vegetables, , techniques of seed production biennial vegetables viz., cole crops, bulb crops, root vegetables, and vegetative propagated vegetables.
18.	Production Technology of Medicinal and Aromatic Crops	Herbal industry, WTO scenario, Export and import status, Indian system of medicine, Indigenous Traditional Knowledge, IPR issues, Classification of medicinal crops, Systems of cultivation, Organic production, Role of institutions and NGO's in production, GAP in medicinal crop production. Production technology for Senna, Periwinkle, Coleus, Aswagandha, Glory lily, Sarpagandha, Aloe vera, Andrographis paniculata. Production technology for Isabgol, Poppy, Stevia rebaudiana, Ocimum sp. Post harvest handling – Drying, Processing, Grading, Packing and Storage, processing and value addition; GMP and Quality standards in herbal products. Influence of biotic and abiotic factors on the production of secondary metabolites, Regulations for herbal raw materials, Phytochemical extraction techniques.

		Aromatic industry, WTO scenario, Export and import status, Indian perfumery industry, History, Advancements in perfume industry. Production technology for palmarosa, lemongrass, citronella, vetiver, geranium, davana, mentha, ocimum, eucalyptus, rosemary, patchouli. Post-harvest handling, Distillation methods, advanced methods, Solvent extraction process, steam distillation, Perfumes from non-traditional plants, Quality analysis, Value addition, Aroma chemicals, quality standards and regulations. Institutional support and international promotion of essential oil and perfumery products.
19.	Landscaping And Ornamental Gardening	Landscape designs & principles of gardening, types and styles of gardens, English, Mughal, Japanese, Persian, Italian. Urban landscaping, Landscaping for specific situations, institutions, industries, residents, hospitals, roadsides, traffic islands, dam, sites, IT parks, corporates. Features of garden, arboretum, shrubbery, fernery, palmatum, arches and pergolas, edges and hedges, climbers and creepers, cacti and succulents, herbs, annuals, flower borders and beds, ground covers, carpet beds, bamboo groves. Lawns, Establishment and maintenance. Special types of gardens; vertical garden, roof garden, bog garden, sunken garden, rock garden. Bio-aesthetic planning, eco-tourism, theme parks, indoor gardening, therapeutic gardening, non-plant components, water scaping, xeriscaping, hardscaping.
20.	Production Technology of Minor Commercial Flowers	Importance, history, origin; area, distribution, production and culture of minor commercial flowers. Botany, taxonomy, varieties and their classification and crop improvement. Climatic and soil requirements. Propagation, planting and aftercare. Nutrition, irrigation, interculture, weed control and use of growth regulators. Pests/diseases and their managements. Lotus, Amaryllis and Hippeastrum, Bird of paradise, Gaillardia, Gomphrena Zinnia, Gypsophylla, Statice, Salvia, Dahlia

		Zantedeschia, Solidago, Berlaria, Heliconia Harvesting, grading, storing, packing, marketing and economics. Vase life of cutflowers.
21.	Breeding of Flower Crops and Ornamental Plants	Principles — Evolution of varieties, origin, distribution, genetic resources, genetic divergence-Patents and Plant Variety Protection in India. Genetic inheritance of flower colour, doubleness, flower size, fragrance, post harvest life. Breeding methods suitable for sexually and asexually propagated flower crops and ornamental plants— introduction, selection, domestication, polyploid and mutation breeding for varietal development, Role of heterosis, Production of hybrids, Male sterility, incompatibility problems, seed production of flower crops. Breeding constraints and achievements made in commercial flowers - rose, jasmine, chrysanthemum, marigold, tuberose, crossandra, carnation, dahlia, gerbera, gladioli, orchids, anthurium, China aster, heliconia, liliums, Breeding constraints and achievements made in ornamental plants –petunia, hibiscus, bougainvillea, Flowering annuals (zinnia, cosmos,dianthus, snap dragon, pansy) and ornamental foliages– Introduction and selection of plants for water scaping and xeriscaping.
22.	Fundamentals of Processing of Fruits and Vegetables	Importance of processing of fruits and vegetables. Indian and global scenario on production and processing of fruits and vegetable. History of food preservation, Present status and future prospects of fruit and vegetable preservation industry in India. Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary and minimal processing, Nutritive value of processed fruits and vegetables. Processing equipments, Layout and establishment of processing industry, FPO license. Importance of hygiene; Plant sanitation. Principles and methods of preservation by heat, drying, chemicals, radiation, freezing, fermentation, etc., Important fruit and vegetable products. Preservation of fruit juices, beverages, pulp, puree and concentrates. Methods of preparation of confectionery and tomato products. Technology for fruit and vegetable based snacks; chips,

		wafers; processing of fruits for candies, bars, toffees, jams and jellies from locally available fruits. Major value added products from fruits and vegetables. Management and Utilization of horticulture waste and byproducts of fruit and vegetable processing industry. Food safety – Hazard analysis and critical control points (HACCP), Labeling, Labeling Act and Nutrition labeling. Quality assurance and quality control, TQM, GMP. Food standards – FPO, PFA, etc. Food laws and regulations. Study of food standards –National, international, CODEX Alimentarius. Investment analysis. Principles and methods of sensory evaluation of fresh and processed fruits and vegetables.
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