Syllabus of Entrance Examination for Admission to Master Degree Programme (Horticulture and Agril Engineering) in 2014-15 academic Session

Faculty of Horticulture and Agril Engineering

Syllabus of Entrance Examination for Admission to M.Sc.(Hort.) for 2014-15 Academic Session

Economic importance and classification of horticultural crops and their culture and nutritive value, are and production, export and imports, fruit and vegetable zones of India and of different states, nursery management practices, soil and climate, vegetable gardens nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities, principles planning and layout, management of orchards, planting systems and planting densities, principles and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management, seed management, fertility management of horticultural crops, cropping systems, intercropping multi – tier cropping, mulching, bearing habits, factors influencing the fruitfulness and unfruitfulness. Rejuvenation of old orchards, top working, frame working. Plant propagation: Propagation: Need and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages. Seed dormancy (scarification and stratification) internal and external factors. Nursery techniques, apomixes – mono – embryony, polyembryony, chimera and bud sport. Propagation Structures: Mist chamber, greenhouses, cold frames, hot beds, poly house, and lath house. Use of growth regulators in seed and vegetative propagation, methods of growth regulators in seed and vegetative propagation, methods and techniques of cutting, layering, grafting and budding. Physiological and bio0 – chemical basis of rooting, factors influencing rooting of cutting and layering graft incompatibility. Techniques of propagation through specialized organs – corms, runner, sucker. Inspect /pest /disease control in nursery. Tropical and subtropical fruits-I: Horticultural classification of fruits including genome classification, detailed study of area, production and export potential, varieties and hybrids, climate and soil requirements, propagation techniques planting density and systems, after care, training and pruning, management of water, nutrient and weeds, special horticultural techniques including plant growth regulators and its use in commercial orchard, Physiological disorders, harvest indices and harvesting methods of grape, citrus, litchi, longan, rambutan, pineapple,
passion fruit, avocado, macadamia and water apple. Orchard management: Orchard management, importance, objectives, merits, demerits, clean cultivation, sod culture, sod mulch, herbicides, inorganic and organic mulches. Tropical and sub-tropical and temperature horticultural systems, competitive and complimentary effect of root and shoot systems. Biological efficiency of cropping systems in horticulture, systems of irrigation, soil management in relation to nutrient and water uptake and their effect on soil environment, moisture, organisms and soil properties. Integrated nutrient and pest management. Utilization of resources constraints in existing systems. Crop model and crop regulation in relation to cropping systems, good agricultural practices (GAP), HACCP, EURPGAP for certification and export. Growth and development of horticultural crops: Growth and Development – Definitions, components photosynthetic productivity, leaf area index (LAI) – Optimum LAI in Horticultural crops, canopy development; different stages of growth, growth curves, growth analysis in horticultural crops. Plant bioregulators - auxin, gibberellin, cytokinin, ethylene inhibitors and retardants, basic functions, biosynthesis, role in crop growth and development, propagation, flowering, fruit setting, fruit thinning, fruit development, fruit drop and fruit ripening. Flowering- factors affecting flowering, physiology of flowering, photoperiodism – long day, short day and day neutral plants, vernalisation and its application in horticulture, pruning and training physiological basis of training and pruning – source and sink relationship, translocation of assimilates. Physiology of seed development and maturation, seed dormancy and bud dormancy, causes and breaking methods in horticultural crops. Physiology of ripening of fruit – climatic and non – climatic fruits. Tropical and subtropical fruits-II: Origin, area, production and export potential, varieties and gybrids, climate and soil requirements, propagation techniques, planting density and planting systems, after care, training and pruning, management of water, nutrient and weeds, special horticultural techniques including plant growth regulators and use in commercial orchards. Physiological disorders. Harvest indices and harvesting methods of mango, banana, guava, papaya, jackfruit, sapota, loquat, persimmon, carambola and mangostean. Breeding of horticultural crops-I: Fruit breeding- History, importance in fruit production, distribution, domestication and adaptation of commercially important fruits and plantation crops, variably for economic traits, breeding strategies, clonal selection, bud mutations, mutagenesis and its application in crop improvement- policy manipulation, - in vitro breeding tools in mango, banana, citrus, grape, apple, papaya, coconut, cashewnut.
area & production, industrial importance in India. Propagation and planting of trees, shrubs, climbers and creepers, plams and herbaceous perennials and annuals. Flower arrangement, its importance and technique. Bio-aesthetic planning, definition, avenue plantation, beautifying-schools, villages railway station, dam sites, hydroelectric stations, colonies, river banks. Planting materials for playgrounds. Culture of bansai, art of making bonsai. Introductory agroforestry: Agroforestry – definition, objectives and potentials. Distinction agroforestry and social forestry. Status of Indian forests and role in India, farming systems. Agroforestry system, sub-system and practice, agri-silviculture, silvipastoral, horti-silviculture, horti-silvipastoral, shifting cultivation, taungya, home gardens, alley cropping, intercropping, wind breaks, shelterbelts, and energy plantations. Planning for agroforestry – constraints, diagnosis and design methodology, selection of tree crop species for agro-forestry. Agroforestry projects: national, overseas, MPTS- their managements practices, economics of cultivation, nursery and planting (Acacia catechue, Dalbergia sissoo, Tectona, populous, morus, Grewia, Eucalyptus, Quercus spp, bamboo, tamarind, neem etc). Principles of Landscape Gardening: History and scope of gardening, aesthetic values. Gardens in India, types of gardens. Landscaping, historical background, definition of landscaping, basic principles of landscaping and basic components, home garden and outdoor living room concept, what is balance and use area in home garden. Lawn, methods of designing rockery, water garden. Special types of gardens, their designs and values in landscaping. Herbaceous and shrubbery border. Vertical gardens, roof gardens. Parks & public gardens. Medicinal & aromatic crops: History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance, origin, distribution, area, production, climate and soil requirements, propagation and nursery techniques, planting and after care, cultural practices, training and pruning, nutritional and water requirements, plant protection, harvesting and processing of under mentioned important medicinal and aromatic plants, study of chemical composition of important medicinal and aromatic plants, extraction, use and economics of drugs and essential oils in medicinal and aromatic plants. Medicinal plants: Periwinkle, Rauvolfia, Dioscorea, Isabgul, Kalmegh, Vasaka, neem, cinchona, Pyrethrum and other species relevant to local conditions. Aromatic plants: Cymbopogon grass, khus grass, lavender, geranium, patchouli, mint, damask rose, Ocimum and other species relevant to the local conditions. Seed production of Horticultural crops: Introduction & history of seed industry in India. Definition of seeds. Physiological events of seed


Spices and Condiments-I: History and origin, scope and importance, area and production, uses, export potential, role in national economy, nutritive value, classification, botany, soil and climate, varieties, propagation, soil management, planting, nutritional management, water management, intercultural operations, shade regulation, mulching, training and pruning, weed control, role of growth regulators, flowering, fruiting, maturity indices, harvesting, post harvest technology, packaging, storage, va; ue added products, methods of extraction of essential oil, oleoresin, curcumin, etc. Economics of cultivation of black pepper, turmeric, ginger, chilli, onion, garlic, coriander, fenugreek, fennel, black cumin, opium poppy, ajowan, dill, celery. Role of Spice Board, Cardamom Board and Pepper Export Promotion Council, Institutions and Research Centre in R & D.

Plantation Crops-I: History and origin, scope and importance, area and production, export potential, role in national economy, uses, industrial importance, byproduct utilization, nutritive value, botany, soil and climate, varieties, propagation, soil management, planting system, manuring, mulching, weed and water management, different cropping system, training
and pruning, role of growth regulators, flowering, fruiting, top working, physiological disorders, maturity indices, harvesting and yield, post harvest handling, processing and value addition, packaging, grading, marketing and economics of coconut, arecanut, oil palm, palmyra, cashew nut and betelvine. Plantation Crops-II: History and origin, scope and importance, area and state economy, uses, industrial importance, by product utilization, nutritive value, botany, soil and climate, varieties and hybrids, propagation, soil management, different system, manuring, mulching, weed and water management, different, cropping system, training and pruning, shade regulation, role of growth regulators, flowering, fruiting, top working, physiological disorder, maturity indices, harvesting and yield, post harvest handling, processing and value addition, packaging, grading, marketing and economics of tea, coffee, cocoa, rubber and bamboo.

Spices and condiments- II: History and origin, scope and importance, area and production, uses, export potential, role in national economy, nutritive value, classification, botany, soil and climate, varieties, propagation, soil management, planting, nutritional management, water management, intercultural operation, shade regulation, mulching, training and pruning, weed control, role of growth regulators, flowering, fruiting, maturity indices, harvesting, post harvest technology, packaging, storage, value added products, methods of extraction of volatile oil. Economics of cultivation, of vanilla, cinnamon, clove, nutmeg, mace, allspices, curry leaf, tejpat, and mint.


Post Harvest Management of Horticultural Crops –II: Post harvest treatment of horticultural crops, quality parameters and specification. Structure of fruits, vegetable and cut flowers related to physiological changes after harvest. Methods of storage for local market and export, pre-harvest treatment and pre-cooling, pre-storage treatment, Different systems of storage, packaging methods and types of packages, recent advances in packaging. Types of containers and
Economics of cultivation; post-harvest handling and storage. Marketing of tomato, brinjal, chillies, okra and cucurbits. Tropical and subtropical vegetables-II: Area, production, economic importance and export potential of tropical and sub-tropical vegetable crops. Description of varieties and hybrids, climate and soil requirement, seed rate, preparation of field, nursery practice; transplanting of vegetable crops and planting for directly sown/transplanted vegetable crops. Spacing, planting systems water and weed management; nutrient management and deficiencies, use of chemicals and growth regulators. Cropping system, harvesting, yield and seed production. Economics of cultivation; post-harvest handling and storage. Marketing of cluster beans, cowpea, lab-lab, snap bean, amaranthus, moringa, curry leaf, portulaca and basella. Temperate Vegetables-I: Importance of cool season vegetable crops in nutrition and national economy. Area, production, export potential, description of varieties and hybrids, origin, climate and soil, production technologies, seed production, post-harvest technology and marketing of cabbage cauliflower, knol-khol, palak, garlic, onion, radish, carrot, turnip, bet root and peas. Temperate Vegetables-II: Importance of cool season vegetable crops in nutrition and national economy. Area, production, export potential, description of varieties and hybrids, origin, climate and soil, production technologies, seed production, post-harvest technology. Marketing of sprouting broccoli, Brussels sprout, lettuce, Chinese cabbage, spinach, leek, broad beans, rhubarb, asparagus and globe artichoke. Organic Farming: Introduction, concept, relevance in present context; Organic production requirements; Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil improvement and amendments; Integrated diseases and pest management use of biocontrol agents, biopesticides, pheromones, trap crops, bird perches; Weed management; Quality considerations, certification and accreditation procedures, marketing and exports. Potato and tuber crops: Origin, area, production, economic importance and export potential of potato and tropical, sub-tropical, sub-tropical and temperate tuber crops; description of varieties and hybrids, climate and soil requirement, season, seed rate; preparation of field; planting practices; spacing; water, nutrient and weed management; nutrient deficiencies. Use of chemicals and growth regulators; cropping systems. Harvesting practice, yield; seed production, economics of cultivation. Post-harvest handling and storage, field and seed standards and marketing of potato, tapioca, sweet potato, arrow root, cassava, colocasia, xanthosoma, amorphophallus, dioscorea, Jerusalem artichoke, hors radish and other under exploited tuber crops.
Faculty of Agricultural Engineering


Elementary Statistics and theory of probability, differential and integral calculus, linear algebra and Fourier series, differential equations, vector algebra & vector calculus, elementary numerical analysis.

Electric motors: Types, performance, selection, installation and maintenance, measuring instruments, fundamentals of computers, power distribution.

Thermodynamic principles; fluid mechanics, theory of machines

Soil mechanics, soil classification, compaction & shear strength of soils, engineering mechanics, strength of materials

Importance of farm equipment and role of mechanization in enhancing productivity & profitability of Indian agriculture; analysis of forces, design and production of farm machinery and power units; mechanics of tillage & traction operation, repair and maintenance of farm machines and equipment, farm engines; tractors and power tillers; tractor stability and operators comfort; field capacity and cost analysis; test codes and procedure; safety and ergonomic principles. Role of energy in economic development; solar, wind and bio-energy; biogas plants & gasifiers; biofuels from biomass; collection, characterization and storage of biomass, solar cookers & solar refrigerators.

Biochemical and engineering properties of biological materials; quality control & safety of raw and finished products. Principles, practices and equipments for drying, milling, separation and storage of agricultural produce and by-products; material handling equipment and operations; farmstead planning; heating & cooling load calculation; seed processing practices and equipments; food preservation methods and products development; refrigeration and air conditioning; cold stores; waste management, cost analysis & food processing plants layout, feasibility reports

Surveying and leveling; hydrology, water resources in India; efficiency in water use; irrigation system and equipment; water conveyances and associated efficiency; soil-plant-water relationship; estimation of evaporation and water requirements of crop; water harvesting and use, farm ponds and reservoirs, command area development, land use capability classification, ground water development, wells and pumping equipment, soil erosion and its control, land shaping and grading equipment and practices, hydraulic structures, drainage of irrigated and humid areas; salt balance and reclamation of saline and alkaline soils.