Annexure "C"

Syllabus for Written test (Objective Type)

Marks:- 120
Time: - 2.00 Hours

Section – I **Marks: 30**

Fruit Science

Economic importance and classification of horticultural crops, nursery management practices, planting and layout, management of orchards, planting systems and planting densities, nursery techniques and their management. Principles and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management, weed management, fertility management in horticultural crops, intercropping, multi-tier cropping, mulching, bearing habits, factors influencing the fruitfulness and unfruitfulness. Rejuvenation of old orchards, top working, frame working, principles of organic farming.

Need and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages. Seed dormancy (scarification & stratification) internal and external factors. Propagation Structures: Mist chamber humidifiers, greenhouses, glasshouses, cold frames, hot beds, poly-houses, nursery (tools, and implements), uses of growth regulators in seed and vegetative propagation, methods and techniques of cutting, layering, grafting and budding; physiological & bio chemical basis of rooting, factors influencing rooting of cuttings and layering, selection and maintenance of mother trees, collection of scion wood stick, scion-stock relationship, and their influences, Nursery registration act.

Horticultural zones of India, production and export potential, varieties, 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, their solution preparation and use in commercial orchards. harvest indices, harvesting methods, of the following crops. Mango, banana, grapes, citrus, papaya, guava, litchi, loquat. Bearing in mango and citrus, , causes and control measures of special production problems, alternate and irregular bearing overcome,

control measures. Rainfed horticulture, importance and scope of arid and sermi-arid zones of India. Characters and special adaptation of crops: ber , pomegranate, fig.

Classification of temperate fruits, detailed study of areas, production, varieties, climate and soil requirements, propagation, planting density, cropping systems, after care training and pruning , self incompatibility and pollinizers, use of growth regulators, nutrient and weed management, harvesting, of apple, pear, peach, apricot, cherry, strawberry, kiwi, almond, walnut chest nut. Replant problem, rejuvenation and special production problems like pre-mature leaf fall, physiological disorders.

Orchard management, importance, objectives, clean cultivation, sod culture, Sod mulch, herbicides and inorganic and organic mulches, competitive and complimentary effect of root and shoot, systems of irrigation.

Section – II **Marks: 20**

Vegetable Science

- Classification of vegetable crops.
- Economic and medicinal importance and nutritive value.
- Area and production, exports and imports.
- Description of varieties and hybrids.
- Types of vegetable gardens, kitchen garden; principles of planning and layout.
- Nursery management practices.
- Soil and climate, nutrition, seed rate, preparation of field, transplanting, planting for directly sown/transplanted vegetable crops, spacing, planting systems, water and weed management; nutrient management and deficiencies, physiological disorders and their corrective measures, use of chemicals and growth regulators, harvest, yield, post-harvest handling and storage and marketing and seed production of Tomato, Brinjal, Chilli, Sweet pepper, Potato, Beans, Okra, Bottle gourd, Cucumber, Bitter gourd, Squash, Kale, Cabbage, Cauliflower, Knol-khol, Sprouting broccoli, Lettuce, Garlic, Onion, Leek, Radish, Carrot, Turnip, Beet root, Peas, Broad beans, Cowpea, Spinach, Fenugreek, Fennel and Coriander.
- Factors affecting production and productivity of vegetables.
- Cropping systems.
- Raising of vegetable crops organically.

- Nutrient management through the use of organic manures, vermicomposting, green manuring, biofertilizers.
- Disease and pest management organically.
- Types of protected structures.
- Cultivation of vegetable crops under green houses.
- Important diseases and pests of vegetable crops.
- Integrated disease management in vegetable crops
- Integrated insect-pest management in vegetable crops
- History and scope of vegetable seed industry.
- Principles of vegetable seed production.
- Methods of vegetable seed production.

Section – III **Marks: 15**

Floriculture and Landscaping

Principles and elements of landscape design, plant material for maintaning flowering calendar in landscaping, symbols, Landscape and Landscaping with basic principles and basic components, walk-paths, bridges, constructed features etc in landscaping.

Scope and importance of commercial floriculture in India, production techniques of ornamental plants like rose, tulip, Narcissus (Daffodils), Lilium, chrysanthemum, orchid, carnation, gladiolus, tuberose, anthurium, marigold and Gerbera for domestic and export market, growing of flowers under protected environments such as glass house, plastic house etc. Soilless cultivation or hydroponics and its implementation in floriculture. Post harvest management of cut flowers (Pulsing, pre cooling, recut of stem, packaging, storage etc), Flower dehydration techniques for different flower crops.

History, scope of gardening, aesthetic values, Gardens in India, types of gardens, landscaping, historical background, Definition: Floriculture industry, importance, area and production, industrial importance in India. Special types of gardens (bog garden, sunken garden, terrace garden, rock garden, bottle garden, water garden, Childrens garden, roof garden), formal, informal and free style gardens, Mugal garden, Japanses garden, English garden, ornamental trees, shrubs, herbaceous perennials, climbers,creepers, palms, ferns,

grasses and cacti succulents for home gardening and landscaping along with different methods of Progagation. Flower arrangement, Bio-aesthetic planning, round country planning, urban planning and planting avenues, schools, villages, beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, Culture of bonsai. Different methods for turf making including dibbling, turfing, astro turfing, sodding etc. Important grasses for lawns with special features.

Seed production techniques in ornamental annuals, Prospects of seed production in Kashmir.

Scope ,Constraints , Agro climatic zones, Selection of Variety, Maintaining Genetic Purity of flower seeds, Production module for seed production in different annual Crops, Summer season annuals and winter seasonals, Botanical description : Common name, Botanical name, local name, family, Origin, pollination type. Nursery raising, Sowing time and Transplanting Isolation distance, Intercultural operations, Rouging, weed Control, Irrigation, Nutrition, Pinching, Staking, Plant protection, Harvesting: Hand Picking, Shattering, yield, Post harvest management, Seed treatment, Packaging and Seed Storage in *D. caryophyllus*, *D. barabatus*, *Lathyrus odoratus*, *Lupinus sp.* and *Impatiens balsamina, Antirrhinum sp.*, *Godetia sp.*, *Linaria sp.*, *Lobelia sp.*, *Petunia sp.*, *Phlox sp.*, *Salvia splendens*, *Verbena sp.* and *Viola tricolor., Althea rosea*, *Alyssum sp.*, *Calendula sp., Celosia plumosa*, *Centaura sp.*, *Chrysamthemum sp.*, *Clarkia sp.*, *Cosmos sp.*, *Coreopsis sp.*, *Gaidardia sp.*, *Gomphrena sp.*, *Helianthus sp.*, *Helichrysum sp.*, *Iberis sp.*, *Impatiens sp.* and *Zinnia sp*.

Section – IV **Marks: 15**

Natural Resource Management (NRM)

Introduction to soil fertility and productivity- factors affecting. Essential plant nutrient elements- functions. Salt affected soils - characteristics and management. Role of microorganisms in organic matter- decomposition. Integrated plant nutrient management. Critical limits of plant nutrient elements and hunger signs. luxury consumption, nutrient interactions, deficiency symptoms,

Water resources of J&K . Importance and consumptive use of water. Available and unavailable soil moisture. Water budgeting. Rooting characteristics and moisture extraction pattern. Water requirement of horticultural crops -lysimeter studies, use of pan evaporimeter. Critical stages of crop growth for irrigation. Irrigation scheduling, different

approaches. Methods of irrigation - surface and sub-surface pressurized methods viz., sprinkler and drip irrigation, their suitability, merits and limitations, fertigation. Irrigation management practices for different soils and crops.

Methods of soil and plant sampling and processing for analysis. Soil structure and aggregate analysis. concepts of soil moisture estimation. Methods of estimation of redox potential. Soil fertility evaluation methods. Soil micro-organisms and their importance. Saline, alkali, acid, waterlogged and sandy soils, their appraisal and management. Chemical and mineral composition of horticultural crops. Leaf analysis standards, index tissue, interpretation of leaf analysis values. Quality of irrigation water.

Introduction, concept. Organic production requirements; Biological intensive nutrient management, organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers. Weed management.

Section – V **Marks: 10**

Plant Pathology

Introduction to the science of Phyto-pathology and its objectives. Classification of plant diseases, symptoms, signs, and related terminology. Parasitic causes of plant diseases (fungi, bacteria, viruses, phytoplasma), and their characteristics. Non-parasitic causes of plant diseases. Survival and dispersal of plant pathogens. Plant disease epidemiology and forecasting. Principles and methods of plant disease management. Fungicide classification based on chemical nature and commonly used systemic, non-systemic fungicides and bactericides. Preparation of fungicidal solutions, slurries, pastes and their applications. Importance of micro organisms. Mushrooms-edible (Agaricus and Pleurotus) and poisonous types, preparation of culture/spawn and production techniques.

Symptoms, disease development and integrated management of the diseases of fruits, plantation, medicinal and aromatic crops viz. apple, pear (scab, alternaria blotch, powdery mildew, root and collar rot, cankers, pear fabraea leaf and fruit spot, pear fire blight and apple mosaic virus), peach, plum, cherry, apricot, almond, walnut (peach leaf curl, shot hole, powdery mildew, cercospora leaf spot, peach scab, cryptosporopsis leaf & twig blight and walnut anthracnose), grapes (anthracnose, powdery mildew, downy mildew, bunch rot), strawberry (leaf spot, fruit rot), mango (mango malformation, black tip), banana (panama wilt, bunchy top), citrus (citrus canker, tristeza virus), guava (wilt), tea & coffee

rust, belladonna (leaf spot, root rot), dioscorea (leaf blight, rust) and pyrethrum (leaf blight and wilt). Important post harvest diseases of pome and stone fruits and their management.

Symptoms, disease development and integrated management of the diseases of diseases of vegetables, ornamental and spice crops viz., tomato & potato (early blight, late blight, septoria leaf spot, damping off), brinjal (phomopsis, alternaria blight, damping off), chilli (wilt, anthracnose, damping off), cabbage, cauliflower, radish & knol-khol (alternaria leaf blight, wire stem, white rust) onion & garlic (downey mildew, stemphylum blotch) pea (powdery mildew), beans (anthracnose, rust, mosaic), cucurbits (alternaria leaf spot, anthracnose, downey mildew, powdery mildew, angular leaf spot), saffron (leaf blight, bulb rot), cumin (alternaria blight), turmeric (rhizome rot, leaf spot), ginger (bacterial wilt, soft rot), rose (black spot, powdery mildew), gerbera (alternaria leaf blight, powdery mildew), tulip (basal rot, penicillium rot, grey mould rot).

Section – VI **Marks: 10**

Agricultural Entomology

Introduction to phylum arthropoda. Importance of class Insecta. Insect dominance. Definition, division and scope of entomology. Types of mouth parts, antennae, legs and wings. Metamorphosis. Classification of insects up to orders

Definition, economic importance. General characters of plant parasitic nematodes, symptomatology and control of important plant parasitic nematodes of fruits - (subtropical and temperate) and vegetable crops

economic classification of insects; Distribution, host range, bio-ecology, injury, integrated management of important insect pests affecting sub-tropical and temperate fruits, Storage insects-host range, bio-ecology, injury, integrated management of important insect pests attacking stored fruits, Toxicology-insecticide residue problems in fruit and their tolerance limits.

Economic importance of insects in vegetable crops. Distribution, host range, bio-ecology, injury, integrated management of important insect-pests affecting vegetable and ornamental crops. Important storage insect pests of vegetable and ornamental crops, their host range, bio-ecology, injury and integrated management. Insecticidal residue problems in vegetables, Tolerance limit.

Introduction of Bee keeping, important Bee flora, Bee keeping equipments, differentiation of bee castes.

Section: VII **Marks: 10**

Post Harvest Technology

Maturity indices, harvesting, handling, grading of fruits, vegetables and cut flowers. Factors responsible for deterioration of horticultural produce, physiological and bio-chemical changes, hardening and delaying ripening process. Methods of storage for local market and export. Pre-harvest treatment and precooling, pre-storage treatments. Different systems of storage, packaging methods and types of packages. Types of containers and cushioning materials, vacuum packaging, cold storage. Poly -shrinks packaging.

Importance and scope of fruit and vegetable preservation industry in India, losses in post-harvest operations, unit operations in food processing. Principles and methods of preservation by heat. Canning and bottling. Methods of preparation of juices. Squashes, syrups, cordials, fermented beverages, jam, jelly, marmalade, pickles, chutneys and sauces. Preservation by sugar and chemicals; candies, crystallized fruits, preserves, chemical preservatives, preservation with salt and vinegar. Freezing. Govt. policy on import and export of processed fruits. Food laws.

Classification, functions, deficiency and sources of Carbohydrates, Protein and Lipids. Mineral nutrition: macro and micro-minerals (Ca, Fe and P), function, utilization, requirements, sources, deficiency. Vitamins: functions, sources, deficiency, requirements of water soluble and fat-soluble vitamins. Recommended dietary allowances for various age groups.

Section VIII **Marks: 10**

Biotechnology

History of biotechnology. Fundamental principles: micro-propagation and scope for commercialization. Application of micro-grafting in horticultural crops, meristem culture, anther culture, pollen culture, embryo culture, callus culture, cell culture, somaclonal variation, protoplast isolation, culture, fusion and applications. Cryopreservation .Genetic engineering. Future scope and present trends. Importance of biotechnology in horticulture.

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