**Course: M.Sc., Horticulture and Landscape Management**

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| **1st Semester- Theory.** |
| Core Paper 101 | Fundamentals of Horticulture |
| Core Paper 102 | Plant propagation and Nursery management |
| Core Paper 103 | Green House Management |
| Core Paper 104 | Pomology |
| **Practical** |  |
| Practical Paper 101 | Corresponding to Paper 101 &102 |
| Practical Paper 102 | Corresponding to Paper 103 &104 |
| **2nd Semester- Theory.** |
| Core Paper 201 | Olericulture and vegetable seed production |
| Core Paper 202 | Commercial floriculture |
| Core Paper 203 | Plantation crops, spices and condiments |
| Core Paper 204 | Ornamental Horticulture  |
| **Practical** |  |
| Practical Paper 201 | Corresponding to Paper 201 &202 |
| Practical Paper 202 | Corresponding to Paper 203 &204 |
| **3rd Semester- Theory.** |
| Core Paper 301 | Principles of Landscape Gardening |
| Core Paper 302 | Medicinal and Aromatic crops |
| Core Paper 303 | Principles of fruit and vegetables preservation |
| Core Paper 304 | Plant growth regulators in Horticulture |
| **Practical** |  |
| Practical Paper 301 | Corresponding to Paper 301 &302 |
| Practical Paper 302 | Corresponding to Paper 303 &304 |
| **4th Semester- Theory.** |
| Core Paper 401 | Integrated Pest and Disease Management |
| Core Paper 402 | Post-harvest technology of horticultural crops |
| Core Paper 403 | Landscape Management  |
| Core Paper 404 | Recent Advances in Horticulture |
| **Practical** |  |
| Practical Paper 401 | Corresponding to Paper 401 &402 |
| Practical Paper 402 | Corresponding to Paper 403 &404 |

**Core Paper 101: Fundamentals of Horticulture**

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| 1 | Definition of horticulture, importance of horticulture in terms of economy, production, employment generation, environmental protection and human resource development. Scope for horticulture in India. Nutritive value of horticultural crops. Divisions of horticulture with suitable examples and their importance |
| 2 | Classification of horticultural crops based on soil and climatic requirements. Vegetable gardens nutrition and kitchen garden, truck garden, vegetable forcing, market gardens and roof gardens |
| 3 | Establishment of orchards – Explanation of points to be kept in mind while selecting site for the establishment of orchards. Different steps in planning and layout of orchards. |
| 4 | Different steps in establishment of orchards and management of orchards. Different systems of planting orchards-square, rectangle, quincunx, hexagonal and contour systems of planting-their merits and demerits |
| 5 | Calculation of planting densities in different systems of planting. Definition of pruning, objectives of pruning, principles and methods of pruning of fruit crops. |
| 6 | Definition of training, objectives and training, principles and methods of training of fruit crops-open centre, closed centre and modified leader systems their merits and demerits. Definition of irrigation-Different methods of irrigation followed in horticultural crops, their merits and demerits |
| 7 | Definition of manures and fertilizers-different methods of application of manures and fertilizers to horticultural crops. Cropping systems-inter cropping and multi-tier cropping, their merits and demerits with suitable examples |
| 8 | Definition of mulch-objectives of mulching-different types of mulches-organic and inorganic mulches with suitable examples. Definitions of fruitfulness and unfruitfulness-factors influencing the fruitfulness and unfruitfulness with suitable examples. |
| **PRACTICALS:** |
| 1 | Study of features of orchard/fruit garden |
| 2 | Lay out of different planting systems |
| 3 | Preparation of nursery beds for sowing of vegetables seeds |
| 4 | Digging of pits for fruit plants |
| 5 | Study of different methods of Training |
| 6 | Study of different methods of pruning |
| 7 | Preparation of fertilizer mixtures and field application |
| 8 | Lay out of different irrigation systems |
| 9 | Identification and management of nutritional disorders in vegetables |
| 10 | Study of bearing habits in horticultural crops |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Fundamentals of Horticulture | Edmond, j.b, sen, T.L, Andrews, F.S and Halfacre R.G, 1963.Tata McGraw hill Publishing Co., New Delhi |
| 2. | Introduction to Horticulture | Kumar, N 1990. Rajayalakshmi Publications, Nagarcoil, Tamilnadu |
| 3. | Basic Horticulture | Jitendra Singh, 2002 Kalyani Publishers, Hyderabad |

**Core Paper 102: Plant Propagation & Nursery Management**

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| 1 | Propagation, Need and Potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages |
| 2 | Seed dormancy – means to break seed dormancy (Stratification and Scarification) – internal and external factors and seed treatment for germination and disease control; use of growth regulators to overcome the seed dormancy. |
| 3 | Definition of a nursery, different types of nursery beds-flat beds, raised beds and sunken beds, their merits and demerits. Different nursery techniques and their management |
| 4 | Nursery tools and implements. Propagation by division – suckers, rhizomes, corms, tubers, cloves and bulbs. |
| 5 | Propagation structures: Mist chamber, humidifier, greenhouses, glasshouses, cold frames, hot beds and poly houses |
| 6 | Propagation by cutting – Hard wood, Semi-hard wood, Herbaceous – physiological and bio-chemical basis of rooting; Use of growth regulators in rooting of cuttings. Propagation by layering – types of layering; establishment of layers in the field; Use of growth regulators in layering. |
| 7 | Methods of grafting – Approach grafting; Veneer grating; Wedge grafting; Saddle grafting; Tongue grafting; Whip grafting; Bridge grafting; Epi-cotyl grafting; Soft wood grafting. Methods of budding – ‘T’ budding, Inverted ‘T’budding, Shield budding; Chip budding; Flute budding; Ring budding; ‘I’ budding. Selection of mother plant –Establishment of progeny orchard/mother plant block; - pre-curing of scion. |
| 8 | Micro propagation – Choice of explant (totepotency); media-MS-media, Growth regulators in culture, sterilization of the explant, sub-culturing of the callus, Hardening of plants |

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| **PRACTICALS:** |
| 1 | Study of various propagation media for nursery beds, pots and mist chamber.  |
| 2 | Preparation of nursery beds (raised and flat beds) and sowing of seeds. |
| 3 | Raising of root stocks of different fruit plants like Mango, Citrus, Cashew . |
| 4 | Preparation of plant material for planting |
| 5 | Hardening of plants in the nursery – different methods like reducing Irrigation, Shade, exposure for short periods to sun . |
| 6 | Study and practicing of different propagation methods by cutting. |
| 7 | Study and practicing of different propagation methods by layering. |
| 8 |  Study and practicing of different propagation methods by grafting |
| 9 | Study and practicing of different propagation methods by budding |
| 10 | Study and practicing of different propagation methods by divisions |
| 11 | Application of nutrients and plant protection chemicals in the nursery |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Plant Propagation – Principles and Practices. | Hartman,HT and Kester, D.E. 1976.Prentice Hall Of India Pvt. Ltd., Bombay |
| 2. | Plant Propagation. | Sadhu, M.K. 1996.New age International Publishers, New Delhi.  |
| 3. | Propagation of Fruit Crops | Mukherjee, S.K. and Mujumadar, P.K, 1973.ICAR, New Delhi. |
| 4. | Propagation of Horticulture Crops (Principles And Practices) | Sarma, R.R 2002.Kalyani Publishers, New Delhi. |

**Core Paper 103: Greenhouse Management**

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| 1 | Introduction to greenhouses – history – definition – greenhouse effect – advantages of greenhouses. Brief description of types of greenhouses – greenhouses based on shape, utility, construction, covering materials and cost, shade nets |
| 2 | Plant response to greenhouse environments – light, temperature, relative humidity, ventilation and carbon dioxide and environmental requirement of agriculture and horticulture crops inside green houses |
| 3 | Equipment required for controlling greenhouse environment – summer cooling and winter heating, natural ventilation, forced ventilation and **computers** |
| 4 | Planning of green house facility – site selection and orientation, structural design and covering materials |
| 5 | Materials for construction of greenhouses – wood, galvanized iron, glass, polyethylene film, poly vinyl chloride film, tefzel T2 film, fiberglass reinforced plastic rigid panel and acrylic and polycarbonate rigid panel |
| 6 | Design criteria and constructional details of greenhouses – construction of pipe framed greenhouses – material requirement – preparation of materials and procedure of erection |
| 7 | Greenhouse heating and distribution systems – greenhouse utilization – off-season drying of agricultural produce – economic analysis of greenhouse production – capital requirement, economics of production and conditions influencing returns |
| 8 | Irrigation system used in greenhouses – rules of watering – hand watering, perimeter watering, overhead sprinklers, boom watering and drip irrigation. |

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| **PRACTICALS:** |
| 1 | Study of different types of greenhouses based on shape |
| 2 | Study of different types of greenhouses based on construction |
| 3 | Study of materials for construction of greenhouses |
| 4 | Study of construction of pipe framed green house |
| 5 | Measurement of environmental parameters inside greenhouse |
| 6 | Calculation of ventilation rates in active summer cooling system |
| 7 | Calculation of rate of air exchange in active winter cooling system |

**References:**

1. Chakraborthy, A. and De, D.S. 1981. Post-Harvest Technology of Cereals and Pulses. Oxford & IBH Publishing Co., New Delhi. Jagadishwar
2. Sahay 1992. Elements of Agricultural Engineering. Agro Book Agency, Patna.
3. Kennard, S. and Nelson, B.A. 1977. Greenhouse Management for Flowers and Plant Production. International Printers and Publishers Inc., Illinois. Micheal,
4. A.M. and Ojha, T.P. 2008. Principles of Agricultural Engineering. Jain Brothers, New Delhi

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Green House Management For Horticulture Crops | S. Prasad and U. Kumar, 2007, Agrobios (India), Jodhpur |
| 2. | Greenhouse Technology and Management | RadhaManohar, K. and Igathinathane, C. 2000.. BS Publications, Hyderabad  |
| 3. | Greenhouse Technology | Tiwari, G.N and Goyal, R.K. 1998..Narosa Publishing House, New Delhi |

**Core Paper 104: Pomology**

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| 1 | Classification of Fruits based on climatic factors. Mango Varieties: Commercial varieties – Table varieties, Juicy varieties, Table and Juicy Varieties, Pickle Varieties. Propagation: Commercial propagation by Epicotyl grafting, Veneer grafting planting Density; High Density Planting system. Nutritional and Irrigation requirement; Role of Major & Minor nutrients, Inter cultivation; Intercropping, Weed management. Harvesting & Yield:  |
| 2 | Banana and Plantains: Production Technology: Climate, Soil requirements. Propagation by Suckers, Treatement of suckers before planting; Micro propagation: Planting density Irrigation, Fertilizer doses and application. Management of Banana crop: Desuckering, Ratoon sucker selection, Weed control, Mulching, Earthing up. Leaf removal, Provision of Wind breaks; Bunch management: Propping of bunches, Wrapping, Trimming, Removal of Male bud, Bunch covering |
| 3 | Production Technology: Climatic & Soil requirements of important citrus groups. Varieties: Citrus Indian and Exotic varieties of Sweet Oranges, Mandarins, Grape Fruit and Pummelo, Lemons, Limes. Propagation: Seedling stocks, Root stocks, methods of propagation. Planting Densities, Irrigation, Root Stocks, Age & Bearing Capacity; Nutrient management: Major & Minor nutrients, Deficiencies, Weed Management; Root pruning and Bahar Treatment (Ambebahar, MrigBahar and Hasthbahar) Harvesting: Maturity Indices, Yield of fruits, |
| 4 | Sapota: Varieties and hybrids; Production Technology: Climatic & Soil requirements; Propagation, Root Stocks, Planting Density, methods of irrigation, nutrient management, Interculture, weed management and intercropping.Maturity Indices, Harvest & Yield; Handling, Grading, Packing, Transport, Marketing, Ripening and Storage. |
| 5 | Guava: Varieties, Hybrids; Production Technology: Soil & Climatic requirements, propagation by Vegetative methods (Air layering, Ground layering and Stooling); Planting, Planting density, Irrigation, Nutrient management, training and pruning. Bahar treatment (Ambebahar, Mrigbahar and Hasta bahar), Harvesting & Yield. Papaya: Varieties: (Pusa varieties, Coimbatore varieties, Taiwan varieties etc.); Sex expression and Sex identification. Production Technology: Soil & Climatic requirements, Propagation, Planting, Irrigation & Nutrient management. Maturity indices, Harvesting, Yield and Storage.  |
| 6 | Pine Apple: Varieties Production Technology: Soil & Climatic requirements; Propagation by shoot suckers, Ground suckers, slips, crowns, stumps, micro propagation, High Density Planting, Water and Nutrient management, Interculture, flowering and fruiting. Use of chemicals and plant growth regulators. For improving the flowering and fruiting, Maturity indices, Harvesting for local market and Distant markets Yield. |
| 7 | Pomegranate: Varieties: Hard seeded and soft seeded. Production technology: Soil & climatic requirements; Propagation, Planting, Training and Pruning, Irrigation, Nutrient Management, Bahar treatment, Flowering, flower and Fruit thinning, Harvesting indices, Yield, and storage. Physiological disorders – Fruit cracking. Custard Apple: *Annonasquamosa, A muricata, A. reticulate, A.cherimola, Atemoya* Hybrid; Varieties & Groups – Green fruit & Red fruit; Production Technology: Soil and Climate; Propagation: Seed, Vegetative Planting, Planting density; Irrigation & Nutrient management, Flowering time, Fruit Development, Stone Fruit formation and their control, Harvest, Yield, Storage. |
| 8 | Ber: Economic Importance, Nutritive value, Origin & Distribution, Area & Production, Species & varieties; Adaptive features of Ber, Production technology: Soil & climatic requirements; Training and Pruning, irrigation and nutrient management; Flowering & fruit set, Fruit drop and its control, maturity indices, yield. Rain fed Horticulture: Scope and Importance of Arid Fruit Culture, Special Characteristics: of Fruit crops which make them suitable for Arid Zone- 1) Ber 2) Anola 3) Annona 4) Jamun 5) Wood Apple 6) Pomegranate 7) Carissa 8) Date Palm 9) Phalsa 10) Fig 11) Bael 12) Tamarind |

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| **PRACTICALS:** |
| **1** | Description and identification of varieties of Mango and Banana based on flower and Fruit morphology. |
| 2 | Description and identification of varieties of Citrus. |
| 3 | Description and identification of varieties of Papaya, Sapota, Guava and pine apple. |
| 4 | Description and identification of varieties of Pomegranate, Ber. |
| 5 | Training and Pruning of Mango, Guava and Citrus. |
| 6 | Pre-treatment of Banana suckers and desuckering in Banana |
| 7 | Manure & Fertilizer application including Bio-fertilizers in different fruit crops (Methods of application, calculation of the required Manure & Fertilizers based on the nutrient content). |
| 8 | Visit to commercial orchards. |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Fruits : Tropical & Sub- Tropical | Bose, T.K. Mitra, S.k. and Sanyal,NayaUdyog Publishers, Vol-I, II and III |
| 2. | Text book on Pomology(fundamentals of fruit growing) | Chattopadhyay, T.K 1997.Kalyani Publishers, Hyderabad |
| 3. | Hand book of Horticulture | Chandra, K.L. (ICAR) 2002, 2001. ICAR, New Delhi. |

**Core Paper 201: Olericulture and vegetable seed production**

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| 1 | Olericulture–definition- Importance of vegetables: Economic and nutritional importance of vegetables. **Tomato** (Botanical Name): Description of Cultivars Indian / Exotic) Determinate, Semi – Determinate and Indeterminate types; Cultivars suitable for Hills and Cultivars suitable for Processing-Exotic Cultivars. |
| 2 | Production Technology: Method of raising the crop Nursery Vs Direct Sowing, Seed Rate Nursery techniques – Main field preparation – Basal Application of Nutrients – Transplanting, Spacing – Irrigation – Nutrition – Fertilizers Schedule, Major Nutrients, Minor Nutrients, Deficiency of Nutrients and harvesting. Inter cultivation – Weed Control Mulching. Effect of Chemicals & Growth Substances on various growth and Yield Parameters. **Brinjal** (Botanical Name): Brinjal; Flower types based on Style Length-cultivars Production Technology: Soil and Climate; Cultivation; Seed Rate, Seed Treatment and Raising of Nursery, Land Preparation, Transplanting, spacing, Irrigation, Manures and fertilizers-inter culture and crop-rotation in Brinjal harvesting and seed production. |
| 3 | **Chilli** (Botanical Name): Taxonomy-Cultivars. Production Technology: Soil and Climate-Methods of raising the crop-Nursery Vs. Direct Sowing, Seed Rate-nursery techniques-Main field preparation-Spacing-Irrigation-nutrition-Fertilizers Scheduling, Bio-Fertilizers-Inter cultivation. Harvesting and yield-drying and Storage seed production. **Okra** (Botanical Name): Okra-cultivars and hybrids. Production Technology: Soil & climate; cultivation; land preparation, sowing season, seed rate, spacing, nutrition, irrigation and inter culture. Use of growth substances-stage of harvest, harvesting & yield, storage; seed production. |
| 4 | **Cucurbits:** Cultivation details of **Cucumber, Pumpkin and squashes** –production technology –soil and climate-cultivars-propagation and planting methods –seed rate, spacing, irrigation, nutrient management – inter culture–Weed control, Mulching,–harvesting and yield. Cultivation details of **gourds**- Production technology – soil and climate – cultivars – propagation and planting methods – seed rate, spacing, irrigation, nutrient management – Inter culture – Weed Control, Mulching,– harvesting and yield.  |
| 5 | **Cucurbits:** Cultivation details of **melons**- Production technology – soil and climate – cultivars – propagation and planting methods – seed rate, spacing, irrigation, nutrient management – Inter culture – Weed Control, Mulching, harvesting and yield – Production of seedless watermelons. Cultivation details of **Coccinia & Chowchow**- Production technology – soil and climate – cultivars – propagation and planting methods –spacing, irrigation, nutrient management – Inter culture – Weed Control, Mulching, plant growth regulators – maturity indices – harvesting and yield.  |
| 6 | **French Bean:** (Botanical Name)Production Technology: Climate and Soil-cultivars-Season-Seed Rate, Seed Inoculation, Spacing, Nutrition, Irrigation and Inter-cultivation; maturity standards, Harvesting, Yield, Storage-Seed Production. **Lab-Lab (Dolichos) bean** (Botanical Name) : climate and soil, seeds and sowing, season, spacing, nutrient requirements, irrigation, intercropping; harvesting, yield, seed production. |
| 7 | **Cluster Bean**(Botanical Name) : climate and soil; seed rate sowing, spacing, nutrition, irrigation-stage of harvest based on the purposes, yield and storage-seed production and economics.**Leafy Vegetables:** Importance of leafy vegetables and types of leafy vegetables **Amaranthus:** Introduction, Origin, Area, Nutritive value –cultivars-soil & climate land preparation, sowing seed rate, spacing, irrigation and nutrition – methods of harvesting and yield. |
| 8 | **Curry Leaf**(Botanical Name) : Introduction, Origin Area and Nutritive value -cultivars soil & climate, cultivation - land preparation, nursery raising-sowing/ Planting, seed rate, spacing, Irrigation, nutrition –harvesting and yield. **Drumstick / Moringa** (Botanical Name) : Introduction, Origin, Composition of Pods, Leaves and uses of Moringa-cultivars-soil and climate; Propagation and planting methods-seed rate – field preparation-sowing/planting-nutrition, Irrigation and inter culture; pruning for extension of cropping season- harvesting and yield. |
| **PRACTICALS:** |
| 1 | Classification of vegetable crops |
| 2 | Nursery techniques for vegetable production and Hi-tech vegetable nursery production |
| 3 | Identification and description of Solanaceous vegetable varieties |
| 4 | Methods of main field preparation and transplanting of nursery grown seedlings |
| 5 | Nutritional deficiencies and physiological disorders in tropical and sub-tropical vegetables |
| 6 | Identification and description of Okra and Legume vegetables |
| 7 | Identification and description of varieties of cucurbits |
| 8 | Harvesting indices and maturity standards in tropical vegetables |
| 9 | Visit to vegetable farmers’ fields |
| 10 | Visit to vegetable markets for study of marketing problems |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Vegetables Crops | Bose, T.K *et al*, 2003.NayaUdyog Publishers, Kolkata. |
| 2. | Production Technology of Vegetable Crops  | Shanmugavelu, K.G. 1989. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi. |
| 3. | Vegetables | Choudhury, B. (ICAR). 1990. 8th edition, National Book Trust, New Delhi. |

**Core Paper 202: Commercial floriculture**

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| 1. | Scope and importance of commercial floriculture in India. Present status, Future prospects and strategies needed for improvement. Area, production and exports. |
| 2 | **Rose**: Classification, species and varieties, climate and soil requirements, propagation – Rootstocks, Stock scion compatibility, land preparation, planting Manures and fertilizers, cultural operations (pruning, pinching and mulching) use of growth regulators, physiological disorders, harvesting and yield. **Marigold**: Species and varieties, F1 Hybrids, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, (pinching and disbudding) use of growth regulators, harvesting, and yield. |
| 3 | **Chrysanthemum**: Classification, species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, (pinching and disbudding) use of growth regulators, harvesting, and yield. **Gladiolus**: Classification of varieties, species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, physiological disorders, harvesting, and yield |
| 4 | **Jasmine**: Classification, species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, harvesting and yield. |
| 5 | **Crossandra**: Species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, use of growth regulators, harvesting and yield. |
| 6 | **Gerbera**: Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, defoliation, soil loosening, shading, harvesting and yield. |
| 7 | **Tuberose**: Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, harvesting and yield. |
| 8 | **Dahlia**: Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation, land preparation, planting Manures and fertilizers, cultural operations, (pinching and disbudding) harvesting and yield. |
| **PRACTICALS:** |
| 1. | Propagation methods in chrysanthemum |
| 2. | Preparation of nursery bed for flower seeds sowing. |
| 3. | Identification of important flower crops and their varieties |
| 4. | Training and Pruning of Roses in open and polyhouses |
| 5. | Propagation of rose by cutting and budding |
| 6. | Layering methods for Jasmine propagation |
| 7. | Visit to green house to study protected cultivation of Gerbera |
| 8. | Field visit to commercial flower growing area |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Floriculture in India | Randhawa, G.S. and AmitabhaMukhopadhyay. 2004. Allied Publishers Pvt. Ltd., New Delhi. |
| 2. | Introductory Ornamental Horticulture | Aora, J.S. 2006.KalyaniPublishres, Ludhiana – 141 008. |
| 3. | Advanced Commercial Floriculture | Prof. Bhattacharjee, S.K.Aavishkar Publishers Distributor, Jaipur – 320003. |

**Core Paper 203: Plantation crops, Spices and Condiments**

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| 1 | **COCONUT:** Uses, Varieties- Tall x dwarf hybrids (TxD), Dwarf x tall hybrids ( DxT), Tall x tall hybrids (T x T). Soil, Climate, Propagation – Seed propagation, Selection of seed nuts, selection of seedling for planting. Preparation of pits and planting, Irrigation, Manuring and fertilization, methods of application of fertilizers, weeding. Harvesting, Yield, Storage. **OIL PALM :** Introduction, uses, varieties, seed propagation, Climate – Sunshine and Temperature requirement Types of soils for oil palm growing regions, Spacing, Planting, Irrigation, Manuring, Weeding and Mulching Harvesting and yield,  |
| 2 | **COCOA:**  Introduction, products/Byproducts chocolate, varieties, Climate, Soil, Seed and Vegetative propagation, Cuttings, preparation of land, provision of Shade, Spacing, planting-Cocoa under Natural Shade, Intercropping Irrigation, Manuring, weeding, types of branching, training and pruning, Harvesting. **CASHEW NUT :**Introduction, uses, Climate, Soils, varieties/ hybrids, Propagation – Vegetative propagation, Epi-cotyl grafting and Cuttings. Planting, Branching Pattern, Irrigation, weeding, Manuring, Training and pruning, Rejuvenation, flowering, Harvesting, Yield. |
| 3 | **COFFEE:** Introduction, soil, Climate, types- differences Arabica/robusta, branching ,varieties, propagation, Raising nurseries. Preparation of main field and planting, Provision of shade, Advantages of shade, Disadvantages of shade, Irrigation, Manuring, Training and pruning – Trenching, Mulching, Weeding, Liming, Flowering- season of flowering, Fruit set and harvesting and Yield. |
| 4 | **Black Pepper** – Uses, Botany, varieties, soil and intercrop and mixed crop. Propagation with seed, Cuttings, Rapid Multiplication Method. Planting of the vines, shade and shade regulation, Training and pruning of pepper vines. Nutritional management, Irrigation, weed control, harvesting and YIELD. **Cardamom** – Uses, Botany, varieties, types of cardamom like, Malabar, Mysore and Vazukka soil and climate, selection of site and repartition, propagation seed and vegetative method like suckers. mixed cropping planting, shade and shade regulation, Nutrient management, Irrigation, Weeding, Intercultural Operations like Thrashing, Mulching Earthling up Racking, Harvesting indices, and yield.  |
| 5 | **Ginger** – Uses , Botany, varieties, soil and climate, propagation, preservation of seed rhizome, selection of land and preparation, Planting season, Seed rate Spacing, Methods – bed system and ridge and furrow system seasons – Irrigation, Nutrient Management. Weeding, Intercultural Operations like Mulching , Harvesting indices, and yield. |
| 6 | **Turmeric** – Uses, Botany, varieties, soil and climate, propagation, preservation of seed rhizome, selection of land and preparation. Methods of cultivation like bed system ridge and furrow system Planting – Seasons Seed rate, Spacing Mulching, Irrigation, Nutrient Management, Weeding and Intercultural Operations, Shade provision Harvesting – indices, yield . |
| 7 | **Clove** – Uses, Botany, varieties, Soils and Climate, Propagation by seed – Raising of the nursery Planting, Weeding, Staking, Manuring, Intercultural, Irrigation, Pruning, Harvesting, curing and yield. **Cinnamon** – Uses, Botany, Varieties, Propagation – Seed, Cuttings, Tree stumps, Pruning, Soil and Climate, Planting, Weeding. Manuring, Harvesting, and Storage YIELD.  |
| 8 | **Vanilla –** Uses, Botany, Varieties, constraints of production, Propagation by Cuttings Soil and Climate, Land preparation, Staking, Planting, Manuring, Flowering and Pollination Hand Pollination, Harvesting, Curing and processing, Storage and yield.. |

**PRACTICALS:**

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| 1. | Description and identification of coconut, &oil palm varieties/ Hybrids |
| 2. | Description and identification of cashew nut varieties/ Hybrids.  |
| 3. | Description and identification of cacoa varieties/ Hybrids. |
| 4. | Selection of mother palm, seed nuts and planting of seed nuts in the nursery of coconut.  |
| 5. | Layout and planting of coconut, oil palm.  |
| 6. | Description and identification of coffee varieties |
| 7 | Description and identification of Black pepper varieties |
| 8 | Description and identification of turmeric varieties. |
| 9 | Description and identification of Cardamom |
| 10. | Visit of commercial plantations in the district |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Production Technology of Spices and Plantation Crops | Shanmugavelu, K.G. Kumar, N. Nad Peter, K.V. 2005. Agrosis, Jodhpur |
| 2. | Spices and Plantation Crops | Shanmugavelu, K.G. and MadhavaRAo |
| 3. | Introduction To Spices, Plantation Crops And Aromatic Crops | Kumar, N.B. M. Md Abdul khaddar, Rangaswamy, P. And Iruiappan, I. 1997.Oxford & IBH, New Delhi. |
| 4. | Major Spices of India - Crop Management Post Harvest Technology | Pruthi, J.S. 1993.ICAR, New Delhi. |
| 5. | Minor Spices And Condiments – Crop Management And Post-Harvest Technology | Pruthi, J.S. 2001.ICAR, New Delhi. |

**Core Paper 204: Ornamental Horticulture**

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| 1 | Ornamental and shady Trees – Definition – Classification based on purpose with suitable examples – Specimen trees – Shady trees – Flowering trees – Avenue or road side trees – Screening trees – Fragrant flowering trees – Pollution controlling trees – APTI value  |
| 2 | Selection of trees based on – Climatic – Soil – availability and Cost factor s- Methods of planting – Time of planting – Manuring – Care and Maintenance – Planting Schemes for avenue planting – One kind of flowering trees on both sides – two kinds of flowering trees blooming at one time on both sides of road – Two kinds of flowering trees blooming at different time on both sides of road – shady trees only on both sides of road. |
| 3 | Shrubs – Definition – Utility (aesthetic values) – Classification with suitable examples – based on Purpose of growing – Flowering – Foliage – Flowering and foliage – Fragrant shrubs – based on sunlight requirement – shrubs requiring full sunlight – Planting of Shrubs in garden -Growing of shrubs – Soil – Climate – Preparation of soil – Planting – Propagation – seeds – Cuttings – layering – After care – Irrigation – weeding – Pruning.  |
| 4 | Herbaceous perennials – Definition – Introduction – Classification with suitable examples – Herbaceous perennials for plains and for hills – Planting – Manuring – Propagation. Annuals – definition – classification – cultural hints care and maintenance  |
| 5 | Climbers – Definition – Climbers – twiners – ramblers – creepers – Utility (aesthetic values) – Classification with suitable examples – Sunny situation – Partial shade – shade loving climbers – Showy flowering climbers – Climbers with scented flowers – Climbers with attractive foliage – Climbers for pots – Annual climbers – Climbers for hedge making –Soil – Digging of pits – Planting of climbers – After care – Manuring – Maintenance. |
| 6 | Palms – Definition – Introduction – Utility (aesthetic values) – Classification with examples – Feather leaved Palm – Fan leaved Palm – Propagation – Pot culture – Potting – Re-potting - Potting media – Manuring – Aftercare. Study of ornamental grasses. |
| 7 | Ferns – Introduction – Utility (aesthetic values) – Propagation – Spore – Division of Clumps – Suckers – bulbils – Site of growing – Soil media – Pot culture – re-potting – Irrigation – Indoor culture – Important Examples. Propagation , cultivation of bulbous plants  |
| 8 | Cacti – Introduction – Characteristics of Cactaceae – Site of growing – Natural habitat – Domestication (Housing of cacti) – Propagation – Seeds – Offsets – Grafting – Soil – Climate – Containers – Time and method of planting – Potting – Re-potting – Irrigation – Staking. Succulents – Characteristics – Difference between cacti and succulents – Utility (aesthetic values) – Climate – Soil – Housing – Propagation – Seeds – Cuttings – Watering – Re-potting – Summer protection. Identification and culture of bromeliads. |

**Practicals:**

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| 1. | Identification and description of annuals |
| 2 | Identification of Herbaceous perennials |
| 3 | Identification of climbers, creepers, foliage and flowering shrubs |
| 4 | Identification of avenue trees |
| 5 | Identification of cacti and succulents |
| 6 | Identification of Ferns |
| 7 | Identification of Palms |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Floriculture in India | Randhawa, G.S. AmitabhaMukhopadhyay. 2004. Allied Publishers Pvt. Ltd., New Delhi. |
| 2. | Gardening in India | Bose, T.K. Mukherjee, D. 2004. Oxford & IBH Publishers. |
| 3. | Ornamental Horticulture in India | Chandra, K.L. and Choudhary, B. 1986. Publication and Information division ICAR, New Delhi. |

**Core Paper 301: Principles of Landscape Gardening**

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| 1 | Landscaping – History – Principles of landscape gardening  |
| 2 | Hardscaping – garden walls – fences & gates – steps – garden drives & paths – arches & pergolas – bridges – outdoor garden room – garden adornments |
| 3 | Soft scaping – hedges – suitable plant species – types – hedging & screening. Hedge and edge. Topiary. Suitable plant species – topiary frames – training & pruning of hedges & topiaries. Study of topiary gardens – LAVENS HALL (UK). DRUMNOND CASTLE (Scotland). |
| 4 | Carpet bedding – plant species – designing with bedding plants – floral clocks – flower bed, herbaceous borders –importance of these features in garden design. |
| 5 | Types of garden- formal – informal – wild gardens. Different garden styles – Mughal – English – French – Persian gardens – study of special features.  |
| 6 | Types of Japanese garden – features & types of Japanese garden – rock garden & xeriscaping – plan & design – soil amendments – use of mulches – selection of plant species. |
| 7 | Contemporary gardens – healing gardens – garden maintenance – planting & transplanting. Pinching – staking – pruning &training - irrigation – pest & disease management. |
| 8 | Flower shows - floraldesign – exhibits – horticulture exhibits – conservation & educational exhibits –viewing levels – schedule – staging & signage – competitions & judge guide, medals & awards. |

**PRACTICALS:**

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| 1. | Study of various features of Hardscaping components.  |
| 2 | Study of components of a garden and functional uses of plants in landscape |
| 3 | Preparation of topiary plants and frames |
| 4 | Training & pruning of topiary plants & hedges. |
| 5 | Training & pruning of topiary & hedges. |
| 6 | Participation in flower showes& horticulture shows |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Floriculture and Landscaping | Bose, T.K. Malti, R.G. Dhua, R. S. & Das, P. 2004. Nayaprakash, Calcutta. |
| 2. | Introductory Ornamental Horticulture | Aora, J.S. 2006.KalyaniPublishres, Ludhiana. |
| 3. | Floriculture in India | Randhawa, G.S. and AmitabhaMukhopadhyay. 2004. Allied Publishers Pvt. Ltd., New Delhi. |

**Core Paper 302: Medicinal and Aromatic crops**

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| 1 | ALOE: Importance and uses, description of plant, species and varieties, soil, climate, land preparation, propagation crop duration, spacing & planting, manuring, irrigation, inter-cultivation, harvesting, yield and chemical composition. ASWAGANDHA: Importance and uses, description of plant, varieties, soil, climate, propagation manures, fertilizers and inter cultivation Harvesting, crop duration, method of harvesting drying, grading and yield, chemical constituents. |
| 2 | cinchona: Importance and uses, varieties, soil, climate, land preparation, propagation, spacing, planting, manures and fertilizers, weeding, cover cropping, staking, harvesting – method of harvesting and yield of bark. ISABGOL: Importance and uses, description of plant, varieties, soil, climate propagation, manures & fertilizers, irrigation, harvesting, yield, chemical composition . |
| 3 | LONG PEPPER: Importance and uses, botany, wild species and varieties, soil, climate land preparation, propagation, spacing & planting, manures & fertilizers, irrigation, interculture, mulching, harvesting, drying & yield. |
| 4 | RAUVOLFIA AND MORINDA: Importance and uses, botany, varieties, soil, climate propagation spacing, planting, Manuring, irrigation, weeding, harvesting, root yield |
| 5 | SENNA: Importance and uses, botany varieties, soil, climate land preparation propagation, sowing, manures and fertilizers, crop rotation and intercropping, irrigation, weeding and inter-culture, harvesting, drying & storage, yield. |
| 6 | citronella & lemongrass: Importance and uses, botany, varieties, soil, climate, land preparation, propagation, spacing, planting, manures and fertilizers, irrigation, interculture, harvesting & yield of herb and oil. |
| 7 | geranium: Importance and uses, origin, distribution, botany, varieties, soil, climate, propagation, spacing, planting and after care, manures and fertilizers, harvesting & yield. |
| 8 | mint ; Importance and uses, distribution, description of species of mint, varieties, chemical composition and uses, seasons, soil, climate, land preparation, propagation, spacing, planting, manures and fertilizers, irrigation, interculture, harvesting & yield. |

**PRACTICALS:**

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| 1.  | Collection of locally available medicinal plants, plant description and preparation of herbarium  |
| 2 | Collection of locally available aromatic plants, plant description and preparation of herbarium – two classes |
| 3 | Propagation and nursery techniques for important aromatic crops – two classes  |
| 4 | Propagation techniques for two important medicinal plants. |
| 5 | Important cultural aspects and harvesting techniques for important medicinal plants. |
| 6 | Important cultural aspects and Harvesting techniques for important aromatic crops |
| 7 | Visit to commercial farms. |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Production Technology of Spices and Plantation Crops | Shanmugavelu, K.G. Kumar, N. Nad Peter, K.V. 2005. Agrosis, Jodhpur |
| 2. | Spices and Plantation Crops | Shanmugavelu, K.G. and MadhavaRAo |
| 3. | Introduction To Spices, Plantation Crops And Aromatic Crops | Kumar, N.B. M. Md Abdul khaddar, Rangaswamy, P. And Iruiappan, I. 1997.Oxford & IBH, New Delhi. |
| 4. | Major Spices of India - Crop Management Post Harvest Technology | Pruthi, J.S. 1993.ICAR, New Delhi. |
| 5. | Minor Spices And Condiments – Crop Management And Post-Harvest Technology | Pruthi, J.S. 2001.ICAR, New Delhi. |

**Core Paper 303: Principles of fruit and vegetables preservation**

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| 1 | Importance of fruit and vegetable preservation-Definition of preservation- Classify the different Methods of preservation. Principle of preservation-prevention of microbial decomposition-prevention of self-decomposition by enzymes-prevention of damage by insects, rodents, animals. |
| 2 | Principles and method of preservation: Preservation by Asepsis, High Temperature, low temperature, chemicals-Drying, filtration, carbonation, sugar salt, fermentation, acids, oil and spices, antibiotics, irradiation |
| 3 | Unfermented fruit beverages: Preparation and preservation of unfermented fruit beverages juices, RTS, Nectar, cordial, squash, syrup and crush. |
| 4 | Jams, jellies and Marmalades – Procedure for preparation. Jams: Problems of Jam production. Jelly: Important considerations in jelly making and problems of jelly preparations |
| 5 | Preservation by salt: Pickles Procedure for preparation. Preservation by vinegar: Problems of pickle making |
| 6 | Sauces/ketchups Procedure for preparation. Tomato processing: Problems in the preparation of sauces and ketchups  |
| 7 | Preservation by sugar: Candies, Crystallised fruits, Preserves procedure for preparation Important considerations and problems in preparations |
| 8 | Dried products like mango lather, onion powder, tomato slices. Food laws: Fruit Product order-Food Standardization and Regulatory agencies in India |

**PRACTICALS:**

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| 1  | Preparation of syrups and brines |
| 2 | Preparation of Jams |
| 3 | Preparation of Jellies and marmalades |
| 4 | Preparation of RTS/ Squash/syrup |
| 5 | Preparation of Candies and preserves |
| 6 | Dehydration of Fruits and vegetables |
| 7 | Preparation of Pickles (Hot and sweet) |
| 8 | Preparation of Sauces |
| 9  | Preparation of Ketchups |
| 10 | Visit to Processing units |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Principles of Fruit Preservation | T.N. Moris, Agrobios (India) |
| 2. | Preservation of Fruits and Vegetables | Girdharilal, G.S. Siddappa and G.L. Tandon, ICAR, New Delhi , Kalyani Publications |

**Core Paper 304: Plant growth regulators in Horticulture**

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| 1 | Plant growth regulators nomenclature-classification, mode of action, movement-mechanism of action and translocations  |
| 2 | Auxins: in growth development of crops in rooting-flowering-fruiting and yield in different horticultural crops. |
| 3 | Gibberellins in growth and development in seed germination, flowering fruiting, fruit development and yield in different horticultural crops |
| 4 | Cytokinins in growth and development in seed germination, flowering fruiting, fruit development and yield in different horticultural crops.  |
| 5 | Ethylene in growth and development in flowering, fruit development and ripening in horticultural crops.  |
| 6 | Growth regulators in fruit set including parthenocarpy, fruit thinning (grapes), fruit drop (mango and citrus) fruit ripening (Climacteric and Non-climacteric fruits). Tuber and bulb formation nature of the stimulus, tuber growth development by different hormones. |
| 7 | Sex expression and pollination, fruiting by different hormones in Vegetables. Role of growth regulators in flower crops like Rose, Gerbera and Gladiolus  |
| 8 | Role of Growth retardants in canopy management in fruit and plantation crops. |

**Practicals:**

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| --- | --- |
| 1. | Identifying different growth regulators formulations |
| 2 | Calculations of growth regulator requirements for different concentrations |
| 3 | Application of growth regulators and observation on seed germination |
| 4 | Application of auxins to stem cuttings and observation on rooting studies |
| 5 | Study on Delaying of fruit ripening by applications of gibberellins in fruit crops |
| 6 | Study on applications of gibberellins in flower crops |
| 7 | Study on the sex expression studies on vegetables by application of gibberellins. |
| 8 | Study on fruit ripening by applications of Ethephon in fruit crops |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Plant Physiology | Delving, R.M. and Witham, F.S. 1986.CBS Publishers and Distributers, Delhi. |
| 2. | Introductory Plant Physiology | Noggle, G.R. and Fritz, T.G. 1944.Prentice Hall India Pvt. Ltd., New Delhi. |
| 3. | Plant Physiology | Lincoln Taiz and EduardsZeiger 2006. (4th Edition) Sinauer Associates, Inc. |

**Core Paper 401: Integrated Pest and Disease Management in Horticultural crops.**

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| 1 | Identification-control measures of important Pests and Diseases in Mango and Banana,  |
| 2 | Identification-control measures of important Pests and Diseases in Citrus and papaya |
| 3 | Identification-control measures of important Pests and Diseases in tropical Vegetable crops (Bhendi, Brinjal, Tomato and cucurbits) |
| 4 | Identification-control measures of important Pests and Diseases in winter Vegetable crops (cabbage, cauliflower, carrot. |
| 5 | Identification-control measures of important Pests and Diseases in plantation and spice crops (Coconut, Cashew, Oil palm, Chillies, turmeric and ginger. |
| 6 | Identification-control measures of important Pests and Diseases in medicinal and aromatic crops (Rauvulfia, Cinchona, Citronella and Lemon grass. |
| 7 | Identification-control measures of important Pests and Diseases in flower crops and ornamental crops (Roses, Chrysanthemum, gladiolus, gerbera. |
| 8 | Integrated Pest Disease Management – Concepts-application in horticultural crops |

**Practicals:**

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| --- | --- |
| 1. | Identification of pests and diseases on Mango, Banana, Citrus and papaya |
| 2 | Identification of pests and diseases on Vegetable crops (Bhendi, Brinjal, Tomato, Cucurbits and Cole crops. |
| 3 | Identification of pests and diseases on Coconut, Cashew nut and Oil palm. |
| 4 | Identification of pests and diseases on flower crops. |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Elements of Economic Entomology | David, B.V. and Kumaraswamy, T. 1978.Popular book Depot, Madras. |
| 2. | Insects and Mites of Crops in India | Nair, M.R.G.K. 1975ICAR, New Delhi. |
| 3. | Diseases of fruit Crops | Anderson, JV. Publishing House, Jodhpur |

**Core Paper 402: Post harvest technology of horticultural crops**

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| 1 | Importance of Post-harvest technology of horticultural crops-post harvest losses in the country-Loss of revenue in the country. Physiological and Biochemical changes: Physiological – Softening, Physiological loss in weight (PLW), texture, respiration and transpiration, Bio-chemical changes – Change in carbohydrates, organic acids, pigments, phenolic compounds, flavouring compounds, enzyme activity. |
| 2 | Study of Maturity – definition of maturity, different methods to judge maturity in horticultural crops like Mango, Banana, Citrus, Papaya, Brinjal, Tomato, Bhendi, coconut, oil palm. |
| 3 | Physico-chemical changes during development, ripening, storage of fruits and vegetables. Methods of storage and transportation of horticultural crops |
| 4 | Study of Harvesting, grading, packaging and storage of Fruit crops like Mango, Banana, Citrus, Papaya. |
| 5 | Study of Harvesting, grading, packaging and storage of vegetable crops like Brinjal, Tomato, Bhendi, Onion, melons and pumpkin. |
| 6 | Study of Harvesting, grading, packaging and storage of plantation crops like coconut, cashew, coffee , oil palm. |
| 7 | Study of Harvesting, grading, packaging and storage of medicinal crops like Rauvulfia, Cinchona, Senna. |
| 8 | Study of Harvesting, grading, packaging and storage of flower crops like Roses, gladiolus, gerbera, chrysanthemum. |

**PRACTICALS:**

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| 1 | Practice in judging the maturity of various horticultural produce |
| 2 | Determination of physiological loss in weight and quality |
| 3 | Grading of horticultural produce |
| 4 | Packing studies in fruits, vegetables by using different packing material |
| 5 | Packing studies in plantation crops and cut flowers by using different packing material |
| 6 | Methods of storage |
| 7 | Methods of transportation |
| 8 | Identification of storage pests and diseases |
| 9 | Visit to markets, packing houses and cold storages |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Principles and Practice of Post-Harvest Technology | Pandey, P.H. 1998.Kalyani Publishers, Ludhiana. |
| 2. | Post-Harvest Technology of Horticulture Crops  | Prof. K.V Peter, KP Kumar & V. Indira, New publishing Agency |

**Core Paper 403: Landscape Management**

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| 1 | Bio-aesthetic Planning: planning – role of vegetation in landscaping. Landscaping - educational institutions, industrial units- historical buildings, banks of rivers & canals - APTI values. Sustainable Bio-aesthetic planning |
| 2 | **Urban Land scaping** – heat islands – planting objectives & considerations. Avenue planting. Green belts & green strips. Group & mixed planting. Verge planting – suitable tree sps for inner avenues.. |
| 3 | **Roofscaping-** green roofs & rooftop gardens- Planning – suitability of roof versicell drainage mat – water proofing- vegetable roof gardens, home gardens & kitchen gardens. Site selection – layout – cropping pattern. |
| 4 | **Vertical gardens & vertical walls –** importance. Container **–** trelly system– planning & construction. Living walls – exterior & interior walls – out door & indoor vertical gardens – suitable plants – green facades – suitable plants. |
| 5 | **Interior scaping** – indoor plants – hanging baskets – table gardens – window gardens – effects of light & temperature- suitable plant species. Potting and repotting – classification of indoor plants according to light requirements- care & maintenance**.** |
| 6 | **Terrarium culture –** types – drainage & growing medium- effect of light – suitable plant – dish & bowl gardens – different types of pots & containers used in indoors. |
| 7 | **Lawn** – importance – types of grasses species & selection – cool and warm seasons grasses – basic growth habits – physiology. |
| 8 | Site Selection – for lawn – soil preparation – drainage – methods of planting – seed sowing .dibbling – turfing – Lawn maintenance – mowing – rolling – raking, scraping. Weeing & irrigation – fertilization – pest & disease management – lawn mound layout  |

**Practicals:**

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| 1. | Study of roadside planting & avenues for new colonies, traffic islands  |
| 2 | Identification of avenues trees in green belts on NH5 |
| 3 | Visit nearest roof garden |
| 4 | Visiting & identification of plants in both indoor & outdoor vertical gardens |
| 5 | Identification of indoor plants &arranging according to the light requirement. |
| 6 | Planting of Terrarium |
| 7 | Study of lawn mound layout |
| 8 | Preparation of land for lawn planting either dibbling or trufing |

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| S.no | Name of the book | Publications |
| 1. | Floriculture and Landscaping | Bose, T.K. Malti, R.G. Dhua, R. S. & Das, P. 2004. Nayaprakash, Calcutta. |
| 2. | Introductory Ornamental Horticulture | Aora, J.S. 2006.KalyaniPublishres, Ludhiana. |
| 3. | Floriculture in India | Randhawa, G.S. and AmitabhaMukhopadhyay. 2004. Allied Publishers Pvt. Ltd., New Delhi. |

**Core Paper 404: Recent Advances in Horticulture**

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| **1** | Watershed management objectives, approaches, steps in watershed development. |
| **2** | Importance and principles of organic farming in horticultural crops, sources and importance of organic matter. Organic mulches weed control in organic farming, organic pest control. Composting, principles of composting, vermin-culture, vermin-composting & vermin-wash, coir pith manure. |
| **3** | Cultivation of high value crops in Protected Cultivation- poly house culture of vegetable crops.  |
| **4** | Cultivation of high value crops in protected cultivation – poly house culture of flower crops. |
| **5** | Flower arrangement – Ikabana & western trend, Principles of flower arrangement, tools & equipment, dehydrated flowers, dehydration methods, maintenance of flower shape, procedure for embedding, pot –pourri. |
| **6** | Bonsai – Suitable plants for Bonsai; Aesthetics with plant parts, classification of Bonsai, requirements of Bonsai pot, Training and pruning, potting & repotting, general care. |
| **7** | Apiculture, bee-keeping flora in India, bee-keeping technology, equipment, Honey extraction. |
| **8** | Mushroom production nutritional aspects, recipes.,Home scale industry prospects. |

**PRACTICALS:**

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| 1  | Flower arrangement in different styles. |
| 2 | Preparation of bouquets. |
| 3 | Visit to the local florist. |
| 4 | Visit to Protected Cultivated areas of horticultural farms. |
| 5 | Visit to local vermin-compost unit. |
| 6 | Visit to watershed management center |

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| **S.no** | **Name of the book** | **Publications** |
| 1. | Advances in Horticulture Volume 2,3,4,6 and 12 | K.L. Chada and J.S. Grewal, ICAR, Malhotra Publishing House, New Delhi. |
| 2. | Advances in Horticulture | V.K. Sharma, Deep & Deep Publication Pvt. Limited, New Delhi, India. |