

GROUP-8

J.E. Horticulture (Level of Exam- Diploma in Horticulture Engineering)

1) General awareness, Reasoning, Mathematics, Science, History including Haryana related history, current affairs, literature, Geography, Civics, Environment, Culture etc. - **(Weightage 20%)**

2) Computer terminology, Fundamentals, word software, excel software, Power point, internet, web browsing, Communication, emails, downloading and uploading data on websites etc. -

(Weightage 10%)

3) Job Oriented syllabus-

(Weightage 70%)

BASIC HORTICULTURE AND PLANT PROPAGATION

Propagation - Tools and implements - Media – Containers - Propagation - Preparation of nursery beds - Seed treatment - Sowing - Plug transplants / seedling production -Potting, depotting and repotting of plants - Methods of asexual propagation through cuttings, layering, grafting and budding, Advantages and disadvantages of sexual and asexual methods of propagation, - Types of cuttings - Types of layering - Potting of layers and hardening – Raising of rootstocks, seed dormancy and methods to overcome seed dormancy - Grafting methods - Separation of grafts - Potting and maintenance of grafted plants plant propagating structures - Mist chamber - Shade net – Uses - Hardening and maintenance - Application of growth regulators - Growth regulators for seed and vegetative propagation - budding methods -Maintenance of budded plants - Nutrition and plant protection.

SOIL AND FERTILITY, IRRIGATION AND WEED MANAGEMENT

Soil – Definition – Components – Physical properties of soil – Colour, Texture, structure, Bulk density, Particle density, Pore space; soil water, soil air, soil temperature and their significance in crop production. Soil chemical properties – Soil reaction, EC and CEC. Soil Organic Matter and its importance on soil properties –Essential nutrients for crop plants - Major, secondary and micro nutrients – Manures and fertilizers – Types – Straight, Complex, Compound, Mixed, Fortified and chelated fertilizers and their reactions in soil - Techniques to enhance fertilizer use efficiently. Soil fertility – INM and IPNS – Problem soils – Acid, saline and alkaline soils - Their formation, reclamation and management.Irrigation – Sources of water for irrigation – Water movement, soil–plant andatmosphere soil moisture constants – Available soil moisture - Effect of water stress on crop yield – Water use efficiency – Water requirement of major crops – Critical stages of water requirement – Irrigation scheduling – Types and advantages – Irrigation methods – Irrigation water use efficiency – Management of poor-quality irrigation water. Weeds –definition and importance of weed control in crop production – Classification of weeds –Methods of weed control – Manual, mechanical, cultural, chemical and biological methods - Relative merits and demerits – Herbicide classification based on method of application – Weed control practices for major horticultural crops, Integrated weed management – Concepts and practices.

PRODUCTION TECHNOLOGY OF FRUITS AND VEGETABLES

Scope and importance of fruit cultivation – Area and production of fruit crops in Haryana – Selection and layout of orchard - Physical features in orchard - Study of culturalpractices of Tropical fruits – Mango, Banana, Grapes, Papaya, Sapota, Guava, Jackfruit - Sub-tropical and temperate fruits –

Pomegranate, citrus, Pineapple, Avocado, Apple, Pear, with reference to soil, climate, varieties / hybrids methods of propagation, nutrient, irrigation and weed management practices – Training and pruning – Growth regulators – Maturity standards for harvesting – Post-harvest handling of fruit crops physiological disorders– Yield – Grading – packing –Storage and value added products. - Organic fruit production and Good Agricultural Practices.Dry land horticulture – Importance, scope and distribution of arid and semi-arid zones in India and Haryana. Crops suitable for dry land production – Important varieties, climate and soil requirements, commercial propagation methods - Spacing and planting systems - Cropping systems and intercropping – Mulching - Soil and moisture conservation methods – Anti-transpirants – Management of nutrients, water, weeds and problem soils – Regulation of cropping – Training and pruning - Top working and rejuvenation – Use of plant growth regulators – post-harvesthandling. Scope and importance of vegetable cultivation – Area and production in Haryana –Systems of vegetable cultivation – Kitchen Garden – Truck Garden and market garden –Gardening for processing. Climate – Soil requirement – Varieties / hybrids – Seed rate –Sowing nursery practices – Portray nursery – Transplanting – Manuring – Irrigation –Fertigation - Nutrient deficiency and their corrective measures - Weeding –chemical –Mechanical weed control – Use of growth regulators - Special horticultural practices(training, staking, pruning) – Physiological disorders and corrective measures – Maturity indices - Harvesting – Grading, sorting – Packing and storage and yield for important vegetable crop; Tomato, Brinjal, Chillies, Bhindi, Onion, Gourds – Bitter gourd – Ridge gourd – Snake gourd - Pumpkin - Water melon – Musk melon - Ash gourd - Tapioca –Yams – Colocasia - Cabbage – Cauliflower, Radish – Carrot Beet root, Amaranthus –Moringa – Potato – Cluster beans – Lab lab - Peas and Beans.

PRODUCTION TECHNOLOGY OF FLOWER CROPS AND LANDSCAPING

Scope and importance of commercial flower crops – Area and production - Study of cultural practices of commercial loose flowers – Rose, Jasmine, Tuberose, Chrysanthemum, Marigold, Crossandra, Celosia, Nerium and Gomphrena. Floral concrete, pigment and dye extraction from loose flowers - Introduction to protected structures for cut flower production — Study of cut flower production techniques of Rose, Carnation, Gerbera, Chrysanthemum, Orchids, Anthurium, Gladiolus, Liliun, Alstroemeria and Heliconia. Post-harvest management of cut flowers – Floral decorations, bouquets and dry flowers – Grading, packing and marketing of flowers. Scope and importance of ornamental gardening and landscaping – Principles – Styles of garden - Formal and informal garden – Features of garden - Garden components and adornments – Plant Components – Edges, hedges, flower beds, trophy, topiary, mixed borders – non-plant components - Garden walls, fencing, steps, garden drives and paths, pavements, fountains, arches, pergolas, trellises, pools, etc. - operations in maintenance of trees, annuals, shrubs, climbers, creepers, herbaceous perennials, ferns, cacti and succulents, palms and cycads – Sunken garden, roof garden, rockeries.Operations in planting and maintenance of public garden, institutional garden, Industrial Garden, residential complex garden - Operations in landscape maintenance for high ways, bus terminus, airports, city roads and IT parks - Lawn – Types of lawn grasses –Criteria for selection- methods of lawn establishment - Operation and maintenance –Problems and remedial management – Flower arrangements and dry flowers – Suitable plant selection and methods of arrangement.

PRODUCTION TECHNOLOGY OF SPICES, PLANTATION CROPS, MEDICINAL AND AROMATIC CROPS

Scope and importance of spices - Area and production and productivity in Haryana –Study of cultural practices for the important spice crops Pepper, Cardamom, Turmeric, Ginger, Clove, Nutmeg, Cinnamon, Tamarind, Allspice, Curry leaf, Coriander, Fenugreek, Fennel, Cumin and Paprika with reference to soil, climate, varieties, propagation, planting – Irrigation – Nutrition and weed management - Cultural practices- Training and pruning – Harvesting - Yield – Post-harvest handling:

Processing –grading and packing – Organic farming and GAP in spice production.Scope and importance of plantation crops - Area - Production and productivity in Haryana – Study of cultural operations for the plantation crops Tea, Coffee, Rubber, Cocoa, Cashew, Coconut, Arecanut, Oil palm and Palmyrah with reference to soil, climate, varieties, propagation, cultural practices - Training and pruning – Harvesting -Yield – Processing – Grading and packing. Medicinal and aromatic plants - Scope and importance - Medicinal plant wealth of India and Haryana - Area and production - Classification - Annual, biennial and herbaceous perennial - Medicinal and aromatic plants for tropical, sub–tropical and temperate region - Contract farming and Good Agricultural Practices - Soil and climatic -conditions, propagation and planting, irrigation, manuring, weed control, economic parts, harvesting, yield, post-harvest handling, curing and processing practices, storage methods of medicinal plants: Glory lily, Medicinal Coleus, Senna, Periwinkle, Gymnema, Ashwagandha, Phyllanthus, Kalmegh, Aloe vera and Stevia - Aromatic plants: Japanese mint, Rosemary, Lemon grass, Citronella, Palmarosa, Vetiver, Geranium, Patchouli, Sacred and sweet basil.

INSECT PEST AND DISEASES OF HORTICULTURAL CROPS AND THEIR MANAGEMENT

Pest - Categories – Causes for pest for outbreak. Pest management - Principles and components. Natural enemies in pest suppression. IPM – Management strategies for important insect pests' groups – Chewing insects - Stem borers – Fruit borer –Sap feeders of important fruit, vegetable, spices, medicinal and plantation crops-Special pest management strategies in ware house, green house, poly house. Management techniques for plant parasitic nematodes.Etiology, symptoms and integrated management of important diseases due to fungi,bacteria, viruses, phytoplasma, phanerogamic parasites of Fruits: Mango, Banana, Citrus, Grapes, Guava, Sapota, Pomegranate, Peach, Papaya, Jack fruit, Pineapple, Ber, Apple, Pear, Plum Vegetables: Brinjal, Tomato, Bhindi, chillies Cucurbits, Crucifers, Beans, Peas, Potato, Sweet potato, Radish and Cassava. Mushroom: Cultivation techniques. Cultivation of Onion, Garlic, Chillies, Cardamom, Pepper, Turmeric, Ginger, Betelvine, Coriander, Fenugreek, Clove and Nutmeg Plantation crops: Tea, Coffee, Cocoa, Rubber, CoconutArecanut and Cashew Flowers: Jasmine, Rose, Crossandra, Chrysanthemum, Tube rose, Carnation, Medicinal plants: Gloriosa, Stevia, Senna, Coleus, Aloe vera, Solanumnigrum and Withania, Bio-control agents.

POST HARVEST HANDLING AND VALUE ADDITION OF HORTICULTURAL CROPS

Scope and importance of post-harvest technology in horticultural crops - Washing, grading, sorting - pre cooling and pre-treatments - Blanching & peeling methods – Post-harvest handling methods: Dehydration, Canning of fruits and vegetables - Thermal processing - Low temperature processing - Cold storage - Controlled and atmospheric storage - Refrigeration truck, ripening chamber, packaging for horticultural crops - Value addition in horticultural crops : Definition - Need for value addition. General principles and method for value added products - Processing of value-added products:Processing of fruits - Jam, Jelly, Squash, RTS and Candy. Processing of vegetables -Pickle, chutney, sauce and ketchup. Processing of spices - Spice powders and masalamix - Food safety standards: Principles National - Agmark, BIS, FSSAI, HACCP International - Codex, ISO.

COMMERCIAL AGRICULTURE

Hybrid Seed Production - Hybrids – Production of hybrid varieties – Development of inbreeds – Single cross evaluation – Prediction of double cross performance –Production of hybrid seed – Cytoplasmic, Genetic male sterility – Maintenance of Male sterile lines – Production of single cross hybrids – Production of double cross hybrid varieties - Manual emasculation and / or Pollination – Chemically induced male sterility – Merits and demerits of hybrid varieties – Floral biology, anthesis, pollination,

selfing, emasculation and crossing technique in Rice, Sorghum, Pearl millet, Red gram, Castor, Sunflower, Cotton, Tomato, Bhindi - Harvesting – Physical and chemical indices –Extraction techniques – Seed processing – Use of cleaner, grader – Seed treatment –Seed packaging – Seed storage – Sanitation – Certification procedure.Production of Bio-Control Agents - Introduction to bio-control agents – Importance –History and development - Classical examples of bio-control agents – Role in pest and disease management – Categories of bio-control agents. Setting up a bio-control laboratory. Mass culture of tobacco caterpillar (*Spodopteralitura*) and gram pod borer (*Helicoverpaarmigera*) - Synthetic diet – Mass production of SINPV and HaNPV. Mass production of *Trichogramma* spp., *Chrysoperla*, coccinellid predators, *Trichoderma*viride, *Pseudomonas fluorescens* and Entomo-pathogenic nematodes.Production of Spawn and Mushroom – Mushroom - Introduction, importance -Present production and trade, scope for export, markets for mushroom and mushroom products – Mushroom morphology: Common edible mushrooms - *Pleurotus*, *Calocybe* –Poisonous mushrooms - Laboratory techniques: Equipments used, sterilization of glassware, media preparation, pure culture techniques, sub-culturing and storage. Spawn: Types of spawn, mother spawn and bed spawn. Cultivation: Oyster mushroom, Milky mushroom – Problems in cultivation: Weed moulds, diseases, pests and abiotic disorders - Uses of mushroom: as food, nutraceutical and pharmaceutical values, composting coir-pith and other Agri-wastes – post-harvest technology:methods of preservation and value addition.Organic Composting - Agricultural, Industrial and Urban wastes - Nutrient potential of different organic manures – Preparation of FYM Compost – Composting methods -Preparation of enriched FYM – Coir pith composting – Sugarcane trash – Press-mud -Farm wastes and farm weeds - *Parthenium* composting – Determination of maturity indices of composts – Commercial utility of organic manures, Introduction to vermicompost – Types of Vermicompost - Materials for vermicomposting. Preliminary treatment of composting material – Small Scale vermicomposting – Large scale vermicomposting – Other types of vermicomposting – Requirements for vermicomposting – Bedding materials, container, pH, Moisture content, Temperature –Cover feed substrates - Selection of right type of worm species – Preparation of vermicompost beds – Collection of Vermicompost – Vermicompost efficiency –Transportation of live worms – Application of vermicompost.

FARM MANAGEMENT, MARKETING AND EXTENSION EDUCATION

Farm Management - Scope – Relationship with other sciences - Economic principlesapplied to the organization of farm business - Principles of variable proportions - Farm planning and Budgeting – Types and system of farming - Farm planning – Meaning -Need for farm planning -Types of Farm plans - Simple farm plan and whole farm plan -Characteristics of a good farm plan - Basic steps in farm planning - Farm budgeting –Meaning - Types of farm budgets – Enterprise budgeting - Partial budgeting and whole farm budgeting - Farm Risk Management - Distinction between risk and uncertainty -Sources of risk and uncertainty - Production and technical risks - Price risk - Financial risk - Methods of reducing risks - Horticultural Marketing – Nature and Scope -Concepts and definition of marketing - Scope of agricultural marketing -Classification of markets - Structure, conduct – Performance - Market forces - Demand and supply -Characteristics of agricultural commodities - Marketing costs and marketing margins -Price spread. Marketed and marketable surplus - Marketing Functions and Institutions -Marketing functions – Packaging – Transportation - Grading and standardization –Warehousing – Processing - Cold storage - Marketing agencies and institutions - Cooperative marketing societies - Role of regulated markets – NAFED – TANFED –NHB - Commodity boards - Marketing of agricultural inputs - Market information and intelligence - AGMARKNET, DEMIC, DMI etc., - Usage of market information. Agricultural Extension – Scope, principles - Teaching Learning Process. Communication – Meaning, definition, elements and their characteristics, types, models and barriers in communication. Diffusion – Elements - Adoption – Stages, adopter categories

and their characteristics. Extension methods – Definition, classification - Individual contact, group contact and mass contact methods. Participatory Rural Appraisal techniques. Audio -Visual aids – Definition, advantages, classification, choice, criteria for selection. Farm Journalism – Definition, basic concepts, writing for media. Information and Communication Technology (ICT) – Computer networks, internet, video conferencing, Agri-portals, Kisan Call Centre, mobile phone. Photography – Basic concepts, advancements.

Important Note: The Weightage as mentioned against the syllabus is tentative & may vary.

