

CHAPTER-6

SELECTION PROCEDURE

6.1 SCHEME OF EXAMINATION

The following shall be the Scheme of Examination, components of written test and its syllabus for Recruitment:

(A) Scheme of Examination:

Stage-I (MCQ Type)	Time: 2 Hours	Max. Marks. 150 (150 questions)
Stage-II (Descriptive Type) * Only for those who qualify Stage-I	Time: 2 Hours	Max. Marks. 100
Total Marks		250 Marks

NOTE

- Each question at Stage-I shall have 1 mark each.
- There will be no negative marking.
- The candidates will be shortlisted for Stage-II in the ratio of 1:10 i.e. about 10 times the number of vacancies in each category on the basis of their performance in Stage-I.
- If the examination is held in more than one session, the scores across various sessions will be equated following standard practice to adjust for slight differences in difficulty level of different test batteries used across sessions.
- **The Total Marks Obtained at Stage-II will be used to determine final Merit.**

6.2 Test Components

Stage-I (MCQ Type)	Test Components	Duration 2 Hours	
		No. of Questions	Marks
1	Horticulture	60	60
2	General Studies	30	30
3	English Comprehension	30	30
4	Quantitative Aptitude & Mental Ability	30	30
Total		150	150

Stage -II	Test Components	Duration 2 Hours
		Marks
	Descriptive Type	100
	Total	100

(B) Syllabus:

Stage-I

Horticulture: Tropical and Dry Land Fruit Production, Subtropical and Temperate Fruit Production, Breeding of Fruit Crops, Post-Harvest Technology, Biotechnology of Fruit Crops, Principles and Practices of Plant Propagation, Production Technology of Cool Season Vegetable Crops, Production Technology of Warm Season Vegetable Crops, Seed Production, Hi-Tech Production Technology of Fruits, flowers & Vegetable Crops, Production Technology of Spice Crops, Statistics.

General Studies: Questions on General Science, current events of national and international importance, History of India, Indian agriculture, Indian Geography, Indian Culture & new Agri-horti initiatives and schemes of Govt. of India i.e. PEQ, CPP, CDP, MIDH, NABARD, ICAR research institutions & Environmental studies.

English Comprehension: Active Passive, One-word Substitution, Unseen Passage, Fill in the blanks, Antonyms, Synonyms, Direct-Indirect, Error Detection, Sentence Improvement.

Quantitative Aptitude & Mental Ability: Time & Work, Average, Percentage, Ratio & Proportion, Interest, Profit & Loss, Time & Distance, Decimals, Fractions, Partnership, Analogies, Problem Solving, Judgement, Coding –Decoding, Relationship concept.

Stage-II

Descriptive Type: The questions will be designed to test the ability of the candidate's knowledge and awareness about the subject detailed below:

TOPIC	MARKS ALLOCATED
Horticulture and General Agriculture	100 marks

Horticulture:

1: Tropical and Dry Land Fruit Production

Commercial varieties of regional, national and international importance, eco-physiological requirements. Recent trends in propagation, scion-stock relationship, planting systems, cropping systems, canopy management, nutrient management, water management, fertigation, role of bio-regulators, abiotic factors limiting fruit production, physiology of flowering, pollination, fruit set and development, honeybees in cross pollination, physiological disorders-causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; Mechanization, industrial and export potential. Agri. Export Zones (AEZ) and industrial supports. Crops: Mango, Banana, Citrus, Papaya, Guava. Sapota, Annonas, Aonla, Bael, Wood apple, Jamun, Pomegranate, Ber and minor fruits of tropics.

2: Subtropical and Temperate Fruit Production

Commercial varieties of regional, national and international importance, eco-physiological requirement; recent trends in propagation, scion-stock relationship, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bio-regulators, abiotic factors limiting fruit production, physiology of flowering, pollination, fruit set and development, honeybees in cross pollination, physiological disorders-causes and remedies, quality improvement -by management practices: maturity indices, harvesting, grading, packing, storage and ripening techniques Mechanization industrial and export potential. Agri Export Zones (AEZ) and industrial supports. Crops Avocado Pineapple, Jackfruit. Mangosteen. Carambola, Fig and Rambutan. Litchi, Loquat, Apple, Pear, Quince. Grapes, Plums: Peach, Apricot. Cherries, Persimmon, Kiwifruit, Strawberry, Walnut, Almond, Pistachio, Hazelnut.

3: Breeding of Fruit Crops

Origin and distribution, taxonomical status - species and cultivars, cytogenetics, genetic resources, blossom biology, breeding systems, breeding objectives, breeding constraints and types, approaches for crop improvement introduction, selection, hybridization, mutation breeding, polyploidy breeding. rootstock breeding, improvement of quality traits, resistance breeding for biotic and abiotic stresses, biotechnological interventions, achievements and future thrust in the following selected fruit crops. Crops: Mango. Banana, Pineapple. Citrus, Grapes, Guava, Sapota, Jackfruit, Papaya. Custard apple, Aonla Avocado, Ber. Litchi, Jamun, Phalsa, Mulberry, Raspberry, Apple, Pear, Plums, Peach. Apricot, Cherries and Strawberry.

4: Post-Harvest Technology

Maturity indices, harvesting practices and grading for specific market requirements, influence of pre-harvest practices, enzymatic and textural changes, respiration, transpiration: Physiology and biochemistry Sacred fruit ripening, ethylene evolution and ethylene management, factors leading to post-harvest loss, pre- HPSC cooling: Treatment prior to shipment, viz., chlorination, waxing, chemicals, bio-control agents and natural plant products, fungicides, hot water, vapour heat treatment, sulphur fumigation and irradiation. Methods of storage-ventilated, refrigerated, MAS, CA storage, physical injuries and disorders. Packing methods and transport, quality evaluation, principles and methods of preservation, food processing, canning, fruit juices. beverages, pickles, jam, jelly, candy: Dried and dehydrated products, nutritionally enriched products, fermented fruit beverages, packaging technology, processing waste management and food safety standards; Role of HACCP.

5: Biotechnology of Fruit Crops

Harnessing bio-technology for improvement of horticultural crops, influence of plant materials, physical, chemical factors and growth regulators on growth and development of plant cell, tissue and organ culture Callus culture _ types, cell division, differentiation, morphogenesis, organogenesis, embryogenesis; Use of bioreactors and in vitro methods for production of secondary metabolites, suspension culture, nutrition of tissues and cells, regeneration of tissues, ex vitro, establishment of tissue culture plants, physiology of hardening and field transfer, organ culture-meristem, embryo, anther, ovule culture, embryo rescue. somaclonal variation, protoplast culture and fusion; Construction and identification of somatic hybrids and cybrids, wide hybridization, in vitro pollination and fertilization, haploids, in vitro mutation, artificial seeds, cryopreservation, rapid clonal propagation, genetic engineering and transformation in horticulture crops, use of molecular markers. In vitro selection for biotic and abiotic stress, achievements of biotechnology in horticultural crops and application of gene editing tools in horticultural crops.

6: Principles and Practices of Plant Propagation

Introduction, life cycle in plants, cellular basis for propagation. Sexual propagation apomixis, polyembryony, chimeras. Factors influencing seed germination, hormonal regulation of germination and seedling growth. Seed quality, treatment, packing, storage, certification and testing. Rooting of cuttings under mist and hot beds. Physiological, anatomical and biochemical aspects of root induction in cuttings Selection of elite mother plants. Establishment of bud wood bank. Stock, scion and inter stock relationship and incompatibility Physiology of dwarfing rootstocks. Rejuvenation of senile and seedling orchards progeny orchard and scion bank, nursery act and guidelines. Micropropagation In vitro clonal propagation, somatic embryogenesis, embryogenesis, micro grafting and meristem culture. Hardening, packing and transport of micro- propagules.

7: Production Technology of Cool Season Vegetable Crops

Introduction, climatic and soil requirement, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment. nutritional and irrigation requirements, intercultural operations. weed control, mulching, physiological disorders. harvesting of potato, chow chow, cole crops: cabbage. cauliflower, knolkhol, sprouting broccoli, Brussels sprout, root crops: carrot, radish, turnip, and beetroot, bulb crops: onion and garlic, Peas and beans, leafy vegetables: palak

8: Production Technology of Warm Season Vegetable Crops

Introduction, climatic and soil requirements, commercial varieties hybrids, sowing, planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting of: Tomato, eggplant, hot and sweet pepper, Okra, vegetable cowpea, Dolichos lablab and cluster bean, cucurbitaceous crops; and sweet potato, cassava. yams, coelocasia, moringa and amaranths.

9: Seed Production

Introduction, importance and present status of vegetable industry; modes of propagation in vegetables: Seed morphology and development in vegetable seeds; Floral biology of these plant species: classification of vegetable crops based on seed dormancy pollination and reproduction behavior, steps in quality seed production; identification of suitable areas locations for seed production of these crops; methods of seed production: comparison between different methods eg. pollination mechanisms; sex types, ratios and expression and modification of flowering pattern in cucurbits; nursery raising and transplanting stage: Seed production technology of vegetables viz solanaceous, cucurbitaceous, leguminous, malvaceae, cole crops. leafy vegetables, root, tuber and bulb crops: harvesting/picking stage and seed extraction in fruit vegetables, grading, 'storage, seed quality testing and seed certification standards; clonal propagation and multiplication in tuber crops e.g. Potato. and sweet potato, seed-plot technique in potato, TPS (True Potato Seed); hybrid seed production technology of vegetable crops; maintenance of parental lines; use of male sterility and self-incompatibility in hybrid seed production.

10: Hi-tech Production Technology of Fruits, flowers & Vegetable Crops

Importance and scope of protected cultivation of Fruits, flowers & vegetable crops, principles used in protected cultivation and greenhouse technology, effect of temperature, carbon dioxide, humidity, energy management, low cost structures, training methods) engineering aspects, classification of protected structures including low cost poly-house/green houses and other structures in vegetable production, types of cladding material, types of median Mulching, solarisation, fumigation. Drip and sprinkler irrigation. fertigation: special horticultural practices, hydroponics, Mechanization and automation, vertical farming and soilless culture for enhancing productivity and off-season of high value vegetable crops like tomato, capsicum and cucumber.

11: Production Technology of Spice Crops

Introduction, importance of spice crops-historical accent, present status national and international, future prospects, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, site selection, seed planting material production including rapid multiplication and micro propagation. sowing planting times and methods; seed rate and seed treatment, nutritional and irrigation requirements, intercropping, mixed cropping; intercultural. operations, weed control, mulching, physiological disorders. harvesting, post-harvest management and processing -practices plant protection measure precision farming, quality control of Black pepper, cardamom, clove, cinnamon, nutmeg, allspice, turmeric, ginger garlic, coriander, fenugreek, .cumin, fennel, ajwain, dill, celery, tamarind, garcinia, curry leaf, saffron, and vanilla Role of commodity boards in spices development.

12: Statistics

Frequency distribution. Measures of central tendency and dispersion: mean, median, mode, standard deviation etc. Population distributions: normal, binomial and Poisson. Correlations: regression, partial and multiple. Tests of significance t, F and Chi square and randomized block, Latin square and split plot designs, their analysis and interpretation

13: General Agriculture:

1. Agriculture, its importance in National economy. Factors determining agro-ecological zones and geographic distribution of crop plants. Importance of crop plants, cultural practices for cereal, pulses, oilseed, fibre, sugar, tuber and fodder crops and scientific basis for these crop-rotations, multiple and relay cropping, intercropping and mixed cropping.
2. Soil as medium of plant growth and its composition, mineral and organic constituents of the soil and their role in crop production; chemical, physical and microbiological properties of soils. Essential plant nutrients (macro and micro) their functions, occurrence, cycling in soils. Principles of soil fertility and its evaluation for judicious fertilizer use. Organic manures and bio-fertilizers, inorganic fertilizers, integrated nutrient management.
3. Principles of plant physiology with reference to plant nutrition, absorption, translocation and metabolism of nutrients.
4. Diagnosis of nutrient deficiencies and their amelioration photosynthesis and respiration, growth and development, auxins and hormones in plant growth.
5. Cell and cell organelles. Cell division. Reproductive cycle, Principles of genetics, gene interaction, sex determination, linkage and re-combination, mutation, extra chromosomal inheritance, polyploidy. Origin and domestication of crop plants. Genetic resources-conservation and utilization. Floral biology in relation to selfing and crossing.
6. Genetic basis of plant breeding pureline selection, mass selection, male sterility and incompatibility and their use in plant breeding. Pedigree selection, back-cross method of selection. Heterosis and its exploitation. Development of hybrids, composites and synthetic, important varieties, hybrids, composites and synthetic of major crops. Seeds and seed production techniques.
7. Important fruit and vegetable crops of India, method of Propagation-Sexual and asexual. Package and practices and their scientific basis. Crop rotation, intercropping, companion crops, role of fruits and vegetables in human nutrition, post-harvest handling and processing of fruits and vegetables. Landscaping and ornamental horticulture, commercial floriculture. Medicinal and aromatic plants. Serious pests and diseases affecting major crops. Principles of control of crop pests, and diseases, integrated management. Proper use and maintenance of plant protection equipment.
8. Principles of economics as applied to agriculture. Farm planning and optimum resource-use efficiency and maximizing income and employment. Farm systems and their spatial distribution, their significant roles in regional economic development.

RESOLUTION OF TIE CASES

In cases where more than one candidate secures the equal aggregate marks in **Stage-I**, tie will be resolved by applying the following methods one after another:

- i) Date of Birth, with older candidates placed higher.
- ii) Alphabetical order in which names of the candidates appear.