

M.Sc. AGRICULTURE

SEMESTER-I (HORTICULTURE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment		Total Marks		Grand Total
			Th.	Pract	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	FSC-511	Tropical Fruit Production and Dry Land Horticulture	4	3	80	40	20	10	100	50	150
2	FSC-512	Nutrient and Canopy Management in Fruit Crops	4	6	80	40	20	10	100	50	150
3	FSC-513	Systematic Pomology	4	3	80	40	20	10	100	50	150
4	SSC-410 (Minor)	Soil Chemistry and Bio Chemistry	4	6	80	40	20	10	100	50	150
5	STA-415	Statistical Methods for Research Workers	4	3	80	40	20	10	100	50	150
6.	*FSC-411	Nursery Management of Horticultural Crops									NC
7.	*FSC-412	Fundamentals of Fruit Production									NC
Total			20	21	400	200	100	50	500	250	750

*Note: The students from the stream other than they opted for Post Graduate classes will have to clear UG course of Elective subject with UG classes as per schedule.

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SEMESTER-II (HORTICULTURE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	FSC-521	Sub Tropical and Temperate Fruit Production	4	3	80	40	20	10	100	50	150
2	FSC-522	Breeding of Fruit Crops	4	6	80	40	20	10	100	50	150
3	FSC-523	Post Harvest Technology of Fruit Crops	4	3	80	40	20	10	100	50	150
4	SSC-420/ PBG-420 (Minor)	Soil Fertility and Fertilizer Use/Principles of seed Production	4	6	80	40	20	10	100	50	150
5	STA-425	Experimental Designs for Research Worker	4	3	80	40	20	10	100	50	150
6.	*FSC-421	Commercial Fruit Production									NC
7.	*FSC-422	Processing and Value Addition of Horticultural Crops									NC
Total			20	21	400	200	100	50	500	250	750

Note: The students from the stream other than they opted for Post Graduate classes will have to clear UG course of Elective subject with UG classes as per schedule.

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SEMESTER-III (HORTICULTURE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment		Total Marks		Grand Total
			Th.	Prac	Th.	Prac	Th	Prac	Th	Prac	
1	FSC-531	Principles and Practices of Plant Propagation	4	3	80	40	20	10	100	50	150
2	FSC-532	Plant Growth Regulators in Fruit Crops	4	6	80	40	20	10	100	50	150
3	SSC-430 / PFE-430// BOT-430 (Minor)	Fertilizer Technology / / Protected Cultivation / Physiology of Growth & Development	4	3	80	40	20	10	100	50	150
4		Credit seminar	3		100				100		100
5		Research Work (Four periods per Teacher per Student)	-	4							
	Total		15	16	340	120	60	30	400	150	550

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SEMESTER-IV (HORTICULTURE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Prac	Th	Prac	
1	FSC-541	Citriculture	4	3	60	20	15	05	75	25	100
2.	FSC-542	Orchard Management and Organic Horticulture	4	3	60	20	15	05	75	25	100
3		Research Work (Four Periods per Teacher Per Student)		4		250				250	250
		Total	08	10	120	290	30	10	150	300	450

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SEMESTER-I (HORTICULTURE)

FSC-511: Tropical Fruit Production and Dry Land Horticulture

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Origin, Distribution, Commercial Importance and Export Potential. Ecophysiological Requirements. Species and Varieties. Rootstocks and Propagation. Planting, Root Zone, Training and Pruning. Nutrition and Water Requirements, Fertigation, Role of Bio-regulators, Major Pests, Diseases, Physiological Disorders and their Control Measures. Abiotic Factors limiting Fruit Production. Flowering, Pollination and Fruit set. Quality improvement Storage and Ripening Techniques. Industrial and Export potential, Agri. Export Zones (AEZ) and Industrial Support. Fruit Crops- Itrus, Mango, Papaya, Pineapple, Banana, Avocado, Sapota, Guava, Ber, Pomegranate, Aonla, Jack Fruit, Annonas, Minor Fruits of Tropics. Possibilities and Constraints in Dry Land Fruit Production, Fruits suitable for Dry Land Horticulture.

Practical:

Time: 3 Hours

Description and Identification of Species and Varieties. Growth and Development. Growth Regulation. Nutritional and Physiological Disorders and their Control. Rejuvenation of Old and Unproductive Trees. Visit to Commercial Orchards. Project Preparation for Establishing Commercial Orchards.

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SEMESTER-I (HORTICULTURE)

FSC-512

Nutrient and Canopy Management in Fruit Crops

Time: 3 Hours

Max. Marks: 150

Theory:80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+6

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Essential elements, Criteria of essentiality. Natural sources and fertilizers. Role of essential elements in fruit plants. Interaction of nutrients. Canopy management, Importance and advantages. Factors affecting canopy development. Canopy types and structures. Light interception and distribution in different types of tree canopies. Spacing and utilization of land area. Canopy management through the use of rootstock and scion, plant growth inhibitors, training and pruning and management practices. Canopy development in relation to growth, flowering, fruiting and fruit quality in temperate fruits, grapes, pomegranate, mango, sapota, guava, citrus and ber.

Practical:

Time: 3 Hours

Leaf sampling techniques, Determination of nutrient status through soil and plant analysis. Study of different types of canopies. Training of plants for different canopy types. Canopy development through pruning, use of plant growth inhibitors and, geometry of planting. Effect of canopy types on production and quality of fruits.

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SEMESTER-I (HORTICULTURE) Systematic Pomology

FSC-513

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week: 04+3

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1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
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Theory

Plant Taxonomy, Systematic pomology, its significance, systems of classification, history of systematic Pomology. Nomenclature and code of nomenclature, naming of fruit varieties, Speciation and classification of temperate, tropical and sub-tropical fruit plant species. Pomological description of temperate fruits (pear, apple, peach, plum, apricot, cherry, kiwi fruit, strawberry), citrus fruits and other major fruits (mango, guava, grapes, pomegranate, date, ber, litchi, loquat, papaya, jamun, cashewnut, banana, aonla, sapota, phalsa and cape gooseberry).

Practical:

Time: 3 Hours

Vegetative and floral morphology of fruit plants. Description and identification of pome, stone, citrus and other major fruits (mango, guava, grapes, pomegranate, date, ber, etc etc.) Preparation and use of keys for the identification of fruit plant species and varieties. Visit to the fruit research stations for identification of different fruit species.

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SEMESTER-I (HORTICULTURE)

SSC-410: Soil Chemistry and Biochemistry (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+6

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
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5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Soil colloids–nature, properties, origin of charges and their significance; Cation and anion exchange phenomena and their importance; Introduction to ionic adsorption and fixation; Soil reaction and buffering; Distribution, characterization, genesis and amelioration of acid, acid sulphate, saline, saline-sodic, sodic and calcareous soils; Plant reaction and tolerance to soil salinity, sodicity and acidity; Chemical and electro chemical properties of submerged soils; Organic matter and characterization of clay –organic matter interaction ; Biochemical decomposition of organic manures and farm wastes, composting and vermicomposting, Biochemistry of humus formation and biogas production .

Practical:

Time: 3 Hours

Determination of the effect of dilution and salinity on soil pH; Active and potential acidity; Cation and anion exchange capacity and exchangeable cations; Soluble salts in soils; Lime and gypsum requirements. Nutrient adsorption and fixation capacities of soils; Estimation of biochemical constituents of organic residues- cellulose, hemi-cellulose, lignin and C: N ratio; Preparation of enriched compost, biofertilizers and vermiculture.

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SEMESTER-I (HORTICULTURE)

STA-415: Statistical Methods for Research Workers

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

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Theory

Probability and fitting of standard frequency distribution, sampling techniques, sampling distributions, mean and standard error, simple partial, multiple and intra- class correlation and multiple regression, tests of significance, students'-t, chi-square and large sample tests, confidence intervals, analysis of variance for one way and two way classification with equal cell frequencies, transformation of data.

Practical:

Time: 3 Hours

Fitting of distributions, samples and sampling distributions, correlation and regression, tests of significance and analysis of variance.

Note: Students shall be trained to use computer to analysis the data, using available software's. However, during university examination students will use scientific calculators to analyse the data.

M.Sc. AGRICULTURE

SEMESTER-I (HORTICULTURE)

FSC-411

Nursery Management of Horticultural Crops

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per Week 4+3

Instructions for the paper setters

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Principles of plant propagation. Seed dormancy and germination. Selection of rootstock and scion. Stock scion relationship. Factors affecting successful propagation. Physiology of dwarfing rootstock. Different methods of propagation like division, cutting, layering, budding and grafting, and tissue culture. Containers, media and mixtures. Propagation structures. Nursery act, quarantine and certification. Nutrient management and plant protection measures in nursery. Economics of raising fruit plant nursery.

Practical: Raising of rootstock. Methods to break seed dormancy. Propagation techniques. Training, lifting and packing of nursery plants. Preparation of media and mixtures, and raising nursery in poly bags. Project formulation and valuation of nursery raising.

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SEMESTER-I (HORTICULTURE)

FSC-412

Fundamentals of Fruit Production

Time: 3 Hours

Max. Marks: 100

Theory: 80

Internal assessment 20

Periods per Week: 4+3

Instructions for the paper setters

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Climatic classification of fruits in Punjab & India. Climate as a limiting factor in Horticulture, Principles of orchard planning, selection of site for establishing an orchard. Winter killing and hardiness. Protection of fruit against adverse climatic conditions. Water requirement of fruit crops and factors influencing it. Critical period of water supply, wilting point, wilting coefficient and wilting of fruit plants under field conditions. Factors influencing rate of transpiration and moisture absorption. The response of fruits plants to varying conditions of soil moisture and humidity. Influence on new shoot formation, vegetative growth, yield and fruit development and cropping time and method of irrigation. Orchard soil management methods. Their relation to moisture conservation and nutrient supply. Different types of soils. Nutrients and their availability. Soil improvement and maintenance of organic matter in the soil. Macro and micro elements. Detection of nutrient deficiency in the orchards. Method and time of application, Role of different elements in Horticulture.

Problems of pollination and fruit set. Factors associated with fruit setting and development of fruits.(Internal & External factors). Role of growth regulators in fruit set, fruit development and maturity of fruits.

Pollen viability and germination; stigma receptivity and pollination studies in fruits.

Practical:

Nomenclature and identification of fruit plants, Planning and layout of an orchard, Planting of an orchard, Study of different methods of irrigation of fruit crops, Calculate water requirement of fruit crops, Study of different cultural practices adopted in the orchards, Weeds and their management in fruit crops, Protection of fruit plants against adverse weather conditions, Manuring and fertilization of fruit crops, Identification and management of nutritional deficiencies in fruit crops, Collection of soil and leaf samples for diagnosis of nutritional deficiencies, Study of bearing habits of fruits, Types of inflorescence in fruit crops, Role of growth regulators in fruit plants.

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SEMESTER-II (HORTICULTURE)

FSC-521: Sub-Tropical and Temperate Fruit Production

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Origin, distribution, commercial importance and export potential. Ecophysiological requirements. Species and varieties. Rootstocks and propagation. Planting, root zone, training and pruning. Nutrition and water requirements, fertigation, role of bio- regulators, major pests, diseases, physiological disorders and their control measures. Abiotic factors limiting fruit production. Flowering, pollination and fruit set. Quality improvement. Storage and ripening techniques. Industrial and export potential, Agri. Export Zones (AEZ) and industrial support. Fruit crops-Apple, pear, quince, grapes, plum, peach, apricot, cherries, hazelnut, litchi, loquat, persimmon, kiwifruit, strawberry, walnut, almond, pistachio, pecan, mangosteen, carambola, bael, wood apple, fig, jamun, rambutan and pomegranate.

Practical:

Time: 3 Hours

Description and identification of species and varieties. Growth and development. Growth regulation. Nutritional and physiological disorders and their control. Rejuvenation of old and unproductive trees. Visit to commercial orchards. Project preparation for establishing commercial orchards.

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SEMESTER-II (HORTICULTURE) Breeding of Fruit Crops

FSC-522:
Time: 3 Hours

Max. Marks: 150
Theory: 80
Practical: 40
Internal assessment 20+10=30
Periods per week : 04+6

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Origin and distribution, taxonomical status of species and cultivars. Cytogenetics and genetic resources. Blossom biology, breeding objectives, systems and ideotypes. Crop improvement through introduction, selection, hybridization, mutation breeding, polyploid breeding and rootstock breeding. Improvement of quality traits. Resistance breeding for biotic and abiotic stresses. Biotechnological interventions, achievements and future thrusts in the following selected crops.

Crops: Mango, banana, citrus, grapes, guava, papaya, amla, ber, litchi, jamun, phalsa, apple, pear, peach, plum, almond and strawberry.

Practical:

Time: 3 Hours

Characterization of germplasm. Blossom biology and anthesis. Estimating fertility status. Practices in hybridization, ploidy breeding, mutation breeding, evaluation of biometrical and quality traits. Screening for resistance, developing breeding programme for specific traits. Visit to research stations.

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SEMESTER-II (HORTICULTURE)

FSC-523:

Post Harvest Technology of Fruit Crops

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+6

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Importance and scope. Maturity indices, harvesting practices and grading for specific market requirements. Influence of pre-harvest practices, enzymatic and textural changes, respiration and transpiration. Physiology and biochemistry of fruit ripening, ethylene evolution and its management. Pre-cooling. Factors leading to post-harvest losses. Treatments prior to transportation viz. chlorination, waxing, chemicals, bio-control agents, natural plant products fungicides, hot-water, vapour heat treatment, sulphur fumigation and irradiation. Methods of storage. Physical injuries and disorders during storage. Packing methods and transport. Quality evaluation.

Practical:

Time: 3 Hours

Analyzing maturity stages of commercially important fruit crops, harvesting methods, pre-cooling methods, grading. Pre-harvest and post-harvest application of growth substances, fungicides, nutrients, waxes and hot water treatments, sulphuring. Improved packing and storage of important horticultural commodities. Physiological loss in weight of fruits. Estimation of transpiration, respiration rate, ethylene release. Estimation of quality characteristics in stored fruits. Cold chain management – visit to cold storage and CA storage units.

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SEMESTER-II (HORTICULTURE)

SSC-420: Soil Fertility and Fertilizer Use (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+6

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2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Plant growth – factors affecting, growth equations; Plant nutrients-functions, deficiency symptoms;, content and distribution in soils; Nutrient toxicities nutrient transformations, retention and availability; Nutrient interactions; Nutrient removal by crops; Methods of soil fertility evaluation; Maintenance of soil fertility; Fertilizers and their fate in soils; Crop responses to fertilizers; Fertilizer use efficiency; Principles of time and mode of fertilizer application; integrated use of fertilizers and manures; Nutrient release and carry -over effects; Current fertilizer production and consumption, future trends and needs in India.

Practical:

Time: 3 Hours

Analysis of soils for different forms of nitrogen, phosphorus, potassium and sulphur; Determination of DTPA extractable micronutrients; Plant analysis for nitrogen, phosphorus, potassium, calcium, magnesium and sulphur; Diagnosis and management of nutrient deficiencies and toxicities.

M.Sc. AGRICULTURE

SEMESTER-II (HORTICULTURE)

PBG-420

Principles of Seed Production (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+6

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Importance of Seed production, Certified, foundation and breeder seed production. Maintenance of genetic purity. Seed quality and classes of seed, maintenance and multiplication of pre-release and newly released varieties of self and cross pollinated crops. Seed production in tomato, brinjal, onion, bottle guard, and ridge gourd. Seed certification. Seed Act and its enforcement. Intellectual property rights, patenting, WTO, plant breeder rights. Principles and methods of seed drying. Seed processing. Planning and layout seed processing plant. Different upgrading equipments and their use. Seed testing procedures for quality assessment. Seed treatment and its importance. Seed packing and storage. Seed marketing and organizational setup.

Practical:

Time: 3 Hours

Seed sampling principles and procedures. Determination of physical purity, germination, moisture, viability, seed health, seed vigour of crops. Seed dormancy and breaking methods. Visit to seed production plots testing laboratories and hybrid seed production farms.

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SEMESTER-II (HORTICULTURE)

STA-425: Experimental Designs for Research Workers

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the Paper Setters:

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2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Note: Students are allowed to use scientific calculator in University examinations; statistical tables will be provided to students in examinations. No rigorous mathematical proofs are expected from students; stress will be on application only.

Theory

Need for designing of experiments- characteristics of a good design, basic principles- randomization, replication and local control, uniformity trials- size and shape of plots and blocks, analysis of variance and interpretation of data, completely randomized, randomized block and latin square design, multiple comparison tests, factorial experiments- interpretation of main effects and interactions, orthogonality and partitioning of degrees of freedom confounding in 2^3 , 2^4 and 3^3 designs, split and strip plot designs, crossover designs and balanced incomplete block designs, response surface designs, switch over trials and long term experiments; Selection of experimental design, mechanical errors in field experiments and methods of reducing it, presentation of research results.

Practical:

Time: 3 Hours

cross over and balanced incomplete block designs.

Note: Students shall be trained to use computer to analysis the data, using available software's. However, during university examination students are allowed to use scientific calculators to analysis is the data.

M.Sc. AGRICULTURE

SEMESTER-II (HORTICULTURE)

***FSC-421**

Commercial Fruit Production

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per Week 4+6

Instructions for the paper setters

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Importance and uses, botany, flowering and fruiting, climate and soil, promising varieties, horti-agri techniques, production, plant protection measures and special problems in fruits such as citrus, mango, guava, apple, pear, peach, plum, ber, litchi, grapes, pomegranate, papaya, pineapple, phalsa, banana and sapota.

Practical: Identification of species and fruit varieties, training and pruning, maturity standards, harvesting, handling, grading and packing of fruits. Project formulation and valuation of orchard management.

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SEMESTER-II (HORTICULTURE)

***FSC-422 Processing and Value Addition of Horticultural Crops**

Time: 3 Hours

Max. Marks: 100

Theory: 60

Practical: 20

Internal assessment 15+5=20

Periods per Week 4+6

Instructions for the paper setters

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Scope of fruit preservation industry in India, present status, constraints and prospects. Importance, principles and practices of fruit processing. Maturity indices, harvesting, transportation and quality parameters of fruits. Pre and post harvest factors affecting processing quality of fruits. Commercial processing technologies for fruits like mango, citrus, guava, grapes, ber, apple, pear, peach, plum, phalsa, litchi, pomegranate and papaya etc. Packing technology for export and value addition.

Practical:

Judging of maturity of different fruits. Methods of preparation of jam, jelly, ready to serve, squash, nectar, canning, chutney, pickle and marmalade etc. Packing technologies. Drying and dehydration of fruits. Visit to local processing unit.

M.Sc. AGRICULTURE

SEMESTER-III (HORTICULTURE)

FSC-531: Principles and Practices of Plant Propagation.

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

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1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
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5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Introduction, life cycles 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. Progeny orchard and scion bank. Micro-propagation - in vitro clonal propagation, direct organogenesis, embryogenesis, micrografting and Meristem culture. Hardening, packing and transport of micro-propagules. Nursery structures.

Practical:

Time: 3 Hours

Anatomical studies in rooting of cutting and graft union. Propagation structures. Use of media and PGR. Micropropagation and hardening of plants. Explant preparation, media preparation, culturing in vitro, clonal propagation, meristem culture, shoot tip culture, axillary bud culture., Micro grafting and hardening. Visit to TC labs and nurseries.

M.Sc. AGRICULTURE

SEMESTER-III (HORTICULTURE)

FSC-532.:

Plant Growth Regulators in Fruit Crops

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

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5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

History, nomenclature, role and physiological effects of plant growth regulators in fruit crops; Methods of application of growth regulators; Methods of isolation and estimation; Mechanism of action; Role of plant regulators in plant propagation, seed dormancy, apical dominance, rooting of cutting, flower initiation, fruit set and fruit development; flower and fruit thinning, parthenocarpy, fruit drop and induced fruit abscission, fruit ripening and quality improvement in fruit crops.

Practical:

Preparation of growth regulator solutions; Methods of application; Application in plant propagation, prevention of flower and fruit drop; induction of parthenocarpy, fruit set, fruit thinning, fruit ripening and quality improvement; Isolation and bioassays for the estimation of plant regulators.

M.Sc. AGRICULTURE

SEMESTER-III (HORTICULTURE)

SSC-430

Fertilizer Technology (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Fertilizer industry in India; Raw materials; Manufacture of different types of fertilizers including reactions and flow diagrams; Granulation, segregation, caking, drying and cooling of fertilizers; Complex, mixed, liquid, suspension and slow release fertilizers; Production of fertilizers containing secondary and micronutrients; Changing trends in fertilizer technology.

Practical:

Collection of soil and fertilizer samples; Preparation of standard solutions. Colorimetric and flame photometric methods; Analysis of soil for fertilizer recommendations and suitability for orchard plantation; Gypsum and lime requirements of soil; Analysis of fertilizer for quality control; Planning and formulation of project on establishment of soil and fertilizer testing laboratories. Visit to fertilizer factories.

M.Sc. AGRICULTURE

SEMESTER-III (HORTICULTURE)

PFE-430

Protected Cultivation

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Objectives, Importance and scopes of protected cultivation; Principles used in protected cultivation; Regulatory structures/ glass houses; Effect of different factors such as temperature, light, CO₂ and humidity on growth of different vegetables; fertigation, nursery raising under protected structures like poly tunnels; Types of green house, glass houses, hot beds, cold frames, poly houses; Different media for growing nursery under cover; Specific technology for raising tomato, sweet pepper, cucumber and other vegetables in green house; Insect and disease management in green house; Economics of protected cultivation; Types of benches and containers, training and staking in green house; Soil less culture, (hydroponics); Manipulation of CO₂, light and temperature for timing vegetable crop production; Problems of growing vegetables under green house and their remedies; Suitability of crops and varieties/ Genotypes for growing under green house and poly houses; Use of glass/green house for seed production; Practical use of growing vegetables under forced conditions.

Practical:

Study of various types of structures, methods to control temperature, CO₂, light, demonstration for sanitation, media hydroponics, maintenance of parental lines and hybrid seed production in the glass house, fertigation and nutrient management control of disease and insect pest in glass house; visit to established green houses in the region.

M.Sc. AGRICULTURE

SEMESTER-III (HORTICULTURE)

BOT-430

Physiology of Growth and Development

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Concepts of growth, differentiation and pattern formation; growth curves, meristems, growth kinetics, factors affecting growth and general aspects of development, level of differentiation, control of development at genetic level. Hormones and growth regulators - auxins, gibberellins, cytokinins, ethylene, ABA, other inhibitors, retardants, polyamines, aliphatic alcohols, brassins, hormonal regulation of growth and development, plant movements; photoperiodism, phytochrome, flowering hormones, vernalization, abscission, ageing, senescence; physiology of seed and fruit development; seed germination; seed and bud dormancy. Plant physiology and agriculture.

Practical:

Experiments on growth measurements, hormonal bioassays, plant movements; experiments on quality of light on seed germination, breaking of dormancy. Experiments on photoperiodism. Experiments on hormonal regulation of development.

M.Sc. AGRICULTURE

SEMESTER-III (HORTICULTURE)

CREDIT SEMINAR

**Total Marks: 100
Periods per week: 03**

M.Sc. AGRICULTURE

SEMESTER-IV (HORTICULTURE)

FSC-541:

Citriculture

Time: 3 Hours

Max. Marks: 100

Theory: 60

Practical: 20

Internal assessment 15+5=20

Periods per week :4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Origin, distribution and commercial importance: Important cultivated species and varieties: Propagation and rootstocks climatic and soil requirements: Training and pruning: Intercropping and weed control. Fertilization and irrigation: Physiological and pathological disorder and their control: Harvesting and handling of fruits.

Practical:

Time: 3 Hours

Description and identification of different citrus species and cultivars: Training and pruning: study of various stionic combinations: identification of rootstocks through chemical test: weed control: control of fruit drop: nutritional disorders: Quality analysis: fertilization and irrigation.

M.Sc. AGRICULTURE

SEMESTER-IV (HORTICULTURE)

FSC-542: Orchard Floor Management and Organic Agriculture

Time: 3 Hours

Max. Marks: 150

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week : 04+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Soil quality and its management for orchard plantation. Effect of soil organic matter on physico-chemical characteristics of the soil. Moisture conservation and water requirement for fruit crops. Principles, methods and scheduling of irrigation. Principles and status of organic horticulture. Organic farming systems. Organic inputs and their role. EM technology and its impact. Indigenous practices of sustainable soil fertility, weed management and biological/natural control of pests and diseases. Fruit quality improvement. Good Agricultural Practices (GAP), HACCP and certification of organic products. Standards evolved by different agencies. Constraints in certification, organic horticulture and export.

Practical:

Different methods of irrigation. Mulching and weed control in orchards. Determination of soil organic matter. Inter-cropping exercise. Input analysis of manures. Bio-composting, biofertilizers and their application. Methods of preparation of organic manures. EM technology and products. Biological/natural control of pests and diseases. Soil solarization. Case studies. Residue analysis in organic products and documentation.

M.Sc. AGRICULTURE

SEMESTER-IV (HORTICULTURE)

RESEARCH WORK

Total Marks: 250

Periods per week: 04