M.Sc. AGRICULTURE

SEMESTER-I (VEGETABLE SCIENCE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	VSC-511	Production Technology of Warm Season Vegetable Crops	4	3	80	40	20	10	100	50	150
2	VSC-512	Growth & Development of Vegetable Crops	4	6	80	40	20	10	100	50	150
3	VSC-513	Systematics of Vegetable Crops	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.	*VSC-413	Commercial Vegetable Production									NC
7.	*VSC-414	Vegetable Breeding and Seed 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.

M.Sc. AGRICULTURE

SEMESTER-II (VEGETABLE SCIENCE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	VSC-521	Production Technology of Cool Season Vegetable Crops	4	3	80	40	20	10	100	50	150
2	VSC-522	Breeding of Vegetable Crops	4	6	80	40	20	10	100	50	150
3	VSC-523	Production Technology of Underexploited Vegetable 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.	*VSC-423	Forcing Techniques in Vegetable 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.

M.Sc. AGRICULTURE

SEMESTER-III (VEGETABLE SCIENCE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment		Total Marks		Grand Total
			Th.	Prac	Th.	Prac	Th	Prac	Th	Prac	
1	VSC-531	Fundamentals of Processing of Vegetables	4	3	80	40	20	10	100	50	150
2	VSC-532	Protected Cultivation of Vegetable Crops	4	6	80	40	20	10	100	50	150
3	SSC-430 / AGM-430// BOT-430 (Minor)	Fertilizer Technology / / Fundamentals of Agroclimatology/ 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**

M.Sc. AGRICULTURE

SEMESTER-IV (VEGETABLE SCIENCE)

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Prac	Th	Prac	
1	VSC-541	Seed Certification, Processing and Storage of Vegetable Crops	4	3	60	20	15	05	75	25	100
2.	VSC-542	Organic Vegetable Production Technology	4	3	60	20	15	05	75	25	100
3		Research Work (Four Periods per Teacher Per Student)		4		250				250	250
		Total	**08**	**07**	**120**	**290**	**30**	**10**	**150**	**300**	**450**

M.Sc. AGRICULTURE

SEMESTER-I

(VEGETABLE SCIENCE)

VSC-511 Production Technology of Warm Season Vegetable Crops

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:

Introduction, botany and taxonomy, climatic and soil requirements, commercial arieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological isorders, harvesting, post harvest management, plant protection measures, economics of crop production and seed production of:

UNIT I

Tomato, eggplant, hot and sweet peppers

UNIT II

Okra, beans, cowpea and clusterbean

UNIT III

Cucurbitaceous crops

UNIT IV

Tapioca and sweet potato

UNIT V

Green leafy warm season vegetables

Practical:

Cultural operations (fertilizer application, sowing, mulching, irrigation, weed control) of summer vegetable crops and their economics; study of physiological disorders and deficiency of mineral elements, preparation of cropping schemes for commercial farms; experiments to demonstrate the role of mineral elements, physiological disorders; plant growth substances and herbicides; seed extraction techniques; identification of important pests and diseases and their control; aturity standards; economics of warm season vegetable crops.

M.Sc. AGRICULTURE

SEMESTER-I
(VEGETABLE SCIENCE)

VSC-512 Growth And Development Of Vegetable 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:

UNIT I

Cellular structures and their functions; definition of growth and development, growth analysis and its importance in vegetable production.

UNIT II

Physiology of dormancy and germination of vegetable seeds, tubers and bulbs; Role of auxins, gibberellilns, cyktokinins and abscissic acid; Application of synthetic hormones, plant growth retardants and inhibitors for various purposes in vegetable crops; Role and mode of action of morphactins, antitranspirants, anti-auxin, ripening retardant and plant stimulants in vegetable crop production.

UNIT III

Role of light, temperature and photoperiod on growth, development of underground parts, flowering and sex expression in vegetable crops; apical dominance.

UNIT IV

Physiology of fruit set, fruit development, fruit growth, flower and fruit drop; parthenocarpy in vegetable crops; phototropism, ethylene inhibitors, senescence and abscission; fruit ripening and physiological changes associated with ripening.

UNIT V

Plant growth regulators in relation to vegetable production; morphogenesis and tissue culture techniques in vegetable crops.

Practical:

Preparation of solutions of plant growth substances and their application; experiments in reaking and induction of dormancy by chemicals; induction of parthenocarpy and fruit ripening; pplication of plant growth substances for improving flower initiation, changing sex expression in cucurbits and checking flower and fruit drops and improving fruit set in solanaceous vegetables; growth analysis techniques in vegetable crops

M.Sc. AGRICULTURE

SEMESTER-I

(VEGETABLE SCIENCE)

VSC-513 **Systematics Of Vegetable Crops**

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:

UNIT I

Principles of classification; different methods of classification; salient features of international code of nomenclature of vegetable crops.

UNIT II

Origin, history, evolution and distribution of vegetable crops, botanical description of families, genera and species covering various tropical, subtropical and temperate vegetables.

UNIT III

Cytological level of various vegetable crops; descriptive keys for important vegetables.

UNIT IV

Importance of molecular markers in evolution of vegetable crops; molecular markers as an aid in characterization and taxonomy of vegetable crops.

Practical:

Identification, description, classification and maintenance of vegetable species and varieties; survey, collection of allied species and genera locally available; methods of preparation of herbarium and specimens.

M.Sc. AGRICULTURE

SEMESTER-I

(VEGETABLE SCIENCE)

SSC-410 Soil Chemistry and Bio Chemistry (Minor)

Time: 3 Hours **Max. Marks: 150**

Theory: 80

Practical: 40

Internal assessment 20+10=30

Periods per week: 04+06

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:

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:

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.

M.Sc. AGRICULTURE

SEMESTER-I

(VEGETABLE SCIENCE)

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

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.

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

Probability and fitting of standard frequency distributions, sampling techniques, sampling distributions, mean and standard error, simple partial, multiple and intraclass 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 call frequencies, transformation of data.

Practical:

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 softwares. However, during university examination students are allowed to use scientific calculators to analysis is the data.

M.Sc. AGRICULTURE

SEMESTER-I

(VEGETABLE SCIENCE)

***VSC-413 Commercial Vegetable 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:

Role of soil, climatic and agronomic factors in vegetable production. Principles of cultivation including direct sowing, nursery management, transplanting, hardening of seedlings and vegetable forcing. Weeds and their control. Rotation and Intercropping in vegetable crops. Export potentiality, postharvest handling, processing, storage and marketing of vegetables.

Practical:

Sowing and transplanting of vegetable crops. Effect of soil conditions on seedling emergence and plant growth. Nutrient deficiency symptoms. Common weeds, their identification and control. Project formulation and evaluation for vegetable nursery production and vegetable forcing techniques.

M.Sc. AGRICULTURE

SEMESTER-I

(VEGETABLE SCIENCE)

***VSC-414 Vegetable Breeding and Seed 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:

Scope of vegetable breeding and seed production. Origin, floral biology and breeding systems in vegetable crops. Germplasm resources. Principles and methods of breeding self-pollinated, often cross-pollinated and cross- pollinated vegetable crops. Plant introduction, selection, hybridization, population improvement, mutation and polyploidy. Seed production of conventional varieties. Production of F1 hybrids using male sterility, self-incompatibility, various sex-forms etc. Methods of production of nucleus, breeder, foundation and certified seeds isolation, pollination, seed harvesting, processing and storage. Seed testing and certification. Seed Act. Vegetable seed industry and its problems.

Practical:

Study of inflorescence and flower structures. Practice in emasculation and artificial pollination. Inspection and rouging. Testing of seeds for purity and germination. Project formulation and evaluation for seed production of vegetable crops.

M.Sc. AGRICULTURE

SEMESTER-II

(VEGETABLE SCIENCE)

VSC-521 Production Technology of Cool Season Vegetable Crops

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:

Introduction, botany and taxonomy, climatic and soil requirements, commercial arieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection measures and seed productionof:

UNIT I

Potato

UNIT II

Cole crops: cabbage, cauliflower, knoll kohl, sprouting broccoli, Brussels sprout

UNIT III

Root crops: carrot, radish, turnip and beetroot

UNIT IV

Bulb crops: onion and garlic

UNIT V

Peas and broad bean, green leafy cool season vegetables

Practical:

Cultural operations (fertilizer application, sowing, mulching, irrigation, weed control) of winter vegetable crops and their economics; Experiments to demonstrate the role of mineral elements, plant growth substances and herbicides; study of physiological disorders; preparation of cropping scheme for commercial farms; visit to commercial greenhouse/polyhouse.

M.Sc. AGRICULTURE

SEMESTER-II

(VEGETABLE SCIENCE)

VSC-522 **Breeding Of Vegetable 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:

Origin, botany, taxonomy, cytogenetics, genetics, breeding objectives,breeding methods introduction, selection, hybridization, mutation), varieties and varietal characterization, esistance breeding for biotic and abiotic stress, quality improvement, molecular marker, genomics, marker assisted breeding and QTLs, biotechnology and their use in breeding in vegetable crops-Issue of patenting, PPVFR act.

UNIT I

Potato and tomato

UNIT II

Eggplant, hot pepper, sweet pepper and okra

UNIT III

Peas and beans, amaranth, chenopods and lettuce

UNIT IV

Gourds, melons, pumpkins and squashes

UNIT V

Cabbage, cauliflower, carrot, beetroot, radish, sweet potato and tapioca

Practical:

Selection of desirable plants from breeding population observations and analysis of various qualitative and quantitative traits in germplasm, hybrids and segregating generations; induction of flowering, palanological studies, selfing and crossing techniques in vegetable crops; hybrid seed production of vegetable crops in bulk. screening techniques for insect-pests, disease and environmental stress resistance in above mentioned crops, demonstration of sib-mating and mixed population; molecular marker techniques to identify useful traits in the vegetable crops and special breeding techniques. Visit to breeding blocks.

M.Sc. AGRICULTURE

SEMESTER-II
(VEGETABLE SCIENCE)

VSC-523 Production Technology of Underexploited Vegetables Crops

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:

Introduction, botany and taxonomy, 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, arvesting, post harvest management, plant protection measures and seed production of:

UNIT I

Asparagus, artichoke and leek

UNIT II

Brussels's sprout, Chinese cabbage, broccoli, kale and artichoke.

UNIT III

Amaranth, celery, parsley, parsnip, lettuce, rhubarb, spinach, basella, bathu (chenopods) and chekurmanis.

UNIT IV

Elephant foot yam, lima bean, winged bean, vegetable pigeon pea, jack bean and sword bean.

UNIT V

Sweet gourd, spine gourd, pointed gourd, Oriental pickling melon and little gourd (kundru).

Practical:

Identification of seeds; botanical description of plants; layout and planting; cultural practices; short-term experiments of underexploited vegetables.

M.Sc. AGRICULTURE

SEMESTER-II

(VEGETABLE SCIENCE)

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

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:

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:

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
(VEGETABLE SCIENCE)

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, brinzal, 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:

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

M.Sc. AGRICULTURE

SEMESTER-II
(VEGETABLE SCIENCE)

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:

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.

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

(VEGETABLE SCIENCE)

***VSC-423 Forcing Techniques in Vegetable Production**

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:

Objectives, importance and scope of protected cultivation. Nursery raising techniques. Environmental factors. Vegetable growing media. Irrigation and fertigation. Sustainable land use systems. Maximizing and use efficiency i-protected structures. Problems of growing vegetables in protected structures,. Soil sterilization techniques. Hydroponics cultivation. . Pest management in green house/glass house. Crops and varieties suitable for protected cultivation. Specific technology for raising tomato, sweet pepper, cucumber and high value crops in off season. Cladding material for protected structures -use of mulches. Seed production of vegetables.

Practical: **Time: 3 Hours**

Study of various types of structures. Methods to control temperature, CO2, light. Demonstration for sanitation measures. Hydroponics. Maintenance of parental lines and hybrid seed production in glasshouse. Fertigation and nutrient management. Control of diseases and insect pests in glasshouse. Visit to established greenhouses in the region.

M.Sc. AGRICULTURE

SEMESTER-III
(VEGETABLE SCIENCE)

VSC-531 **Fundamentals Of Processing Of Vegetables**

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:

UNIT I

History of food preservation. Present status and future prospects of vegetable preservation industry in India.

UNIT II

Spoilage of fresh and processed horticultural produce; biochemical changes and enzymes associated with spoilage of horticultural produce; principal spoilage organisms, food poisoning and their control measures. Role of microorganisms in food preservation.

UNIT III

Raw materials for processing. Primary and minimal processing; processing equipments; Layout and establishment of processing industry, FPO licence. Importance of hygiene; Plant sanitation.

UNIT IV

Quality assurance and quality control, TQM, GMP. Food standards – FPO, PFA, etc. Food laws and regulations.

UNIT V

Food safety – Hazard analysis and critical control points (HACCP). Labeling and labeling act, nutrition labeling.

UNIT VI

Major value added products from vegetables. Utilization of byproducts of vegetable processing industry; Management of waste from processing factory.

UNIT VII

Investment analysis. Principles and methods of sensory evaluation of fresh and processed vegetables.

Practical:

Study of machinery and equipments used in processing of horticultural produce; Chemical analysis for nutritive value of fresh and processed vegetables; Study of different types of spoilages in fresh as well as processed horticultural produce; Classification and identification of spoilage organisms; Study of biochemical changes and enzymes associated with spoilage; Laboratory examination of vegetable products; Sensory evaluation of fresh and processed vegetables; Study of food standards – National, international, CODEX Alimentarius; Visit to processing units to study the layout, equipments, hygiene, sanitation and residual / waste management.

M.Sc. AGRICULTURE

SEMESTER-III

(VEGETABLE SCIENCE)

VSC-532 Protected Cultivation Of Vegetable 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

Crops: Tomato, capsicum, cucumber, melons and lettuce

UNIT I

Importance and scope of protected cultivation of vegetable crops; principles used in protected cultivation, energy management, low cost structures; training methods; engineering aspects.

UNIT II

Regulatory structures used in protected structures; types of greenhouse/polyhouse/nethouse, hot beds, cold frames, effect of environmental factors, *viz.* temperature, light, CO_2 and humidity on growth of different vegetables, manipulation of CO_2, light and temperature for vegetable production, fertigation.

UNIT III

Nursery raising in protected structures like poly-tunnels, types of benches and containers, different media for growing nursery under cover.

UNIT IV

Regulation of flowering and fruiting in vegetable crops, technology for raising tomato, sweet pepper, cucumber and other vegetables in protected structures, training and staking in protected crops, varieties and hybrids for growing vegetables in protected structures.

UNIT V

Problem of growing vegetables in protected structures and their remedies, insect and disease management in protected structures; soil-less culture, use of protected structures for seed production.

Practical:

Study of various types of structures, methods to control temperature, CO_2 light, media, training and pruning, maintenance of parental lines and hybrid seed production of vegetables, fertigation and nutrient management, control of insect-pests and disease in greenhouse; economics of protected cultivation, visit to established green/polyhouse/net house/shade house in the region.

M.Sc. AGRICULTURE

SEMESTER-III

(VEGETABLE SCIENCE)

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

(VEGETABLE SCIENCE)

AGM-430 Fundamentals of Agroclimatology (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:

Survey of the atmosphere; introduction to basic meteorological processes; nature, receipt and disposal of solar radiation; Atmospheric humidity and forms condensation; Evaporation and evapotranspiration ; Winds, air masses and disturbance ;influence of climate on plants, animals and pests; Meterological droughts; indices in agroclimatrology ; Agroclimatic classifications and their application; field climate modification.

Practical:

Meteorological instruments and their use in the measurement of agroclimatic environment; Measurement of field climate; Computation of agroclimatic indices-GDD, PTU, PET etc; Determining crop production sensitivity to weather.

M.Sc. AGRICULTURE

SEMESTER-III

(VEGETABLE SCIENCE)

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
(VEGETABLE SCIENCE)

CREDIT SEMINAR

Total Marks: 100
Periods per week: 03

M.Sc. AGRICULTURE

SEMESTER-IV

(VEGETABLE SCIENCE)

VSC-541: Seed Certification, Processing and Storage of Vegetable Crops

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:

UNIT I

Seed certification, objectives, organization of seed certification, minimum seed certification standards of vegetable crops, field inspection,specification for certification.

UNIT II

Seed processing, study of seed processing equipments seed cleaning and upgrading, Seed packing and handling, equipment used for packaging of seeds, procedures for allocating lot number.

UNIT III

Pre-conditioning, seed treatment, benefits, types and products, general principles of seed storage, advances in methods of storage, quality control in storage, storage containers, seed longevity and deterioration, sanitation, temperature and relative humidity control.

UNIT IV

Seed testing; ISTA rules for testing, moisture, purity germination, vigor test, seed sampling, determination of genuineness of varieties, seed viability, seed health testing; seed dormancy and types of dormancy, factors responsible for dormancy.

UNIT V

Seed marketing, demand forecast, marketing organization, economics of seed production; farmers' rights, seed law enforcement, seed act and seed policy.

Practical

Seed sampling, purity, moisture testing, seed viability, seed vigor tests, seed health testing, seed cleaning, grading and packaging; handling of seed testing equipment and processing machines; seed treatment methods, seed priming and pelleting; field and seed inspection, practices in rouging, seed storage, isolation distances, biochemical tests, visit to seed testing laboratories and processing plants, mixing and dividing instruments, visit to seed processing unit and warehouse visit and know about sanitation standards.

M.Sc. AGRICULTURE

SEMESTER-IV

(VEGETABLE SCIENCE)

VSC-542 Organic Vegetable Production Technology

Time: 3 Hours **Max. Marks: 100**

Theory: 60

Practical: 20

Internal assessment 15+5=20

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:

UNIT I

Importance, principles, perspective, concept and component of organic production of vegetable crops.

UNIT II

Organic production of vegetables crops, *viz.*, solanaceous crops, cucurbits,cole crops, root and tuber crops.

UNIT III

Managing soil fertility, pests and diseases and weed problems in organic farming system; crop rotation in organic horticulture; processing and quality control for organic foods.

UNIT IV

Methods for enhancing soil fertility, mulching, raising green manure crops. Indigenous methods of compost, Panchagavvya, Biodynamics, preparation etc Pest and disease management in organic farming; ITK's in organic farming. Role of botanicals and bio-control agents.

UNIT V

GAP and GMP- Certification of organic products; organic production and export - opportunity and challenges.

Practical:

Method of preparation of compost, vermicomposting, biofertilizers, soil solarization, bio pesticides in horticulture, green manuring, mycorrhizae and organic crop production, waster management, organic soil amendment for root disease, weed management in organic horticulture. Visit to organic fields and marketing centers.

M.Sc. AGRICULTURE

SEMESTER-IV

(VEGETABLE SCIENCE)

RESEARCH WORK

Total Marks: 250
Periods per week: 04