B.Sc. Agriculture (Horticulture)

[4-Year, 8- Semester]

CHOICE BASED CREDIT SYSTEM (CBCS)

Effective from Academic Year 2017-2018

HIMALAYAN GARHWAL UNIVERSITY

POKHRA, PAURI, GARHWAL
UTTARAKHAND .

DEPARTMENT OFAGRICULTURE (HORTICULTURE)

HIMALAYAN GARHWAL UNIVERSITY POKHRA, PAURI, GARHWAL, Uttarakhand, India

Course Curriculum for B. Sc.Agriculture (Horticulture), 2017-18 under CBCS Course offered

Course no.	Paper Title	Total marks	Theory marks		Credits
			Internal	External	
Semester I					
Core					
BAGT101	Fundamentals of Soil Science	**100**	**30**	**70**	**2**
BAGP101	Fundamentals of Soil Science	**100**	**-**	**100**	**1**
BAGT102	Principles of Crop Production	**100**	**30**	**70**	**2**
BAGP102	Principles of Crop Production	**100**	**-**	**100**	**1**
BAGT103	Fundamentals of Horticulture	**100**	**30**	**70**	**2**
BAGP103	Fundamentals of Horticulture	**100**	**-**	**100**	**1**
BAGT104	Introductory Plant Pathology	**100**	**30**	**70**	**2**
BAGP104	Introductory Plant Pathology	**100**	**-**	**100**	**1**
Ability Enhancement Compulsory Course (AECC)					
BAGT105	Structural and Spoken English	**100**	**30**	**70**	**1**
BAGP105	Structural and Spoken English	**100**	**-**	**100**	**1**
Elective					
Student has to earn 7 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.					
BAGT106	Elementary Statistics and Applied Mathematics	**100**	**30**	**70**	**1**
BAGP106	Elementary Statistics and Mathematics	**100**	**--**	**100**	**1**
BAGT107	Elements of Genetics	**100**	**30**	**70**	**1**
BAGP107	Elements of Genetics	**100**	**-**	**100**	**1**
BAGT108	Rural Sociology and Educational Psychology	**100**	**30**	**70**	**1**
BAGP108	Rural Sociology AndEducational Psychology		**-**	**100**	**1**
BAGP109	Physical Education/Yoga	**100**	**-**	**100**	**1**

Total Credit to earn in the semester I

Core	AECC	SEC	Elective	Total
12	**2**	**-**	**7**	**21**

Theory and practical are linked to each other ----In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

T- Theory

P-Practical

Course no.	Paper Title	Total	Theory marks	Credits

		marks	Internal	External	

Semester II

Core

BAGT201	Elementary Plant Biochemistry and Chemistry of Plant Products	**100**	**30**	**70**	**3**
BAGP201	Elementary Plant Biochemistry and Chemistry of Plant Products	**100**	**-**	**100**	**1**
BAGT202	Elementary Crop Physiology	**100**	**30**	**70**	**3**
BAGP202	Elementary Crop Physiology	**100**	**-**	**100**	**1**
BAGT203	Introduction to Agricultural and Natural Resource Economics and Farm Management Economics	**100**	**30**	**70**	**3**
BAGP203	Introduction to Agricultural and Natural Resource Economics and Farm Management Economics	**100**	**-**	**100**	**1**

Ability Enhancement Compulsory Course (AECC)

BAGT204	Irrigation and water management	**100**	**30**	**70**	**1**
BAGP204	Irrigation and water management	**100**	**--**	**100**	**1**

Elective

Student has to earn 6 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.

BAGT205	Fundamentals of Extension Education and Rural Development	**100**	**30**	**70**	**1**
BAGP205	Fundamentals of Extension Education and Rural Development	**100**	**-**	**100**	**1**
BAGT206	Agricultural Meteorology	**100**	**30**	**100**	**1**
BAGP206	Agricultural Meteorology	**100**	**-**	**100**	**1**
BAGT207	Introductory Entomology	**100**	**30**	**100**	**1**
BAGP207	Introductory Entomology	**100**	**-**	**100**	**1**

Total Credit to earn in the semester II

Core	AECC	SEC	Elective	Total

12	2	-	7	21

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Course no.	Paper Title	Total marks	Theory marks		Credits
			Internal	External	
Semester III					
Core					
BAGT301	Tropical and Sub tropical Fruits	**100**	**30**	**70**	**2**
BAGP301	Tropical and Sub tropical Fruits	**100**	**-**	**100**	**1**
BAGT302	Weed Management in Horticultural Crops	**100**	**30**	**70**	**1**
BAGP302	Weed Management in Horticultural Crops	**100**	**-**	**100**	**1**
BAGT303	Tropical and Sub tropical Vegetables	**100**	**30**	**70**	**2**
BAGP303	Tropical and Sub tropical Vegetables	**100**	**-**	**100**	**1**
BAGP304	Orchard Management	**100**	**30**	**70**	1
BAGP304	Orchard Management	**100**	**-**	**100**	**1**
BAGP305	Principles of Plant Breeding	**100**	**30**	**70**	**2**
BAGP305	Principles of Plant Breeding	**100**	**-**	**100**	**1**
Skill Enhancement	**Compulsory Course (SEC)**				
BAGT306	Propagation and Nursery Management	**100**	**30**	**70**	**1**
BAGP306	Propagation and Nursery Management	**100**	**--**	**100**	**1**

Elective

Student has to earn 6 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.

BAGT307	Fundamentals of Entomology & Nematology	**100**	**30**	**70**	**1**
BAGP307	Fundamentals of Entomology & Nematology	**100**	**-**	**100**	**1**
BAGT308		**100**	**30**	**70**	**1**

BAGP308			**-**	**100**	**1**
BAGT309	Fundamentals of Plant Pathology	**100**	**30**	**100**	**1**
BAGP309	Fundamentals of Plant Pathology	**100**	**-**	**100**	**1**

Total Credit to earn in the semester III

Core	AECC	SEC	Elective	Total
13	-	2	6	21

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Course no.	Paper Title	Total marks	Theory marks		Credits
			Internal	External	
Semester IV					
Core					
BAGT401	Spices and Condiments	**100**	**30**	**70**	**1**
BAGP401	Spices and Condiments	**100**	**-**	**100**	**1**
BAGT402	Temperate Fruits	**100**	**30**	**70**	**2**
BAGP402	Temperate Fruits	**100**	**-**	**100**	**1**
BAGT403	Ornamental Horticulture	**100**	**30**	**70**	**2**
BAGP403	Ornamental Horticulture	**100**	**-**	**100**	**1**
BAGP404	Water Management in Horticultural Crops	**100**	**30**	**70**	1
BAGP404	Water Management in Horticultural Crops	**100**	**-**	**100**	**1**
BAGP405	Plantation Crops	**100**	**30**	**70**	**2**
BAGP405	Plantation Crops	**100**	**-**	**100**	**1**
Skill Enhancement	**Compulsory Course (SEC)**				
BAGT406	Organic Farming	**100**	**30**	**70**	**1**
BAGP406	Organic Farming	**100**	**--**	**100**	**1**

Elective

Student has to earn 6 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.

BAGT407	Breeding of Fruits and Plantation Crops	**100**	**30**	**70**	**1**
BAGP407	Breeding of Fruits and Plantation Crops	**100**	**-**	**100**	**1**
BAGT408	Growth and Development of Horticultural Crops	**100**	**30**	**70**	**1**
BAGP408	Horticultural Crops		**-**	**100**	**1**
BAGT409	Genetic Resources of Horticultural Crops	**100**	**30**	**100**	**1**
BAGP409	Genetic Resources of Horticultural Crops	**100**	**-**	**100**	**1**

Total Credit to earn in the semester IV

Core	AECC	SEC	Elective	Total
13	**-**	**2**	**6**	**21**

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Course no.	Paper Title	Total marks	Theory marks		Credits
			Internal	External	
Semester V					
Core					
BAGT501	Temperate Vegetables	**100**	**30**	**70**	**2**
BAGP501	Temperate Vegetables	**100**	**-**	**100**	**1**
BAGT502	Principles of Landscape Gardening	**100**	**30**	**70**	**1**
BAGP502	Principles of Landscape Gardening	**100**	**-**	**100**	**1**
BAGT503	Farm Power and Machinery	**100**	**30**	**70**	**1**
BAGP503	Farm Power and Machinery	**100**	**-**	**100**	**1**
BAGP504	Diseases of Fruit, Plantation, Medicinal and Aromatic Crops	**100**	**30**	**70**	2
BAGP504	Diseases of Fruit, Plantation, Medicinal and Aromatic Crops	**100**	**-**	**100**	**1**
BAGP505	Insect Pests of Fruit, Plantation, Medicinal & Aromatic Crops	**100**	**30**	**70**	**2**
BAGP505	Insect Pests of Fruit, Plantation, Medicinal & Aromatic Crops	**100**	**-**	**100**	**1**
Skill Enhancement	**Compulsory Course (SEC)**				
BAGT506	Communication Skills & Entrepreneurship Development	**100**	**30**	**70**	**1**
BAGP506		**100**	**--**	**100**	**1**

	Communication Skills & Entrepreneurship Development				

Elective

Student has to earn 6 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.

BAGT507	Soil and Plant Analysis	**100**	**30**	**70**	**1**
BAGP507	Soil and Plant Analysis	**100**	**-**	**100**	**1**
BAGT508	Mushroom Culture	**100**	**30**	**70**	**1**
BAGP508			**-**	**100**	**1**
BAGT509	Fundamentals of Food Technology	**100**	**30**	**100**	**1**
BAGP509	Fundamentals of Food Technology	**100**	**-**	**100**	**1**

Total Credit to earn in the semester V

Core	AECC	SEC	Elective	Total
13	-	2	6	21

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Course no.	Paper Title	Total marks	Theory marks		Credits
			Internal	External	
Semester VI					
Core					
BAGT601	Potato and Tuber crops	**100**	**30**	**70**	**1**
BAGP601	Potato and Tuber crops	**100**	**-**	**100**	**1**
BAGT602	Breeding of Vegetable, Tuber and Spice Crops	**100**	**30**	**70**	**2**
BAGP602	Breeding of Vegetable, Tuber and Spice Crops	**100**	**-**	**100**	**1**
BAGT603	Post harvest Management of Horticultural Crops	**100**	**30**	**70**	**2**
BAGP603	Post harvest Management of Horticultural Crops	**100**	**-**	**100**	**1**
BAGP604	Seed production of Vegetable, tuber and Spice Crops	**100**	**30**	**70**	2
BAGP604	Seed production of Vegetable, tuber and Spice Crops	**100**	**-**	**100**	**1**
BAGP605	Insect Pests of Vegetable, Ornamental and Spice Crops	**100**	**30**	**70**	**2**

BAGP605	Insect Pests of Vegetable, Ornamental and Spice Crops	**100**	**-**	**100**	**1**
Skill Enhancement	**Compulsory Course (SEC)**				
BAGT606	Commercial Floriculture	**100**	**30**	**70**	**1**
BAGP606	Commercial Floriculture	**100**	**--**	**100**	**1**

Elective

Student has to earn 6 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.

BAGT607	Breeding and Seed Production of Ornamental Plants	**100**	**30**	**70**	**1**
BAGP607	Breeding and Seed Production of Ornamental Plants	**100**	**-**	**100**	**1**
BAGT608	Diseases of Vegetable, Ornamentals and Spice Crops	**100**	**30**	**70**	**1**
BAGP608			**-**	**100**	**1**
BAGT609	Protected Horticulture	**100**	**30**	**100**	**1**
BAGP609	Protected Horticulture	**100**	**-**	**100**	**1**

Total Credit to earn in the semester VI

Core	**AECC**	**SEC**	**Elective**	**Total**
14	**-**	**2**	**6**	**22**

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Course no.	**Paper Title**	**Total marks**	**Theory marks**		**Credits**
			Internal	**External**	
Semester VII					
Core					
BAGT701	Processing of Horticultural Crops	**100**	**30**	**70**	**2**
BAGP701	Processing of Horticultural Crops	**100**	**-**	**100**	**1**
BAGT702	Protected Cultivation of High Value Horticultural Crops I. Project preparation	**100**	**30**	**70**	**3**
BAGT703	Nursery Production and Management I. Project preparation	**100**	**-**	**100**	**3**

Skill Enhancement Compulsory Course (SEC)

BAGT704	Horti-Business Management	**100**	**30**	**70**	**2**
Elective **Student has to earn 6 credits from the electives. Student can choose any elective from same department or other department of School of Agriculture & Allied Sciences.**					
BAGP705	Protected Cultivation of High Value Horticultural Crops II. Report writing, presentation and discussion.	**100**	**30**	**70**	**6**
BAGP706	Nursery Production and Management II. Report writing, presentation and discussion.	**100**	**-**	**100**	**6**

Total Credit to earn in the semester VII

Core	AECC	SEC	Elective	Total
09	**-**	**2**	**6**	**17**

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Course no.	Paper Title	Total marks	Theory marks		Credits
			Internal	External	
Semester VIII					
Core					
BAGT801	**Horticultural Work Experience(HWE)** I. Project preparation	**100**	**30**	**70**	**6**
BAGP801	**Horticultural Work Experience(HWE)** II. Field Work	**100**	**-**	**100**	**6**
BAGT702		**100**	**30**	**70**	**6**

Total Credit to earn in the semester VIII

Core	AECC	SEC	Elective	Total
18	-	-	-	18

Theory and practical are linked to each other.
In Theory, One credit = 1 hr
In practical, One credit= 3 hrs

Summary of credits:

SEMESTER	CORE	AECC	SEC	ELECTIVE	TOTAL
I	12	2	-	6	20
II	12	2	-	6	20
III	13	-	2	6	21
IV	13	-	2	6	21
V	13	-	2	6	21
VI	14	-	2	6	22
VII	09	-	2	6	17
VIII	18	-	-	-	18
TOTAL	104	4	10	42	160

Note: Practicals in affiliated colleges/ institute shall be conducted by the university appointed examiner.

Semester-I
Course- I

semester- I **2+1=3**

FUNDAMENTALS OF SOIL SCIENCE

1. Definition of Soil, Components of Soil and their role in agriculture.
2. Soil forming rocks and minerals, Development, of Soil profile, Soil formation, factors affecting soil formation, soil forming processes.
3. Soil reaction and its measurements and significance.
4. Chemistry of clay minerals with special reference to Kaorinite, Montmorillonite and illite.
5. Physical properties of soil and their significance.
6. Chemical properties of soil, cation and anion exchange phenomenon and their importance in agriculture.

7. Soil organic matter, humus formation and its importance in soil fertility, management and maintenance of organic matter in soils.
8. Soil of U.P.&Uttrakhand, classification, distribution, characteristics.
9. Elementary idea of soils of India, occurrence, characteristics, physico-chemical properties of chernozems, podzol and laterite soil.
10. Basic idea of comprehensive system (7th approximation) of soil classification.
11. Occurrence, distribution and functions of Soil Microorganisms. Biological Nitrogen Fixation (Symbiotic and Non symbiotic), Nitrification, Microbial decomposition of organ Matter in soil,
12. Classification and use of Insecticide, Fungicides and herbicides e.g. BHC, DDT, Malathion, 2,4-D.

Practical:

1. Preparation of HCL extract of Soil
2. Determination of FeO, R_2O_3, Ca and P in HCl extract
3. Determination of soil O.M.
4. Estimation of Cl, CO_3, HCO_3 in soil extract
5. Determination of total nitrogen in soil.

Course- II

Semester-I **2+1=3**

PRINCIPLES OF CROP PRODUCTION

1. Definition and scope of Agronomy.
2. Classification of Crops on Different basis.
3. General principles of Crop production: Climate, soil, preparation, seed and sowing, post sowing-tillage, water management, nutrition, plant protection measures, harvesting, threshing and storage.
4. Crop sequences and system with emphasis on mixed cropping and inter cropping.
5. Nutritional management of crops including application of manures, fertilizers and bio-fertilizers.

Practical

1. Study of weather and weather forecasting.

2. Identification of crops, manures and fertilizers.
3. Framing of crop rotations and preparation of cropping schemes for varying agro-climatic conditions.
4. Preparation of seed bed based on important inter-cropping systems.
5. Calculation of fertilizer requirement, fertilizer mixtures and unit values.
6. Methods of fertilizer application.

Course-III

Semester- I **2+1=3**

FUNDAMENTALS OF HORTICULTURE

Introductory knowledge of main branches of horticulture and their importance; Botanical classification of fruits; climatic fruit zones of Uttar Pradesh&Uttrakhand and fruits grown therein; Establishment of orchards; Selection of site, systems of planting; Orchard soil management; Systems of irrigation; Principles of pruning and systems of training of fruit plants; Unfruitfulness, its causes and measures to overcome it; fruit drop, its causes and measures to control it; rejuvenation of orchards, Brief studies of Polyembryony, Parthenocarpy and incompatibility.

Practical

1. Identification of garden tools and plants;
2. Preparation of orchard layouts for different climatic zone of U.P.&Uttrakhand;
3. Practice of propagation of major fruit plants;
4. Preparation and seed beds and raising of seedlings;
5. Practice of lifting and packing of nursery plants;
6. Visit to nurseries, gardens and research stations.

Plant Pathology

Course- IV

Semester- I **2+1=3**

INTRODUCTORY PLANT PATHOLOGY

Definition and importance of plant pathology.Causes of plant diseases.

Classification of plant diseases according to cause and occurrence. Plant Pathogens:

(a) Fungi

Economic importance and general characteristics.

Morphology of different vegetative structures (thallus, mycelium, haustoria etc.) Reproduction

Different types of spores.
Levels of parasitism
Nomenclature

Classification of fungi with special reference to genera listed under following item

Life histories of Pythium, Albugo, Erysiphe, Ustilago, Claviceps and Puccinia.Diagnostic characters of the following genera.Phytophthora, Peronospora,

Sclerospora, Ustilago, Sphacelotheca, Tolyposporium, Melampsora, Alternaria, Cerospora, Fusarium, HelminthosporiumPyricularia, Rhizoctonia, Colletotrichum.

(b) Bacteria:

Brief history of bacteria as plant pathogens.Morphology and Cell structure.

Vegetative reproduction.

Brief outline of classification of plant pathogenic bacteria.A brief account of mycoplasma.

(c) Viruses Nature and properties.
Transmission of plant virus

(d) Phanerogamic parasites: Cuscuta, Loranthus, Orobanche and Striga.

Practical

Temporary slide preparation of representative genera of disease causing fungi for morphological studies

Simple staining of bacteria from milk and curd
Preparation of PDA
Practical record

Viva voce

Course- V

Semester- I **1+1=2**

STRUCTURAL AND SPOKEN ENGLISH

(A) ELEMENTS OF ENGLISH GRAMMER: A REVISION

1. Study and use of Articles: Pronouns and Prepositions.
2. Tenses in English

(B) SENTENCE STRUCTURE

1. Sentence formation
2. Some common varieties of sentence structure (including errors).

(C) READING COMPREHENSION

Six specified lessons from the following text book:

Name : Glimpses of English Prose.

Author : Dr. O.P. Dixit

Publisher : SahityaNiketan, Kanpur

(D) WRITTEN COMMUNICATION

1. Letter and application writing
2. Report writing.

(E) VOCABULARY

1. Synonyms and antonyms
2. One word substitution
3. Affixes, prefixes and suffixes

PRACTICALS

1. Speech mechanism-speech event, production of speech, speech organs.
2. Phonetic sounds and symbols-pure vowels, diphthongs and constants.
3. Stress and intonation-word-accent (syllable, consonant clusters), compound words, word accent in Indian English v/s R.P., rules for accentual patterns.
4. Accent in connected speech-rhythm, weak forms, intonation etc.
5. Listening comprehension
6. Reading comprehension.

Course- VI

Semester- I **1+1=2**

ELEMENTARY STATISTICS AND APPLIED MATHEMATICS STATISTICS

Definition, Aims, Characteristics and Limitations of statistics, Classification and Tabulation of data.

Definition, advantages and disadvantages of Arithmetic Mean, Median, Mode; Geometric Mean, Harmonic Mean and Weighted Mean as measures of central tendency; and Range,

Quartile Deviation, Mean Deviation, Variance, Standard Deviation and Coefficient of variation as measures of dispersion.

Definition of probability, Additive and Multiplicative Laws of probability and simple problems based on them.Definition, merits and demerits of Non-random sampling and Random Sampling.Concept of Standard Error. Basic concepts used in tests of Significance like Null Hypothesis, Degrees of freedom and Level of significance. Definition and uses of z and t-tests in testing significance of difference between two means; F-test in testing equality of two variances and (χ^2= test as a test of independence of attributes in 2×2 contingency table only.

Basic principles of Experimental Design. Description and Analysis of Completely Randomized Design (C.R.D.), Randomized Block Design (R.B.D.) and Latin Square Design (L.S.D.)

MATHEMATICS

Binomial Theorem for positive integral index only.Uses of Natural and common Logarithms.Exponential Series.Limits and Differentiation (Without differentiation by first principles). Differentiation of algebraic, trigonometrically, logarithmic and exponential functions only, Logarithmic differentiation. Differentiation of products, quotients, function of functions, implicit and explicit functions.

Practical

Based on

1. Measures of Central Tendency
2. Measures of Dispersion
3. Tests of Significance
4. Analysis of CRD, RBD and LSD

Course- VII

Semester- I **1+1=2**

ELEMENTS OF GENETICS

1. Definition, significance and historical development in genetics.
2. Mendel's Law's of heredity and exceptions to the laws.
3. Chromosomal theory of inheritance, meiosis and mitosis.
4. Linkage and crossing over - types, mechanism and significance,
5. Nucleic acid as genetic material - structure, replication, genetic code, transcription and

translation.

6. Mutation - spontaneous and induced.
7. Chromosomal changes - molecular, structural and numerical.
8. Multiple factor inheritance and multiple alleles, blood groups in man and body coat colour in rabbits.
9. Sex chromosomes and its determination in man and drosophila, sex linked characters.
10. Cytoplasmic inheritance - plasma and nuclear, gene interaction.

Practical

1. Preparation of temporary cytological slides (mitosis and meiosis)
2. Genetical problems on mono and dihybrid ratios with their modifications.
3. Chi-square test and goodness of fit of Mendelian modified ratios.
4. Practical record
5. Viva-voce

Course-VIII

Semester- I **1+1=2**

RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY

1. Definition and scope of rural sociology.
2. Basic concept of society, community and groups
3. Characteristics and Differences of rural and urban communities
4. Basic rural institutions and their role in Agriculture development.
5. Definition and types of rural leadership and their role.
6. Definition, nature and importance of psychology in the development of human behavior.
7. Meaning of habit and habit development.
8. Basic Psychological concepts; motivation, Social Interaction, Attitudes, Emotions, Prejudices and Social Perception.
9. Personality- definition and development.

Practical

1. Socio-economic survey of village communities.
2. Developing schedules and questionnaires.

3. Practical knowledge about the working of basic rural institutions.
4. Identification of important value systems in the rural setting as a means of social control.
5. Identification of rural personality traits that affect the development of personality in rural situation.

Semester-II

Course- I

Semester- II **3+1=4**

ELEMENTARY PLANT BIOCHEMISTRY AND CHEMISTRY OF PLANT PRODUCTS

Scope of biochemistry.

Carbohydrates - Definition, Classification, Chemistry and Structural formula of the following:-
Monosaccharides - D Glucose, D. fructose, D. Galactose
Oligosaccharides - Sucrose, Maltose, Lactose.
Polysaccharides - Starch, Cellulose, Inulin.

Proteins - definition, classification, composition, important functions Primary and secondary Structure of protein, Biological significance of proteins.

Amino acids - Classification, properties of Amino acids structure of the following amino acids- Glycine, Tryptophan, Aspartic acid, serine, Lysine, Histidine, Methionine, protein; Essential and non-essential amino acids, Nutritional significance of amino acids.

Lipids- Definition, classification, properties and structural formula of the following saturated fatty acids (Butyric acid, caproic acid, palmitic acid, stearic acid) and unsaturated fatty acid (oleic acid, Linolenic acid, erucic acid).

Enzyme - Occurrence, nomenclature, classification, mechanism of action, general properties and factors effecting the rate of enzyme action, co-enzyme-A.

Vitamins - Classification, biochemical functions and structural formula of vitamin A, thiamine, riboflavin, Vit. B_{12} Ascorbic acid, vitamin D.

Phytohormones - Occurrence, structure and functions of important plant growth substances viz. Auxins, gibberellins, cytokinins and Abscisic acid.

Alkaloids - Occurrence, classification, uses general properties and Biological significance of alkaloids. Structural formula of Cocine Nicotine and Papaverine.

Nucleic acid - structural formula of Pyrimidines and Purines, Nucleosides and Nucleotides Watson and crick model of DNA.

Practical

Qualitative test of important sugars, proteins and alkaloids.
Estimation of starch in plants.
Estimation of reducing and non reducing sugars in cane juice and jaggery.
Separation and identification of amino acid by paper chromatography.
Iodometric titration.
Estimation of Diastase enzyme in plants.

Estimation of Ca by EDTA method.

Course- II

Semester- II **2+1=3**

ELEMENTARY CROP PHYSIOLOGY

1- Role of plant physiology in agriculture.
2- Cell structure and function.
3- Physico-chemical phenomenon-diffusion, osmosis and imbibitions.
4- Essential nutrient elements, their role, deficiency symptoms, mineral salt, absorption.
5- Photosynthesis - light and dark reactions. Significance of C_3, C_4 and CAM Pathway.
6- Mechanism of respiration, transpiration
7- Fat metabolism, synthesis of fatty acids, glycerol and their condensation.
8- Assimilation of nitrogen in plants.
9- Plant growth substances, photoperiodism and vernalization.

Practical

1- Experiments on diffusion, osmosis and imbibitions.
2- Determination of transpiration rate by photometers.
3- Extraction of photosynthetic pigments, separation of chlorophyll "a" and "b" and carotenoides.
4- Experiments on factors affecting rate of photosynthesis (CO, light and temperature).
5- Determination of photosynthetic and respiration rates through portable CO_2 gas analyzer.

Course- III

Semester- II **3+1=4**

NATURAL RESOURCE AND FARM MANAGEMENT ECONOMICS

A. Natural Resource Economics

Definition, subject matter and scope of economics.
Micro Economics and Macro Economics within both static and dynamic framework.
Definition, subject matter and significance of agricultural economics.
Primitive and scientific Agriculture. Characteristics and Indian agriculture; major problems including causes of low productivity.
Economic Development, role of agriculture Technological change in agriculture and various inter-relationships.
Task of an economic system, role of economic theory in agriculture.

Production:

Basic production problems production function, productivity curves; relationships thereof, intensity of resource use, law of diminishing returns, output-elasticity, homogeneity in production functions.

Consumption:

Theory of demand, demand curves, consumption function, Elasticity, Utility Analysis, Indifference Curve, Consumer's surplus.

B. Natural Resources

Meaning, Geographical situations, Topography and crops (Agro zones), Temperature and plant growth, Land and land use, cultivable waste land crop rotations, cropping scheme and cropping intensity. Forest- Classification, causes of deforestation. Functions of forests. Forestry programmes of the Indian Government Water Irrigation sources, progress, Misuse of irrigation water. Application of economic laws to irrigation, growth and utilization of irrigation potential, Command Area-meaning and Functions of water Managements. Management of irrigation water. Ongoing projects including watershed management programme. Utilized groundwater resources.

C. Farm Management Economics

Definition and scope of farm economics and management
Farm Management and production economics. Agricultural Economics and industrial Economics-Similarities and differences.
Management decisions and cultivators' holdings. Economic Principles their role in farm management. Application of economic Principles/Laws.
Law of Diminishing, Returns/Principle of variable Proportions laws of return, scale properties, Law of Equi-mangiral Returns, Law of such situation, opportunity cost/opportunity Returns, Law of comparative advantage.
Production Function, productivity curves, least cost combination of inputs, Principle of combining Enterprises Determination of Optimum output.
Cost concepts and Principles, Cost Relationship and curves.
Time Comparison (Compounding and discounting of costs). Allocation of Over-head and command costs.
Profit Maximization. Measures of
form profit. Farm Records and
Accounts.
Methods of valuation and depreciation of assets.
Types of farming: Diversified, General farm, subsistence or Marginal farming, specialized farms, Mixed farming, Ranching and Dry farming.
Systems of farming Cooperative farming, peasant farming, state farming, collective farming, capitalistic farming.
Tools of Farm Management: Farm Budgeting (Complete and partial budgeting) and farm planning, Linear Programming (Graphical method).
Definition of Institute and University: Types of uncertainty in agriculture (Price uncertainty,

yield uncertainty, innovation uncertainty Social and legal frame as a source of uncertainty). Diversification (complementary and supplementary relationships) as a mechanism to minimize uncertainty), crop and cattle insurance, pump set insurance Arguments for and against.

Practical:

Socio-economic survey and collection of data, classification and tabulation with special reference to natural resources of a village.

Study of a farm holding (resources, enterprises, costs, profit and complete farm economy) of the allotted farmer by cost-accounting method.

Preparation of an alternative farm plan for the farmer.
Submission of Report.

Course- IV

Semester- II **1+1=2**

IRRIGATION AND WATER MANAGEMENT

Importance of water in crop production.

Soil Moisture constants.
Estimation of Potential Evapo-transpiration and consumptive use.
Water requirement of crops and factors affecting it.
Approaches of irrigation scheduling.
Systems and methods of irrigation – drip, sprinkler and mist Irrigation.
Quantity and quality of irrigation.
Measurement of irrigation water.
Elementary idea of drainage on farms.

Practical

Measurement of irrigation water.
Determination of soil moisture content and quality of water.
Calculation on consumptive use of water.
Numerical exercises on drainage and irrigation requirement.
Calculation of irrigation water use efficiency

Visit to irrigation and drainage projects.

Course- V

Semester- II **2+1=3**

FUNDAMENTALS OF EXTENSION EDUCATION AND RURAL DEVELOPMENT

1. Extension Education:

Meaning, definition, objectives, Principles, Scope, Philosophy and its distinguishing features.
Extension Teaching and Learning: Teaching, Teaching Elements, steps in Teaching, Learning, Learning Situation, Basic Principles of Teaching and Learning.
Early Extension Efforts in India.
Comparative study of Extension Service in India and USA.

2. Community Development:

Meaning, Definition and objectives of community development.
Organizational set up and Activities of Community development at State, District, Block and Village level.
Extension and Rural Development Programmes: Including T and V system, National Demonstration, IRDP, Jawahar Rojgar Yozana.

3. Extension Programme Planning, Monitoring and Evaluation:

Meaning, Principles and Procedure of Programme Planning.
Definition: purpose, types, criteria and steps involved in monitoring and evaluation.

Practical

Practice in Conducting Survey
Practice in preparing schedule and Questionnaire for studying the organizational set up of community development.
Contact with the farmers and educating them in new technology of Agriculture.
Development programme for a village and a Block.
Preparation of an outline and practice on evaluation of a programme.
Classification, Tabulation and diagrammatic representation of data.
Writing study Reports.

Course-VI

Semester- II **1+1=2**

AGRICULTURAL METEROLOGY

Different meteorological variables related to agriculture.
Rainfall- Hydrologic cycle and its components. Types and forms of precipitation.
Storms, occurrence, variation and measurement of rainfall. Rain gauges, Computation and analyses of data. Plotting of mass curve and rainfall, intensity curve.
Run-off- Definition, types, factors affecting, estimation and measurement of runoff.
Atmosphere - Definition and structure, climate and weather, atmospheric pressure, factors affecting, measurement.
Elementary idea of Insolation, Temperature, kinds and measuring instruments.
evaporation, factors affecting, measurement
Humidity, definition, Wind Vane, Anemo-Meter.
Indian Agro Climatic Zones
Elementary idea of weather forecasting.

Practical

1. Computation of average rainfall.
2. Mass Curve
3. Plotting Barograph for rainfall data.
4. Rainfall intensity curve.
5. Measurement of rainfall by Rain Gauge.
6. Measurement of Atmospheric Pressure.
7. Plotting line graphs for illustrating climatic factor such as temperature.
8. Measurement of Relative Humidity.
9. Study of wind vane and Anemometer.

Measurement of Evaporation by USDA evaporation pan.

Course- VII

Semester- II **1+1=2**

INTRODUCTORY ENTOMOLOGY

General introduction to Phylum-Arthropoda, its various classes and their distinguishing characters.
Insect Morphology : Body wall-structure, composition and functions; Body divisions-Head (Structure and its appendages; structure, functions and modifications of antennae; Mouthparts-Biting and chewing, piercing and sucking, sponging, siphoning, chewing, and lapping); Thorax-its structure and appendages, modifications and functions of legs and wings, wing coupling apparatus and wing venation; Abdomen-its segments and appendages.
Anatomy: Digestive, Excretory, Reproductive, circulatory, respiratory and nervous systems of grass hopper.
Post-embryonic development including ecdysis, instars, types of larvae and pupae. Different types of metamorphosis.
Taxonomy: Insect Classification up to the level of families of agricultural importance of following orders:
Orthoptera : Acrididae;
Isoptera : Termitidae;
Hemiptera : Coreidae, Pyrrhocoreidae, Lophopidae, Aleurodidae, Jassidae, Aphidae, Coccidae.

Coleoptera : Dermestidae, Coccinellidae, Bruchidae Chrysomelidae;
Curculionidae, Tenebrionidae, Scarabaeidae;
Lepidoptera : Gelechiidae, Pyralididae, Noctuidae, Cymbidae, Papilionidae
and Arctiidae.
Hymenoptera : Tenthredinidae and Apidae
Diptera : Trypetidae

Practical

Dissection of Grasshopper for the study of digestive, reproductive and nervous system.
Study and Temporary mounting of external parts of grasshopper.
Identification and comments upon the various Arthropods
Collection and preservation of insects.
Viva-voce and practical records.

Semester III

BAGT301 : Tropical and Sub-Tropical Fruits (2)

Horticultural classification of fruits including genome classification. Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning. Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Physiological disorders. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, bael, banana, grapes, citrus, papaya, sapota, guava, pineapple, jackfruit, avocado, mangosteen, litchi, carambola, durian and passion fruit. Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures. Seediness and kokkan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production. Rainfed horticulture, importance and scope of arid and semi-arid zones of India. Characters and special adaptation of crops: ber, aonla, annona, jamun, wood apple, bael, pomegranate, carissa, date palm, phalsa, fig, west Indian cherry and tamarind.

BAGP301: Tropical and Sub-Tropical Fruits (1)

Description and identification of varieties based on flower and fruit morphology in above crops. Training and pruning of grapes, mango, guava and citrus. Selection of site and planting system, pre-treatment of banana suckers, desuckering in banana, sex forms in papaya. Use of plastics in fruit production. Visit to commercial orchards and diagnosis of maladies. Manure and fertilizer application including bio-fertilizer in fruit crops, preparation and application of growth regulators in banana, grapes and mango. Seed production in papaya, latex extraction and preparation of crude papain. Ripening of fruits, grading and packaging, production economics for tropical and sub-tropical fruits. Mapping of arid and semi-arid zones of India. Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa, wood apple, West Indian cherry, tamarind, aonla, bael and annona.

BAGT302 : Weed Management in Horticultural Crops (1)

Weeds: Introduction, harmful and beneficial effects, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and llelopathy Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations,

methods of application; Introduction to Adjuvants and their use in herbicides; Introduction to selectivity of herbicides; Compatibility of herbicides with other agro chemicals; Weed management in major field and horticultural crops, shift of weed flora in cropping systems, aquatic and problematic weeds and their control.

BAGP302 : Weed Management in Horticultural Crops (1)

Identification of weeds; Survey of weeds in crop fields and other habitats; Preparation of herbarium of weeds; Calculations on weed control efficiency and weed index; Herbicide label information; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Preparation of list of commonly available herbicides; Study of phytotoxicity symptoms of herbicides in different crops; Biology of nut sedge, bermuda grass, parthenium and celosia; Economics of weed control practices; Tours and visits of problem areas.

BAGT303 : Tropical and Sub-Tropical Vegetables (2)

Area, production, economic importance and export potential of tropical and sub-tropical vegetable crops. Description of varieties and hybrid, climate and soil requirements, seed rate, preparation of field, nursery practices; transplanting of vegetable crops and planting for directly sown/transplanted vegetable crops. Spacing, planting systems, water and weed management; nutrient management and deficiencies, use of chemicals and growth regulators. Cropping systems, harvest, yield and seed production. Economic of cultivation of tropical and subtropical vegetable crops; post-harvest handling and storage. Marketing of tomato, brinjal, chillies, okra, amaranthus, cluster beans, cowpea, lab-lab, snap bean, cucurbits, moringa, curry leaf, portulaca and basella.

BAGP303 : Tropical and Sub-Tropical Vegetables (1)

Identification and description of tropical and sub-tropical vegetable crops; nursery practices and transplanting, preparation of field and sowing/planting for direct sown and planted vegetable crops. Herbicide use in vegetable culture; top dressing of fertilizers and intercultural; use of growth regulators; identification of nutrient deficiencies. Physiological disorder. Harvest indices and maturity standards, post-harvest handling and storage, marketing, seed extraction (cost of cultivation for tropical and sub-tropical vegetable crops), project preparation for commercial cultivation.

BAGT304 : Orchard Management (1)

Orchard management, importance, objectives, merits and demerits, clean cultivation, sod culture, Sod mulch, herbicides and inorganic and organic mulches. Tropical, sub-tropical and temperate horticultural systems, competitive and complimentary effect of root and shoot systems. Biological efficiency of cropping systems in horticulture, systems of irrigation. Soil management in relation to nutrient and water uptake and their effect on soil environment, moisture, organisms and soil properties. Integrated nutrient and pest management. Utilization of resources constraints in existing systems. Crop model and crop regulation in relation to cropping systems.

BAGP304 : Orchard Management (1)

Layout of different systems of orchard soil management, clean, inter, cover and mixed cropping, fillers. Use of mulch materials, organic and inorganic, moisture conservation, weed control. Layout of various irrigation systems.

BAGT305 : Principles of Plant Breeding (2)

Plant breeding as a dynamic science, genetic basis of Plant Breeding – classical, quantitative and molecular, Plant Breeding in India – limitations, major achievements, goal setting for future. Sexual reproduction (cross and self pollination), asexual reproduction, pollination control mechanism (incompatibility and sterility and implications of reproductive systems on population structure). Genetic components of polygenic variation and breeding strategies, selection as a basis of crop breeding. Hybridization and selection – goals of hybridization, selection of plants; population developed by hybridization – simple crosses, bulk crosses and complex crosses. General and special breeding techniques. Heterosis – concepts, estimation and its genetic basis.

BAGP305 : Principles of Plant Breeding (1)

Breeding objectives and techniques in major field crop plants. Floral biology – its measurement, emasculation, crossing and selfing techniques in major crops. Determination of mode of reproduction in crop plants, handling of breeding material and maintenance of experimental records in self and cross pollinated crops. Demonstration of hybrid variation and production techniques.

BAGT307 : Fundamentals of Entomology & Nematology (1)

Introduction to phylum arthropoda. Importance of class Insecta. Insect dominance. Definition, division and scope of entomology. Comparative account of external morphonology-types of mouth parts, antennae, legs, wings and genetallia. Anatomy of digestive, excretory, nervous and reproductive systems. Postembryonic developmenteclosion. Matamorphosis. Types of larvae and pupa. Classification of insects upto orders and families of economic importance and their distinguished characters.

History of development of nematology- definition, economic importance. General characters of plant parasitic nematodes, their morphology, taxonomy and classification, biology, symptomatology and control of important plant parasitic nematodes of fruits- tropical,
subtropical and temperate fruits, vegetables, tubers, ornamental and plantation crops. Role of nematodes in plant disease complex.

BAGP307 : Fundamentals of Entomology & Nematology (1)

Identification and collection of insects, symptoms of damages, application of insecticides; methods of sampling and extraction of nematodes from soil and plant parts, killing, fixing and separation of temporary and permanent nematode mounts. Nematicides and their use, parts damaged by plant parasitic nematodes.

BAGT308 : Introduction to Major Field Crops (1)

Classification and distribution of field crops, definitions and concept of multiple cropping, mixed cropping, intercropping, relay and alley cropping, cultural practices for raising major cereals, pulses, oil seeds and fodder crops, green masuering, crop rotation.

BAGP308 : Introduction to Major Field Crops (1)

Identification of crop plants, seeds and weeds. Preparation of cropping scheme. Application of herbicides in field crops

BAGT309 : Fundamentals of Plant Pathology (1)

Introduction to the science of phytopathology, its objectives, scope and historical background.

Classification of plant diseases, symptoms, signs, and related terminology. Parasitic causes of plant diseases (fungi, bacteria, viruses, phytoplasma, protozoa, algae and flowering parasitic plants), their characteristics and classification. Non-parasitic causes of plant diseases. Infection process. Survival and dispersal of plant pathogens. Plant disease epidemiology, forecasting and disease assessment. Principles and methods of plant disease management. Integrated plant disease management.

BAGP309 : Fundamentals of Plant Pathology (1)

Familiarity with general plant pathological laboratory and field equipments. Study of disease symptoms and signs and host parasite relationship. Identification and isolation of plant pathogens. Koch's postulates. Preparation of fungicidal solutions, slurries, pastes and their applications.

BAGT306 : Plant Propagation and Nursery Management (1)

Propagation: Need and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages. Seed dormancy (scarification & stratification) internal and external factors, nursery techniques, apomixes – mono-embrony, polyembrony, chimera & bud sport. Propagation Structures: Mist chamber, humidifiers, greenhouses, glasshouses, cold frames, hot beds, poly-houses, nursery (tools and implements), use of growth regulators in seed and vegetative propagation, methods and techniques of cutting,layering, grafting and budding physiological & bio chemical basis of rooting, factors influencing rooting of cuttings and layering, graft incompatibility. Anatomical studies of bud union, selection and maintenance of mother trees, collection of scion wood stick, scion-stock relationship, and their influences, bud wood certification, techniques of propagation through specialized organs, corm, runners, suckers. Micrografting, hardening of plants in nurseries. Nursery registration act. Insect/pest/disease control in nursery.

BAGP306 : Plant Propagation and Nursery Management (1)

Media for propagation of plants in nursery beds, pot and mist chamber. Preparation of nursery beds and sowing of seeds. Raising of rootstock. Seed treatments for breaking dormancy and inducing vigorous seedling growth. Preparation of plant material for potting. Hardening plants in the nursery. Practicing different types of cuttings, layering, graftings and buddings including opacity and grafting, etc. Use of mist chamber in propagation and hardening of plants. Preparation of plant growth regulators for seed germination and vegetative propagation. Visit to a tissue culture laboratory. Digging, labelling and packing of fruit plants. Maintenance of nursery records. Use of different types of nursery tools and implements for general nursery and virus tested plant material in the nursery. Cost of establishment of a mist chamber, greenhouse, glasshouse, polyhouse and their maintenance. Top grafting, bridge grafting and nursery management. Nutrient and plant protection applications during nursery.

Semester IV

BAGT401: Spices and Condiments (1)

History, scope and importance, area and production, uses, export potential and role in national economy. Classification, soil and climate, propagation-seed, vegetative and micro propagation systems and methods of planting. Nutritional management, irrigation practices, weed control, mulching and cover cropping. Training and pruning practices, role of growth regulators, shade crops and shade regulation. Harvesting, post-harvest technology, packaging, storage, value

added products, methods of extraction of essential oil and oleoresins. Economics of cultivation, role of Spice Board and Pepper Export Promotion Council, institutions and research centers in R&D. Crops: Cardamom, pepper, ginger, turmeric, clove, nutmeg, cinnamon, all spice, curry leaf, coriander, fenugreek, fennel, cumin, dill, celery, bishops weed, saffron, vanilla, thyme and rosemary.

BAGP401: Spices and Condiments (1)

Identification of varieties: propagation, seed treatment – sowing; layout, planting; hoeing and earthing up; manuring and use of weedicides, training and pruning; fixing maturity standards, harvesting, curing, processing, grading and extraction of essential oils and oleoresins. Visit to commercial plantations.

BAGT402 : Temperate Fruits (2)

Classification of temperate fruits, detailed study of areas, production, varieties, climate and soil requirements, propagation, planting density, cropping systems, after care training and pruning, self incompatibility and pollinisers, use of growth regulators, nutrient and weed management, harvesting, post-harvest handling and storage of apple, pear, peach, apricot, cherry, persimmon, strawberry, kiwi, Queens land nut (Mecademia nut), almond, walnut, pecan nut, hazel nut and chest nut. Re- plant problem, rejuvenation and special production problems like pre-mature leaf fall, physiological disorders, important insect – pests and diseases and their control measures.

BAGP402 : Temperate Fruits (1)

Nursery management practices, description and identification of varieties of above crops, manuring and fertilization, planting systems, preparation and use of growth regulators, training and pruning in apple, pear, plum, peach and nut crops. Visit to private orchards to diagnose maladies. Working out economics for apple, pear, plum and peach.

BAGT403 : Ornamental Horticulture (2)

History, scope of gardening, aesthetic values. Gardens in India, types of gardens. Landscaping, historical background, definition. Floriculture industry: importance, area and production, industrial importance in India. Landscaping, basic principles and basic components. Principles of gardening, garden components, adornments, lawn making, methods of designing rockery, water garden, etc. Special types of gardens, their walk-paths, bridges, constructed features. Greenhouse. Special types of gardens, trees, their design, values in landscaping, propagation, planting shrubs and herbaceous perennials. Importance, design values, propagation, plating, climbers and creepers, palms, ferns, grasses and cacti succulents. Flower arrangement: importance, production details and cultural operations, constraints, post-harvest practices. Bioaesthetic planning, definition, need, round country planning, urban planning and planting avenues, schools, villages, beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, planting material for play grounds. Vertical gardens, roof gardens. Culture of bonsai, art of making bonsai. Parks and public gardens.

BAGP403 : Ornamental Horticulture (1)

Identification and description of annuals, herbaceous, perennials, climbers, creepers, foliage flowering shrubs, trees, palms, ferns, ornamental grasses; cacti succulents. Planning and designing gardens, layout of location of components of garden study, functional uses of plants in the landscape. Panning design of house garden, roadside planting, avenues for new colonies, traffic islands, preparation of land for lawn and planting. Description and design of garden structures, layout of rockery, water garden, terrace garden, and Japanese gardens, recreational and children' s corner. Layout of terrarium, traffic islands, bottle garden, dish garden. Flower

arrangement, bonsai practicing and training. Visit to nearby gardens. Identification and description of species/varieties of jasmine, chrysanthemum, marigold, dahlia, gladiolus, carnation, aster and their important inter-culture practices

BAGT404 : Water Management in Horticultural Crops (1)

Importance of water, water resources in India. Area of different crops under irrigation, function of water for plant growth, effect of moisture stress on crop growth. Available and unavailable soil moisture – distribution of soil moisture – water budgeting – rooting characteristics – moisture extraction pattern. Water requirement of horticultural crops – lysimeter studies – Plant water potential climatological approach – use of pan evaporimeter – factor for crop growth stages – critical stages of crop growth for irrigation. Irrigation scheduling – different approaches – methods of irrigation – surface and sub-surface pressurized methods viz., sprinkler and drip irrigation, their suitability, merits and limitations, fertigation, economic use of irrigation water. Water management problem, soils quality of irrigation water, irrigation management practices for different soils and crops. Layout of different irrigation systems, drip, sprinkler. Layout of underground pipeline system.

BAGP404 : Water Management in Horticultural Crops (1)

Measurements of irrigation water by using water measuring devices, use of common formula in irrigation practices, practicing of land leveling and land shaping implements, layout for different methods of irrigation. Estimation of soil moisture constants and soil moisture by using different, methods and instruments, scheduling of irrigation, different approaches, practicing use of instruments, estimation of irrigation efficiency and water requirements of horticultural crops, irrigation planning and scheduling, soil moisture conservation practices.

BAGT405 : Plantation Crops (2)

History and development, scope and importance, area and production, export and import potential, role in national and state economy, uses, industrial importance, by products utilization, soil and climate, varieties, propagation: principles and practices of seed, vegetative and micro-propagation, planting systems and method, gap filling, systems of cultivation, mulching, shade regulation, weed and water management, training, pruning and handling, nutrition, foliar feeding, role of growth regulators, soil management, liming practices, tipping practices, top working, physiological disorders, harvesting, post-harvest handling and processing, packaging and marketing, yield and economics of coconut, arecanut, oil palm, palmyrah palm, cacao, cashew nut, coffee, tea and rubber.

BAGP405 : Plantation Crops (1)

Description and identification of coconut varieties, selection of coconut and arecanut mother palm and seed nut, planting of seed nuts in nursery, layout and planting of coconut, arecanut, oil palm, cashew nut, cacao gardens, manuring, irrigation; mulching, raising masonry nursery for palm, nursery management in cacao. Description and identification of species and varieties in coffee, harvesting, grading, pulping, fermenting, washing, drying and packing of coffee, seed berry collection, seed extraction, treatment and sowing of coffee, epicotyl, softwood, grafting and top working in cashew, working out the economics and project preparation for coconut, arecanut, oil palm, cashew nut, cacao, etc. Mother plant selection, preparation of cuttings and rooting of tea under specialized structure, training, centering, pruning, tipping and harvesting of tea.

BAGT407 : Breeding of Fruit and Plantation Crops (1)

Fruit breeding - History, importance in fruit production, distribution, domestication and

adaptation of commercially important fruits, variability for economic traits, breeding strategies, clonal selection, bud mutations, mutagenesis and its application in crop improvement – policy manipulations – *in vitro* breeding tools (important fruit and plantation crops).

BAGP407 : Breeding of Fruit and Plantation Crops (1)

Exercises on floral biology, pollen viability; emasculation and pollination procedures; hybrid seed germination; raising and evaluation of segregating populations; use of mutagens to induce mutations and polyploidy.

BAGT408: Growth and Development of Horticultural Crops (1)

Growth and development-definitions, components, photosynthetic productivity, leaf area index (LAI) - optimum LAI in horticultural crops, canopy development; different stages of growth, growth curves, growth analysis in horticultural crops. Plant bioregulators- auxin, gibberellin, cytokinin, ethylene inhibitors and retardants, basic functions, biosynthesis, role in crop growth and development, propagation, flowering, fruit setting, fruit thinning, fruit development, fruit drop, and fruit ripening. Flowering-factors affecting flowering, physiology of flowering, photoperiodism-long day, short day and day neutral plants, vernalisation and its application in horticulture, pruning and training physiological basis of training and pruningsource and sink relationship, translocation of assimilates. Physiology of seed development and maturation, seed dormancy and bud dormancy, causes and breaking methods in horticultural crops. Physiology of fruit growth and development, fruit setting, factors affecting fruit set and development, physiology of ripening of fruits-climatic and nonclimacteric fruits.

BAGP408 : Growth and Development of Horticultural Crops (1)

Estimation of photosynthetic potential of horticultural crops, leaf area index, growth analysis parameters including harvest index, bioassay of plant hormones, identification of synthetic plant hormones and growth retardants, preparations of hormonal solution and induction of rooting in cuttings, ripening of fruits and control of flower and fruit drop. Important physiological disorders and their remedial measures in fruits and vegetables, rapid tissue test, seed dormancy, seed viability by tetrazolium test, seed germination and breaking seed dormancy with chemicals and growth regulators.

BAGT409 : Genetic Resources of Horticultural Crops (1)

Role of genetic resources- centres of origin and diversity of crops plants- law of homologous series-plant introduction and exchange of genetic resources- principles and concepts of plant quarantine- plant introduction in horticultural crops-germplasm collection and centres- gene band- gene sanctuary- need for conservation- genetic erosion- germplasm explorationgermplasm conservation- in vitro conservation cryopreservation- DNA finger printing.Wild relatives and sources of resistance to biotic, abiotic stresses and quality characters for fruit, vegetable, flower and plantation crops, spices, medicinal plants. International institutes and organizations for germplasm- Trade Related Intellectual Property Rights (TRIPPS) and IPR for Indian cultivars.

BAGP409 : Genetic Resources of Horticultural Crops (1)

Morphological evaluation of germplasm, collections and identification of wild relatives for fruit crops, vegetable crops, flower crops; spices, plantation crops, medicinal and aromatic plants. One or two visits to the nearest germplasm centres.

BAGT406 : Organic Farming (1)

Introduction, concept, relevance in present context; Organic production requirements;

Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil improvement and amendments; Integrated diseases and pest management – use of biocontrol agents, biopesticides pheromones, trap crops, bird perches; Weed management; Quality considerations, certification, labeling and accreditation processors, marketing, exports.

BAGP406 : Organic Farming (1)

Raising of vegetable crops organically through nutrient, diseases and pest management; vermicomposting; vegetable and ornamental nursery raising; macro quality analysis, grading, packaging, post harvest management.

Semester V

BAGT501 : Temperate Vegetables (2)

Importance of cool season vegetable crops in nutrition and national economy. Area, production, export potential, description of varieties and hybrids, origin, climate and soil, production technologies, seed production, post-harvest technology. Marketing of cabbage, cauliflower, knol-khol, sprouting broccoli, Brussels' sprout, lettuce, palak, Chinese cabbage, spinach, garlic, onion, leek, radish, carrot, turnip, beet root, peas, broad beans, rhubarb, asparagus, globe artichoke.

BAGP501 : Temperate Vegetables (1)

Identification and description of varieties/hybrids; propagation methods, nursery management; preparation of field, sowing/transplanting; identification of physiological and nutritional disorders and their corrections; post-harvest handling; cost of cultivation and field visits to commercial farms.

BAGT502 : Principles of Landscape Gardening (1)

Landscaping: historical background, basic principles and components, landscape composition of hills and plains, identification and use of landscape drafting equipments, drawing and designing of home gardens, public parks, avenues, farm complexes and institutions. Layout of formal garden, informal garden, terrace garden, rock garden, bog garden, sunken garden, designing of conservatory and lathe house. Landscape design for specific areas.

BAGP502 : Principles of Landscape Gardening (1)

Principles and elements of landscape design, plant material for landscaping, symbols, tools and implements used in landscape design, layout of formal gardens, informal gardens, special type of gardens (bog garden, sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Landscape design for specific areas.

BAGT503 : Farm Power and Machinery (1)

Basic concepts of various forms of energy, unit and dimensions of force, energy and power, calculations with realistic examples. IC Engines: Basic principles of operation of compression, ignition and spark ignition engines, two stroke and four stroke engines, cooling and lubrication system, power transmission system, broad understanding of performance and efficiency, tractors, power tillers and their types and uses. Electric motors: types, construction and performance comparison. Tillage: objectives, method of ploughing. Primary tillage implements: construction and function of indigenous ploughs, improved indigenous ploughs, mould board ploughs, disc and rotary ploughs. Secondary tillage implements: construction and function of tillers, harrows, levelers, ridgers and bund formers. Sowing and transplanting equipment: seed

drills, potato planters, seedling transplanter. Grafting, pruning and training tools and equipment. Inter-culture equipment: sweep. Junior hoe, weeders, long handle weeders. Crop harvesting equipments: potato diggers, fruit pluckers, tapioca puller and hoists.

BAGP503 : Farm Power and Machinery (1)

Calculation on force, power and energy. IC engines – showing the components of dismantled engines and motors. Primary and secondary tillage implements, hitching, adjustments and operations. Spraying equipment, calibration and operation. Plant protection equipment, calculation of dilution ratio and operation.

BAGT504 : Diseases of Fruits, Plantation and Medicinal and Aromatic Crops (2)

Etiology, symptoms, mode of spread, epidemiology and integrated management of the diseases of fruits, plantation, medicinal and aromatic crops viz mango, banana, grape, citrus, guava, sapota, papaya, jack fruit, pineapple, pomegranate, ber, apple, pear, peach, plum, almond, walnut, strawberry, areca nut, coconut, oil palm, coffee, tea, cocoa, cashew, rubber, betel vine senna, neem, hemp, belladonna, pyrethrum, camphor, costus, crotalaria, datura, dioscorea, mint, opium, *Solanum khasianum* and Tephrosia. Important post-harvest diseases of fruit, plantation and medicinal and aromatic crops and their management.

BAGP504 : Diseases of Fruits, Plantation and Medicinal and Aromatic Crops (1)

Observations of disease symptoms, identification of casual organisms and host parasite relationship of important diseases. Examination of scrapings and cultures of important pathogens of fruits, plantation, medicinal and aromatic crops.

BAGT505 : Insect Pests of Fruit, Plantation, Medicinal and Aromatic Crops (2)

General–economic classification of insects; ecology and insect-pest management with reference to fruit, plantation, medicinal and aromatic crops; pest surveillance. Distribution, host range, bio-ecology, injury, integrated management of important insect pests affecting tropical, subtropical and temperate fruits, plantation, medicinal and aromatic crops like coconut, areca nut, oil palm, cashew, cacao, tea, coffee, cinchona, rubber, betel vine senna, neem, hemp, belladonna, pyrethrum, camphor, costus, crotalaria, datura, dioscorea, mint, opium, *Solanum khasianum* and Tephrosia.. Storage insects – distribution, host range, bioecology injury, integrated management of important insect pests attacking stored fruits, plantation, medicinal and aromatic crops and their processed products. Toxicology – insecticide residue problems in fruit, plantation, medicinal and aromatic crops and their tolerance limits.

BAGP505 : Insect Pests of Fruit, Plantation, Medicinal and Aromatic Crops (1)

Study of symptoms of damage, collection, identification, preservation, assessment of damage and population of important insect – pests affecting fruits, plantation, medicinal and aromatic crops in field and storage

BAGT507 : Soil and Plant Analysis (1)

Methods of soil and plant sampling and processing for analysis. Quantification of minerals and their abundance. Soil structure and aggregate analysis. Theories and concepts of soil moisture estimation – gravimetric, tensiometric, gypsum block, neutron probe and pressure methods. Characterization of hydraulic mobility – diffusion and mass flow. Renewal of gases in soil and their abundance. Methods of estimation of oxygen diffusion rate and redox potential. Soil fertility evaluation methods. Use of radio tracer techniques in soil fertility evaluation. Soil micro-organisms and their importance. Saline, alkali, acid, waterlogged and sandy soils, their appraisal and management. Chemical and mineral composition of horticultural crops. Leaf

analysis standards, index tissue, interpretation of leaf analysis values. Principles of working of pH meter, electrical conductivity meter, spectrophotometer, flame photometer and atomic absorption spectrophotometer. Quality of irrigation water.

BAGP507 : Soil and Plant Analysis (1)

Collection and preparation of soil and plant samples for analysis. Determination of water holding capacity and hydraulic conductivity of soil. Estimation of moisture content in soils and plants. Determination of pH, electrical conductivity, sodium adsorption ratio and exchangeable sodium percentage of soils. Enumeration of soil microbes. Estimation of available macro and micronutrient elements in soils and their contents in plants. Irrigation water quality analysis.

BAGT508 : Mushroom Culture (1)

Introduction to mushrooms fungi – nutritional value, edible and poisonous types, edible mushrooms, *Pleurotus, Volvariella* and *Agaricus*, medicinal value of mushrooms, genetic improvement of mushroom, preparation of culture, mother spawn production, multiplication of spawn, cultivation techniques, harvesting, packing and storage; problems in cultivation – diseases, pest and nematodes – weed moulds and their management strategies. Economics of cultivation, post harvest technologies.

BAGP508: Mushroom Culture (1)

Equipment and sterilization techniques for culture media, isolation of mother culture, and span preparation and maintenance of mushroom beds of oyster mushroom, *Volvariella* and *Agaricus*. Processing and preservations of mushrooms, economics of spawn and mushroom production and mushroom recipes

BAGT509 : Fundamentals of Food Technology (1)

Food and its function, physico-chemical properties of foods, food preparation techniques, nutrition, relation of nutrition of good health. Characteristics of well and malnourished opulation. Energy, definition, determination of energy requirements, food energy, total energy needs of the body. Carbohydrates: classification, properties, functions, source, requirements, digestion, absorption and utilization. Protein, classification, properties, functions, sources, requirements, digestion, absorption, essential and non-essential amino acids, quality of proteins, PER/NPR/NPU, supplementary value of proteins and deficiency. Lapids – classification, properties, functions, sources, requirements, digestion, absorption and utilization, saturated and unsaturated fatty acids, deficiency, rancidity, refining of fats. Mineral nutrition: macro and micro-minerals (Ca, Fe and P), function, utilization, requirements, sources, effects of deficiency. Vitamins: functions, sources, effects of deficiency, requirements of water soluble and fat-soluble vitamins. Balanced diet: recommended dietary allowances for various age groups, assessment of nutritional status of the population.

BAGP509 : Fundamentals of Food Technology (1)

Methods of measuring food ingredients, effect of cooking on volume and weight, determination of percentage of edible portion. Browning reactions of fruits and vegetables. Microscopic examination of starches, estimation of energy, value proteins and fats of foods. Planning diet for various age groups.

BAGT506 : Communication Skills and Entrepreneurship Development (1)

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalisation and the emerging business / entrepreneurial environment. Concept of entrepreneurship; entrepreneurial and managerial characteristics;

managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to horticulture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Overview of horti inputs industry. Characteristics of Indian horticultural processing and export industry. Social Responsibility of Business. Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technicalarticles, précis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

BAGP506 : Communication Skills and Entrepreneurship Development (1)

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, précis writing, summarizing, abstracting; individual and group presentations.

Semester VI

BAGT601 : Potato and Tuber Crops (1)

Origin, area, production economic importance and export potential of potato and tropical, subtropical and temperate tuber crops; description of varieties and hybrids. Climate and soil requirements, season; seed rate; preparation of field; planting practices; spacing; water nutrient and weed management; nutrient deficiencies. Use of chemicals and growth regulators; cropping systems. Harvesting practices, yield; seed production, economics of cultivation. Post harvest handling and storage, field and seed standards, marketing of the following crops:
Crops: potato, tapioca, sweet potato, arrow root, cassava, colocasia, xanthosoma, amorphophallus, dioscorea, jerusalem artichoke, horse radish and other under- exploited tuber crops.

BAGP601 : Potato and Tuber Crops (1)

Identification and description of potato and tropical, subtropical and temperate tuber crops; planting systems and practices; field preparation and sowing/planting. Topdressing of fertilizers and inter culture and use of herbicides and growth regulators; identification of nutrient deficiencies, physiological disorders; harvest indices and maturity standards, post harvest handling and storage, marketing. Seed collection, working out cost of cultivation, project preparation of commercial cultivation.

BAGT602 : Breeding of Vegetable, Tuber and Spice Crops (2)

Centres of origin, plant bio-diversity and its conservation. Models of reproduction, pollination systems and genetics of important vegetable, tuber and spice crops. Selfincompatibility and male sterility, its classification and application in crop improvement. Principles of breeding self-pollinated crops, pure line selection, mass selection, heterosis breeding, hybridization, pedigree method, mass pedigree method, bulk method, modified bulk method, single seed descent method and back cross method. Polyploidy breeding.
Mutation breeding. Principles of breeding cross pollinated crops, mass selection, recurrent selection, heterosis breeding, synthetics and composits. Application of biotechnology in crop improvement. Crops: Solanaceous vegetables, cole crops, cucurbits, bulb crops, root crops,

leafy vegetables, okra, leguminous crops.

BAGP602 : Breeding of Vegetable, Tuber and Spice Crops (1)

Floral biology and pollination mechanism in self and cross pollinated vegetables, tuber crops and spices. Working out phenotypic and genotypic heritability, genetic advance. Preparation and uses of chemical and physical mutagens. Polyploidy breeding and chromosomal studies. Techniques of F1 hybrid seed production. Maintenance of breeding records.

BAGT603 : Post Harvest Management of Horticultural Crops (2)

Importance of post-harvest technology in horticultural crops. Maturity indices, harvesting, handling, grading of fruits, vegetables, cut flowers, plantation crops, medicinal and aromatic plants. Pre-harvest factors affecting quality, factors responsible for deterioration of horticultural produce, physiological and bio-chemical changes, hardening and delaying ripening process. Post-harvest treatments of horticultural crops. Quality parameters and specification. Structure of fruits, vegetables and cut flowers related to physiological changes after harvest. Methods of storage for local market and export. Pre-harvest treatment and precooling, pre-storage treatments. Different systems of storage, packaging methods and types of packages, recent advances in packaging. Types of containers and cushioning materials, vacuum packaging, cold storage, poly shrink packaging, grape guard packing treatments. Modes of transport.

BAGP603 : Post Harvest Management of Horticultural Crops (1)

Practice in judging the maturity of various horticultural produce, determination of physiological loss in weight and quality. Grading of horticultural produce, post-harvest treatment of horticultural crops, physical and chemical methods. Packaging studies in fruits, vegetables, plantation crops and cut flowers by using different packaging materials, methods of storage, post-harvest disorders in horticultural produce. Identification of storage pests and diseased in spices. Visit to markets, packaging houses and cold storage units.

BAGT604 : Seed Production of Vegetable, Tuber and Spice Crops (2)

Introduction and history of seed industry in India. Definition of seed. Differences between grain and seed. Importance and scope of vegetable seed production in India. Principles of vegetable seed production. Role of temperature, humidity and light in vegetable seed production. Methods of seed production of cole crops, root vegetables, solanaceous vegetables, cucurbits, leafy vegetables, bulb crops, leguminous vegetables and exotic vegetables. Seed germination and purity analysis. Field and seed standards. Seed drying and extraction. Seed legislation.

BAGP604 : Seed Production of Vegetable, Tuber and Spice Crops (1)

Study of seed structure, colour size, shape and texture. Field inspection of seed crops. Practices in rouging. Harvesting and seed extraction. Germination and purity analysis. Methods of seed production in cole crops, root vegetables, bulb crops, solanaceous vegetables, cucurbits, leafy vegetables, leguminous vegetables and exotic vegetables. Seed processing machines. Visit to seed production units.

BAGT605 : Insect Pests of Vegetable, Ornamental and Spice Crops (2)

Economic importance of insects in vegetable, ornamental and spice crops -ecology and pest management with reference to these crops. Pest surveillance in important vegetable, ornamental and spice crops. Distribution, host range, bio-ecology, injury, integrated management of important insect-pests affecting vegetable, ornamental and spice crops. Important storage insect-pests of vegetable, ornamental and spice crops, their host range, bioecology, injury and integrated management. Insect –pests of processed vegetables and ornamental crops, their host

range, bio-ecology, injury and integrated management. Insecticidal residue problems in vegetables and ornamental crops, tolerance limits etc.

BAGP605 : Insect Pests of Vegetable, Ornamental and Spice Crops (1)

Study of symptoms, damage, collection, identification, preservation, assessment of damage/population of important insect-pests affecting vegetable, ornamental and spice crops in field and during storage.

BAGT607 : Breeding and Seed Production of Ornamental Plants (1)

History of improvements of ornamental plants, objectives and techniques in ornamental plant breeding. Introduction, selection, hybridization, mutation and biotechnological technique for improvement of ornamental plants. Breeding for disease resistance. Development of promising cultivars of important ornamentals. Role of heterosis and its exploitation, production of F1 hybrids and utilization of male sterility, production of open pollinated seed. Harvesting processing and storage of seeds, seed certification.

BAGP607 : Breeding and Seed Production of Ornamental Plants (1)

Study of floral biology and pollination in important species and cultivars. Techniques of inducing polyploidy and mutation. Production of pure and hybrid seeds. Harvesting, conditioning and testing of seeds. Practice in seed production methods

BAGT608 : Diseases of Vegetable, Ornamental and Spice Crops (1)

Etiology, symptoms, mode of spread, epidemiology and integrated management of diseases of the following vegetables, ornamental and spice crops: tomato, brinjal, chilli, bhindi, cabbage, cauliflower, radish, knol-khol, pea, beans, beet root, onion, garlic, fenugreek, ginger, potato, turmeric, pepper, cumin, cardamom, nutmeg, coriander, clove, cinnamon, jasmine, rose, crossandra, tuberose, geranium. Important post-harvest diseases of vegetables and ornamental crops and their management.

BAGP608 : Diseases of Vegetable, Ornamental and Spice Crops (1)

Observations of symptoms, causal organisms and host parasitic relationship of important diseases, examination of cultures of important pathogens of vegetables, ornamental and spice crops.

BAGT609 : Protected Horticulture (1)

Importance and scope, basic principles of protected cultivation. Green and polyhouse designs, green house environment control, heating and cooling system- use of portable tunnel. Green house cultivation of important horticultural crops- rose, carnation, gerbera, orchids, anthurium, tomato, bell, pepper and strawberry. Insect pest and disease management under protected cultivation.

BAGP609 : Protected Horticulture (1)

Study of green house design. Practice of protected cultivation of horticultural crops- rose carnation, Gerbera and orchids, anthurium, tomato, bell, pepper and strawberry.

BAGT606 : Commercial Floriculture (1)

Scope and importance of commercial floriculture in India, production techniques of ornamental plants like rose, marigold, chrysanthemum, orchid, carnation, gladiolus, jasmine, dahlia, tuberose, bird of paradise, china aster and gerbera for domestic and export market, growing of

flowers under protected environments such as glass house, plastic house etc., post harvest technology of cut flowers in respect of commercial flower crops, dehydration technique for drying of flowers, production techniques for bulbous.

BAGP606 : Commercial Floriculture (1)

Identification of commercially important floricultural crops. Propagation practices in chrysanthemum, sowing of seeds and raising of seedlings of annuals. Propagation by cutting, layering, budding and grafting. Training and pruning of roses. Use of chemicals and other compounds for prolonging the vase life of cut flowers. Drying and preservation of flowers. Flower arrangement practices

Semester VII

BAGT701 : Processing of Horticultural Crops (2)

Importance and scope of fruit and vegetable preservation industry in India, food pipe line, losses in post-harvest operations, unit operations in food processing. Principles and guidelines for the location of processing units. Principles and methods of preservation by heat pasteurization, canning, bottling. Methods of preparation of juices, squashes, syrups, cordials and fermented beverages. Jam, jelly and marmalade. Preservation by sugar and chemicals, candies, crystallized fruits, preserves chemical preservatives, preservation with salt and vinegar, pickling, chutneys and sauces, tomato and mushrooms, freezing preservation. Processing of plantation crops, products, spoilage in processed foods, quality control of processed products, Govt. policy on import and export of processed fruits. Food laws.

BAGP701 : Processing of Horticultural Crops (1)

Equipment used in food processing units. Physico-chemical analysis of fruits and vegetables. Canning of fruits and vegetables, preparation of squash, RTS, cordial, syrup, am, jelly, marmalade, candies, preserves, chutneys, sauces, pickles (hot and sweet). Dehydration of fruits and vegetables – tomato product dehydration, refrigeration and freezing, cut out analysis of processed foods. Processing of plantation crops. Visit to processing units.

BAGT702 : Protected Cultivation of High Value Horticultural Crops (3)

Visit to commercial polyhouses, Project preparation and planning. Specialised lectures by commercial export house.

BAGT703 : Nursery Production and Management (3)

Project preparation

BAGP705 : Protected Cultivation of High Value Horticultural Crops (6)

1. Study of designs of green- house structures for cultivation of crops
2. Land preparation and soil treatment
3.. Planting and production:
    i. Cultural management including soil/media management in poly houses
    ii. Fertigation and irrigation management
    iii. Integrated Pest Management
    iv. Harvesting and post harvest management; certification and distribution
    v. Cost of production
4. Visit to export houses; Market intelligence; Marketing of produce; cost analysis; Institutional management
6. Report writing, presentation and discussion.

BAGP706 : Nursery Production and Management (6)

1. .Nursery registration, methodology and certification
2. Establishment and management of plant propagating structures
3. Establishment of progeny blocks, identification of mother plants and maintenance of bud wood bank
4. Procurement of inputs (pots, polythene,FYM etc.)
5. Techniques and environ management for large scale production
6. Packaging and selling of plant material
7. Working out economics
8. Report writing, presentation and discussion

BAGT704 : Horti- Business Management (2)

Farm management - definition, nature, characteristics and scope. Farm management principles and decision making, production function, technical relationships, cost concepts, curves and functions – factors, product, relationship – factors relationship, product relationship, optimum conditions, principles of opportunity cost-equi-marginal returns and comparative advantages, time value of money, economic of scale, returns to scale, cost of cultivation and production, break even analysis, decision making under risk and uncertainty. Farming systems and types. Planning – meaning, steps and methods of planning, types of plan, characteristics of effective plans. Organizations – forms of business organizations, organizational principles, division of labour. Unity of command, scalar pattern, job design, span of control responsibility, power authority and accountability. Direction – guiding, leading, motivating, supervising, coordination – meaning, types and methods of controlling – evaluation, control systems and devices. Budgeting as a tool for planning and control. Record keeping as a tool of control. Functional areas of management – operations
management – physical facilities, implementing the plan, scheduling the work, controlling production in terms of quantity and quality. Materials management – types of inventories, inventory costs, managing the inventories, economic order quantity (EOQ). Personnel management – recruitment, selection and training, job specialization. Marketing management – definitions, planning the marketing programmes, marketing mix and four P' s. Financial management – financial statements and rations, capital budgeting. Project management – project preparation evaluation measures.

Semester VIII

Horticultural Work Experience 18 (6+6+6)

The students will spend one full semester working with State Department of Horticulture; Horticulture based industries, commercial horticulture farms, plantation industries etc. to gain **first hand information and hands-on-training** in the chosen area of interest. Horticultural work experience will be evaluated by the department committee on the basis of

SOA/HC 132 T : Project report preparation **(6)**

SOA/HC 133 P : Field Work **(6)**

SOA/HC 134 T Project report writing, Presentation and Discussion **(6)**