Study Scheme & Syllabus of

Bachelor of Vocations in Agriculture

(B. Voc. Agriculture)

Batch 2019

By

Board of Studies Agriculture

Department of Academics

IK Gujral Punjab Technical University Jalandhar

Semester First

Course code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVAG101-18	Horticulture -Fruit Crops	3	0	40	60	100	3
BVAG102-18	Chemistry of Agrochemicals	2	0	40	60	100	2
BVAG103-18	Agro meteorology	3	0	40	60	100	3
BVAG104-18	Introductory Agronomy	2	0	20	30	50	2
BVAG105-18	Soil Science	3	0	20	30	50	3
BVAG106-18	Principles of Plant Pathology	2	0	40	60	100	2
BVAG107-18	Horticulture -Fruit Crops (Practical)	0	2	20	30	50	1
BVAG108-18	Agro meteorology (Practical)	0	2	20	30	50	1
BVAG109-18	Soil Science (Practical)	0	2	20	30	50	1
BVAG110-18	Principles of Plant Pathology (Practical)	0	2	20	30	50	1
	Total	15	8	280	420	700	19

Semester Second

Course code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVAG201-18	Manures and Fertilizers	2	0	40	60	100	2
BVAG202-18	Introduction to Genetics	2	0	40	60	100	2
BVAG203-18	Fundamentals of Insect Morphology and Systematics	2	0	40	60	100	2
BVAG204-18	Principles of Agronomy (Rabi Crops)	2	0	40	60	100	2
BVAG205-18	Soil Chemistry, Fertility and Nutrient Management	2	0	40	60	100	2
BVAG206-18	Insect ecology and Integrated Pest Management	2	0	40	60	100	2
BVAG207-18	Introduction to Genetics(Practical)	0	4	20	30	50	2
BVAG208-18	Fundamentals of Insect Morphology and Systematics (Practical)	0	4	20	30	50	2
BVAG209-18	Principles of Agronomy (Rabi Crops) (Practical)	0	4	20	30	50	2
BVAG210-18	Soil chemistry, Fertility, Nutrient and Management (Practical)	0	4	20	30	50	2
BVAG211-18	Insect ecology and Integrated Pest Management (Practical)	0	4	20	30	50	2
BVAG212-19	Project report on Integrated Nutrient Management	0	8	200	00	200	8
	Total	12	28	540	510	1050	30

BVAG101- Horticulture- Fruit Corps

Credit: 3

SECTION - A

Definition, importance and divisions of horticulture. Climatic zones, area and production of different fruit crops; Selection of site, fencing and wind break. Planting systems, high density planting, planning and establishment.

SECTION - B

Propagation methods: conventional and non-conventional. Methods of training and pruning. Use of growth regulators in fruit production.

SECTION - C

Fundamentals for cultivation of horticultural crops, Package of practices for the cultivation of major fruits -mango, citrus, grapes, guava, apple, litchi and papaya.

SECTION - D

Package of practices for the cultivation of Minor fruits - pineapple, pomegranate, ber, fig, loquat, Banana, phalsa, pear, plum, peach.

Books Recommended

1). Fundamentals of Plant propagation: Hartmann
2). Fruits: Ranjit singh
3). Basic Horticulture: Jatinder Singh
4). Fruit Production (vol. 1 and 2): T.K Bose
5) Package of practices for fruit crops- PAU Ludhiana
6) Handbook of Agricultural Sciences- S.S. Singh

BVAG102-18 Chemistry of Agrochemicals

Credit: 2

Unit I

Organic chemistry as prelude to agrochemicals. Diverse types of agrochemicals.

Unit II

Herbicides-major classes, chemistry and use of 2,4-D, atrazine, glyphosate, butachlor, benthiocarb, Plant growth regulators .

Unit III

Fungicides - major classes, Chemistry and use of carbendazim, carboxin, captan, tridemorph and copper oxychloride.

Unit IV

Synthetic organic insecticides, major classes, chemistry and use of some important insecticides under each class. Botanical insecticides (neem), pyrethrum and synthetic pyrethroids..

BVAG**103-18 Introductory Agro meteorology**

Credit: 3

SECTION - A

The earth and its Atmosphere: Environmental factors in agriculture; Elements and factors of climate; Latitudinal and seasonal distribution of temperature and precipitation; Basic parameters in Weather forecasting.

SECTION - B

Agro-climatology: Definition and scope; the role of climate in soil and natural vegetation and livestock distribution with practical examples.

SECTION -C

Impact of climatological factors in crop and livestock distribution in India: Effects of weather on sowing, growth, maturity and harvesting of crops, cropping pattern.

SECTION - D

Weather hazards, their occurrence and impact on agriculture, climate classifications in India and Punjab: Climates of the world & their agricultural potentials with special reference to India.

BOOKS RECOMMENDED

1. The Earth and its Atmosphere by D. R. Bates.
2. Introduction to Climatology for the Tropics by J. D. Yeade.
3. General Climatology by Critbbfierd & Hewarda.
4. Agriculture Meteorology by H. S. Mavi.
5. Fundamentals of Agro Meteorology: G.S Mahi
6. Agro Meteorology : S R Reddy

BVAG**104-18 Introductory Agronomy**

Credit: 2

SECTION - A

Evolution of agriculture, farm tools through ages, classification of crops, their geographical distribution and factors responsible, impact of Agriculture on trade and industry, comparative yield of crops in Punjab and other states.

SECTION - B

Agronomy as a science and its relationship with other sciences; Germination, maturity harvesting and storage of crop plants; Tillage principles, requirement for minimum tillage, seed bed preparation, characteristics of good seed beds, methods of sowing and their suitability under different conditions. Seeding practices in relation to kind of seed, time of sowing, soil moisture, etc. Tillage practices for different soil types and crops.

SECTION - C

Weed characteristics, dissemination, competition for growth factors and losses caused by them. Common methods of weed control.

SECTION - D

Maintenance of soil fertility and soil productivity-green manuring, crop rotation, multiple cropping, mixed cropping, relay cropping, rain fed and dryland farming.

BOOKS RECOMMENDED

1. *Principles of Crop Husbandry* by Ayres.
2. *Principles of Agronomy* by Pearson.
3. *Hand Books of Agriculture* by I. C. A. R.
4. *Agricultural Resources* by A.S.Atwal and H.S.Mavi.
5. Package of Practices for Crops of Punjab -Kharif/Rabi,Punjab Agricultural University Ludhiana.
6. *Punjab Plants, Check-List* by M. Sharma

BVAG **105-18 Introductory Soil Science**

Credit: 3

SECTION - A

Concept of land: soil and soil science; Composition of earth crust and its relationship with soils; Rocks and minerals; Weathering. Soil forming factors and processes; Soil profile; Elementary taxonomic classification of soils; Soils of Punjab and India;.

SECTION - B

Soil physical properties-Soil texture: textural classes; Soil structure- classification, soil aggregation and significance, soil consistency, soil crusting, bulk density and particle density of soils and porosity, their significance and manipulation.

SECTION - C

Soil water: retention and potentials, soil moisture constants, movement of soil water- infiltration, percolation, permeability, drainage and methods of determination of soil moisture, thermal properties of soil, influence of soil temperature and air on plant growth.

SECTION -D

Soil colloids: properties, nature, types and significance; Sources of charges in clay minerals; Introduction of saline and alkaline soils, Ion exchange, CEC; AEC - factors affecting and adsorption of ions; Soil organic matter decomposition, mineralization, humus; Carbon cycle, C: N ratio; Soil organisms - their beneficial and harmful roles.

BOOKS RECOMMENDED

1. Pedology : J L Sehgal
2. Nature and properties of soil: Nyle C. Brady & Ray R. Well
3. Handbook of Agricultural Sciences- S.S. Singh

BVAG106-18 **Principles of Plant Pathology**

Credits: 2

Section-1

Definition, objectives, history, terms and concept of plant pathology.

Section-2

Introduction, importance and general characters of fungi, bacteria, nematodes and viruses.

Section-3

Survival and dispersal of plant pathogens, Phenomenon of infection; defense mechanisms in plants; Plant disease epidemiology and forecasting.

Section-4

General principles of plant disease management. Plant quarantine and inspection. Genetic, cultural, biological, physical and chemical methods of plant disease management. Integrated plant disease management

Books Recommended:

1. Plant Pathology in India by S.S. Chahal
2. Introduction to Principles of Plant Pathology by R.S. Singh
3. Principles of Plant Pathology by M.K. Dasgupta

BVAG107-18 Horticulture-Fruit Crops (Practical)

Credit: 1

Practical: Horticultural tools and their uses. Containers and potting mixtures. Plant and seed propagation, scarification, and stratification. Layout and planting systems. Methods of pruning and training. Training of ber, grape and pomegranate. Pruning of ber, grape, phalsa, fig, apple, pear, peach. Identification of important species and varieties of fruits. Micro Irrigation methods. Methods of fertilizer application. Formulations of growth regulators, powder, solution and lanolin paste for propagation. Application of growth regulators for improving fruit set, fruit size, quality, delaying and hastening ripening. Visit to local commercial orchards and fruit nurseries.

BVAG108-18 Agro meteorology (Practical)

Credit: 1

Practical: Site selection for Agrometeorological Observatory. Project on setting up, recording and maintenance of instruments in a meteorological observatory. Measurement of temperature, rainfall, evaporation, atmospheric pressure, sunshine duration, solar radiation, wind direction, wind speed and relative humidity. Study of weather forecasting and synoptic charts. Processing, presentation and interpretation of climatic data in relation to crops.

BVAG109-18 Soil Science (Practical)

Credit: 1

Practical: Collection and processing of soil samples for analysis of organic carbon, pH, EC, available N, P, K and S. Study of a soil profile, Determination of bulk density and particle density. Identification of rocks and minerals, soil texture determination, soil moisture determination, Soil moisture constants- field capacity, infiltration rate, water holding capacity.

BVAG110-18 Principles of Plant Pathology (Practical)

Credit: 1

Acquaintance to plant pathology laboratory equipments. Preparation of culture media for fungi and bacteria. Isolation techniques and preservation of plant disease samples. Study of important plant pathogenic genera. Demonstration of Koch's postulates. Study of different groups of fungicides and antibiotics. Bio-control of plant pathogens; Visit to remote sensing laboratory and experimental area.

SEMESTER – II

BVAG201-18 Manures and Fertilizers

Credits: 2

Section-1

Fertilizers- classification, manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate), phosphatic (single super phosphate, enriched super phosphate, diammonium phosphate, ammonium poly phosphate), potassic and complex fertilizers

Section-2

Fate and reactions of various types of fertilizers in the soil

Section-3

Secondary and micronutrient fertilizers and amendments; Adulteration in fertilizers; Fertilizer Control Order; Fertilizer storage

Section-4

Bio-fertilizers and their advantages; Manures- bulky and concentrated, Farm Yard and poultry Manures; Composting – different methods, mechanical compost plants, vermi-composting, green manuring, oil cakes. Sewage and sludge-biogas plant slurry, plant and animal refuges.

BVAG202-18 Introduction to Genetics

Section- 1

Cell structure & Cell division, Mitosis and meiosis, their significance and differences between them; Study of chromosome structure, morphology, number and types; Mechanism of crossing over, Numerical and structural chromosomal aberrations.

Section- 2

Mendel's laws of inheritance and exceptions to the laws, Cytoplasmic inheritance, its characteristic features and difference between chromosomal and cytoplasmic inheritance; Types of gene action, Multiple alleles, Pleiotropism, Penetrance and expressivity; Qualitative traits, Quantitative traits and differences between them; Multiple factor hypothesis;

Section- 3

DNA and its structure, function, types, modes of replication and repair. RNA and its structure, function and types; Transcription, Translation. Genetic code and outline of protein synthesis; Linkage, types of linkage; Mutation and its characteristic features; Methods of inducing mutations.

Section- 4

Evolution of different crop species like cotton, wheat and Brassicas.

Books Recommended:
1. Fundamentals of Genetics by B.D.Singh
2. Genetics by P.K. Gupta
3. Principles of Genetics by E.J. Gardner and M.J. Simmons

BVAG203-18 Fundamentals of Insect Morphology and Systematics

Credits: 2

Section-1

Entomology- definition and its history; importance and scope; Factors affecting insect abundance.

Section-2

Taxonomy- its importance, history, development and binomial nomenclature; Classification of class Insecta up to orders, suborders and important families with special emphasis on distinguishing morphological characters.

Section-3

Integument, body regions and segmentation; Modification and function of mouth parts, antennae, legs and wings; wing venation and wing coupling apparatus; Sense organs; metamorphosis and diapauses; Types of reproduction.

Section-4

Morphology and anatomy of Grasshopper

Books:

1. A General Text Book of Entomology by A.D. Imms
2. Principles of Insect Morphology by R.E. Snodgrass.
3. The Insects: Structure and Function by R.F. Chapman.
4. Text Book of Agricultural Entomology by H.S. Pruthi.
5. General Entomology by M.S. Mani
6. Text Book of Agricultural Entomology by P.M..Srivastava and Ashok Kumar

BVAG204-18 Principles of Agronomy (Rabi Crops)

Credits: 2

Section-1

Origin, geographic distribution of crops, Area, yield and production of rabi crops in different states of India; Causes of variation in productivity; National and International Agricultural Research Institutes in India and their mandate.

Section-2

Economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi cereal crops: Wheat and Barley

Section-3

Economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi pulse crops-chickpea, lentil, field pea, French bean and oilseed crops- rapeseed and mustard, sunflower, safflower, linseed

Section-4

Economic importance, soil and climatic requirements, varieties, cultural practices and yield of other rabi crops such as sugarcane, sugar beet, potato and forage crops- berseem, Lucerne and oats

BVAG205-18 Soil chemistry, Fertility and Nutrients Management

Credits: 2

Section-1

Soil as a source of plant nutrients. Essential and beneficial elements- criteria of essentiality, forms of nutrients in soil, mechanisms of nutrient transport to plants. Factors affecting nutrient availability to plants.

Section-2

Measures to overcome deficiencies and toxicities. Problem soils- acid, salt affected and calcareous soils, characteristics, nutrient availabilities, Reclamation- mechanical, chemical and biological methods

Section-3

Fertilizer and insecticides and their effect on soil, water and air. Irrigation water- quality of irrigation water and its appraisal. Soil fertility- approaches for soil fertility evaluation. Methods of soil testing. Critical levels of different nutrients in soil. Plant analysis- DRIS approach, critical levels in plants. Rapid tissue tests.

Section-4

Indicator plants. Biological methods of soil fertility evaluation. Soil test based fertilizer recommendations to crops. Factors influencing nutrient use efficiency (NUE) in respect of N, P, K, S, Fe and Zn fertilizers. Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions.

Books Recommended:
1. The Nature and Properties of Soils by N.C. Brady and Ray R. Well
2. Soil Fertility & Nutrient Management by S.S. Singh

BVAG206-18 Insect Ecology and Integrated Pest Management

Credits: 2

Section-1

Insect Ecology- Introduction, environment and its components, effect of abiotic and biotic factors. Biotic potential, environmental resistance and causes of pest outbreaks in agro-ecosystem. Categories of pests. Insects, Pests problems and Crop Losses. Beneficial insects: important pollinators, weed killers and scavengers; their importance. Important non-insect pests: mites, rodents and birds.

Section-2

Chemical Control: importance, hazards and limitations. Integrated Pest Management(IPM): need, its tools and limitations. Natural Control. Host plant resistance. Physical, Mechanical and Cultural Control. Biological Control: parasitoids, predators and microbes. Legislative Control. Insecticide Act 1968.

Section-3

Classification, toxicity and formulations of insecticides. Study of important insecticides: botanicals, organochlorines, organophosphates, carbamates, synthetic pyrethroids, neonicotinoids, oxydiazines, nereistoxin derivatives, phenyl pyrazoles, thiourea derivatives, pyridines, pyroles,etc., rodenticides,acaricides and fumigants. Biorational and other innovative approaches in pest management: insect growth regulators, semiochemicals, light-activated pesticides, propesticides, avermectins, antifeedants, chemosterilants, genetic control etc.

Section-4

Pest surveillance, monitoring and forecasting. Economic threshold and Economic injury levels. Integration of various control tactics. IPM in important vegetables.

Books Recommened :

1. Agricultural Pests of South Asia and Their Management. A. S. Atwal and G.S Dhaliwal. Kalyani Publishers, Ludhiana.
2. Principles of Insect Pest Management. G. S. Dhaliwal and Ramesh Arora. National Agricultural Technology Information Centre, Ludhiana.
3. Entomology At a Glance. R.C. Saxena and R. C. Srivastava. Agrotech Publishing Academy, Udaipur.
4. Applied Animal Ecology. S.S.Bains and A.S. Atwal.Kalyani Publishers, Ludhiana.

BVAG207-18 Introduction to Genetics (Practical)

Credits: 1

Preparation and use of fixatives and stains for light microscopy; Preparation of micro slides and identification of mitosis and meiosis; Monohybrid, Dihybrid and Trihybrid ratios and their modifications; Chi- square analysis; Interaction of factors; Epistatic factors, Supplementary factors and Duplicate factors; Complementary factors, Additive factors and Inhibitory factors; Linkage - Two point test cross; Linkage - Three point test cross; Induction of polyploidy using colchicine; Induction of chromosomal aberrations using chemicals

BVAG208-18 Fundamentals of Insect Morphology and Systematics (Practical)

Credits: 1

Collection and preservation of insects including immature stages; Morphology and anatomy of grasshopper; different types of antennae, mouth parts, legs and wings; Wing venation and wing coupling apparatus; Types of larvae and pupae; Study of characters of orders - Odonata, Orthoptera, Dictyoptera, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

BVAG209-18 Principles of Agronomy (Rabi Crops) (Practical)

Credits: 1

Study of manures, fertilizers and green manure crops; Study of interculture implements; Methods of fertilizer application; Seed bed preparation and sowing of wheat, sugarcane and sunflower; Calculations of seed rate; Identification of weeds in wheat and grain legumes; Morphological characteristics of wheat, sugarcane, chickpea and mustard; Yield components of wheat and sugarcane.

BVAG210-18 Soil chemistry, Fertility, Nutrient and Management (Practical)

Credits: 1

Principles of analytical instruments and their calibration and applications, Colorimetry and flame photometry. Estimation of available N, P, K, S and Zn in soils. pH, Electrical Conductivity, carbonates, bicarbonates, Ca++ and Mg++ in soil and water. Lime requirement and gypsum requirement of problem soils. Estimation of N, P and K in plants.

BVAG211-18 Insect ecology and Integrated Pest Management (Practical)

Credits: 1

Study of terrestrial and pond ecosystem, behaviour, orientation, distribution patterns of insects. Sampling techniques for the estimation of insect poplulation and damage. Pest surveillance through light and pheromone traps. Practicable IPM practices. Insecticides and their formulations; calculation of doses of insecticides. Compatibility of pesticides. Identification of common insect-pests, phytophagous mites, rodent, bird pests and their damage, other beneficial insect-pollinators, weed killers and scavangers.

Semester-III

Course code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVAG301-18	Plant Physiology	2	0	40	60	100	2
BVAG302-18	Agricultural Extension Education, Methodology and Communication Skills	2	0	40	60	100	2
BVAG303-18	Agriculture Marketing, Trade and Prices	2	0	40	60	100	2
BVAG304-18	Fundamental of Soil and Water Engineering	2	0	40	60	100	2
BVAG305-18	Introduction to Plant Breeding	3	0	40	60	100	3
BVAG306-18	Introductory Forestry	1	0	40	60	100	1
BVAG307-18	Principal of Agronomy (Kharif Crops)	2	0	40	60	100	2
BVAG308-18	Plant Physiology (Practical)	0	2	20	30	50	1
BVAG309-18	Fundamental of Soil and Water Engineering (Practical)	0	2	20	30	50	1
BVAG310-18	Introduction to Plant Breeding (Practical)	0	2	20	30	50	1
BVAG311-18	Introductory Forestry (Practical)	0	2	20	30	50	1
BVAG312-18	Principal of Agronomy (Kharif Crops) (Practical)	0	2	20	30	50	1
BVAG313-18	Exposure visit to Agricultural Section of Commercial Banks in winter break	-	-	Satisfactory / Un Satisfactory			4
BVAG314-19	Project report on Agricultural Marketing system	0	8	00	200	200	8
	Total	14	18	380	770	1150	31

BVAG301-18 **Plant Physiology**

Section-1

Introduction and importance of plant physiology in agriculture

Section-2

Seed structure; Morpho-physiological and biochemical changes during seed development; Physiological and harvestable maturity; Seed germination and seed dormancy

Section-3

Growth and development; Crop water relations; Transpiration and its significance in relation to crop productivity; Water use efficiency; Significance of C3, C4 and CAM pathways; Photorespiration; Photosynthesis and crop productivity; Translocation of assimilates. Source-sink reletionship; its types and significance

Section-4

Mineral nutrition; physiology of nutrient uptake, deficiency and toxicity symptoms and hydroponics; Photoperiodism and vernalization; Plant growth regulators- occurrence, biosynthesis, mode of action and commercial applications; Senescence and abscission; Fruit ripening and its hormonal regulation.

Books:

1. Introduction to Plant Physiology by William G.Hopkins and Norman P.A. Huner

BVAG302 -18
Agricultural Extension Education , Methodology and Communication Skills

Section-**1**

Education-meaning and types; agricultural extension education - meanings, objectives, principles, philosophy and emerging problems and challenges with reference to Human Values.

Section-**2**

Introduction, importance and problems of rural development, Historical perspective of major agricultural and rural development programmes of pre and post independence era

Section- **3**

Panchayati Raj System – Brief history, objectives, Powers, functions and organizational set up of three-tier Panchayati Raj System, emerging problems of Panchayati Raj institutions

Section-**4**

New trends in agricultural extension education and privatization of extension; women development programmes, emergence of broad based extension in the context of international and national developments

Books:

1. Extension Education by A.K. Nayak Singh

2. Agricultural Extension by A.W. van den Ban and H. Staurt Hawkins

3. Panchayti Raj in India by Ravi Goel.

BVAG303-18**:** **Agricultural Marketing, Trade and Prices**

Unit I

Agricultural marketing: concept, definition, scope, components, classification, market structure, conduct and performance; Market functionaries; Producer's surplus: meaning, types, marketable surplus, marketed surplus. Marketing efficiency: meaning, marketing costs, margins and price spreads.

Unit II

Trade: domestic trade, free trade, international trade, GATT, WTO, implications of AOA. Market access, domestic support, export subsidies, EXIM policy and Ministerial conferences.

Unit III

Market integration: definition, types; Cooperative marketing; State trading. Ware Housing Corporation: objectives, functions and advantages. Food Corporation of India: objectives and functions.

Unit IV

Quality Control: agricultural products, AGMARK, meaning and need for agricultural marketing policy. Risk in marketing: meaning, importance and types; Speculations and hedging. Futures trading, Contract farming

BVAG304-18 **Fundamentals of Soil and Water Conservation Engineering**

Unit I

Surveying- survey equipments, chain survey. Plotting procedure. Calculations of area of regular and
irregular fields. Levelling- terminology, equipments, methods of calculation; types of levelling and contouring.

Unit II

Irrigation- classification of projects, flow irrigation and lift irrigation. Water sources. Water lifting devices; pumps, their capacity and power calculations.

Unit III

Irrigation water measurement- weirs, flumes and orifices, Water conveyance systems- open channel and underground pipeline. Surface, drip and sprinkler irrigation methods.

Unit IV

Soil and water conservation, soil erosion, types and control measures.

BVAG305-18**:** **Introduction to Plant Breeding**

Unit I

Floral biology, emasculation and pollination techniques in cereals, millets, pulses, oilseeds, fibers, plantation crops etc. Modes of reproduction- sexual and asexual

Unit II

Plant Breeding- Aims and objectives; Significance in plant breeding; Modes of pollination, genetic consequences, differences between self- and cross- pollinated crops; Methods of breeding - Introduction and Domestication; Johannsen's pure-line theory and its genetic basis; Selection: mass selection, pure-line selection; Hybridization, aims and objectives, types of hybridization; Methods of handling segregating generations, pedigree method, bulk method, back cross method

Unit III

Incompatibility and male sterility and their utilization in crop improvement; Heterosis, inbreeding depression, various theories of heterosis, exploitation of hybrid vigor, development of inbred lines, single-cross and doublecross hybrids; population improvement programmes, recurrent selection, synthetics and composites

Unit IV

Mutation breeding; Ploidy breeding; Apomixis- its types and significance; Wide hybridization and its role crop improvement. Tissue culture, concepts and history, various aspects of plant tissue culture-meristem culture, micropropagation

BVAG306-18**:** **Introductory Forestry**

Unit I

Forestry - definition, scope and important terminology. Status of forests in India and their role. History of forestry development in India. National and International Forestry Organizations. Distribution of forests and their classification.

Unit II

Tending operations. Locality factors: climatic, edaphic, topographical and biotic. Agroforestry, farm forestry and social forestry - definition, objectives and need. Role of trees in rural economy.

Unit III

Choice of species w.r.t. site/economic uses and constraints of tree growing. Tree propagation and planting methods.

Unit IV

Deforestation - forms, causes and remedial measures. Forest management: growing stock, normal forest, sustained yield, increment and rotation. Forest utilizationmajor and minor forest products. Forest policy and laws.

BVAG307-18 Principal of Agronomy (Kharif Crops)

Section-1

Meaning and scope of Agronomy; tillage and crop stand establishment. Planting geometry and its effect on growth and yield; Cropping systems- origin, geographic distribution, economic importance, soil and climatic requirements of major crops

Section-2

Varieties, cultural practices and yield of *kharif* cereal crops- rice, maize, sorghum, pearl millet

Section-3

Varieties, cultural practices and yield of *kharif* pulses- pigeonpea, mungbean, urdbean and oilseeds - groundnut, sesame, soybean

Section-4

Varieties, cultural practices and yield of *kharif* fibre crops- cotton, jute, sunhemp and forage crops - sorghum, maize, cowpea, cluster bean and napier

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Books

1. Handbook of Agriculture-ICAR
2. Package of Practices for Kharif Crops, PAU
3. Text book of Field crops Production-Food grain crops by ICAR
4. Text book of Field Crops Production- Commercial Crops by ICAR

BVAG308-18 **Plant Physiology (Practical)**

Seed structure, germination and seed dormancy. Growth analysis. Calculation of growth parameters. Methods of measuring water status in roots, stems and leaves. Measurement of water potential. Absorption spectrum of chloroplastic pigments. Transpiration. Photosynthesis and respiration. Stomatal frequency and index. Deficiency symptoms of nutrients. Leaf anatomy of C3 and C4 plants.

BVAG309-18 **Fundamentals of Soil and Water Conservation Engineering (Practical)**

Acquaintance with chain survey equipment. Ranging and measurement of offsets. Chain triangulation and plotting. Levelling equipments. Differential levelling. Profile levelling. Contour survey and plotting. Study of centrifugal pumping system and irrigation water measuring devices. Surface irrigation methods. Study of different components of sprinkler and drip irrigation systems. Uniformity of water application in drip and sprinkler systems. Study of soil and water conservation measures.

BVAG310-18: Introduction to Plant Breeding (Practical)

Study of megasporogenesis and microsporogenesis. Fertilization and life cycle of an angiospermic plant; Plant Breeder's kit: Hybridization techniques and precautions to be taken while attempting crosses; Floral morphology, selfing, emasculation and crossing techniques in different self and cross pollinated species; Study of male sterility and incompatibility. Surface sterilization of explants. Establishment of callus/cell suspension cultures. Induction of plant regeneration. Hardening and transfer to soil. Micropropagtaion

BVAG311-18: Introductory Forestry (Practical)

Identification of trees. Measurement of tree height, diameter, girth, bark thickness, increment, age and volume. Nursery raising and silvicultural practices of some economic forest trees viz., safeda, poplar, shisham, mulberry, kikar, sagwan, dek, bamboo and subabul.

BVAG312-18 Principal of Agronomy (Kharif Crops) (Practical)

Study of tillage implements. Practice of ploughing and puddling. Seed bed preparation, sowing, fertilizer application, nursery raising and transplanting of Kharif crops. Calculations of seed rate. Effect of seed size and sowing depth on germination. Identification of weeds of Kharif crops; Study of yield components; Study of kharif crops and their important agronomic practices

BVAG313-18 Exposure visit to Agricultural Section of Commercial Banks

Visits to commercial bank, lead bank of the area, Regional Rural Bank, NABARD office to study the structure of agriculture cell and handling of term loans, KKC, agro-based financial projects, difficulties faced etc.

Each student will write detailed reports on his visit to such locations in his practical notebook.

BVAG314-19 Project report on Agricultural Marketing System

Sketching out the alternative marketing channels of major foodgrains, fruits, vegetables, cotton and dairy products; Listing out the market functions performed by various market functionaries; analysing the marketing spread (costs and margins) in packing, storage, transportation and processing, studying the marketing losses at different levels.

Visit to FCI, MARKFED, State Export Corporation, Regulated markets and cooperative marketing society, warehouse, cold storage and agro-processing units and study their organisational structures, working and performance, highlighting the weaknesses.

Study of export market- procedure and processes involved, SPS and TBT standards, tariff and non-tariff barriers, studying the role of APEDA

Each student will write detailed reports on his visit to such locations in his practical notebook.