

Polytechnic in Agriculture, Diploma Program
Semester wise Courses

First Year

First Semester

Course No.	Course Title	Credit hrs.
Agron. 1.1	Introductory Agriculture and Principles of Agronomy	3 (2 + 1)
Agron. 1.2	Field Crops-I (Kharif)	3 (2 + 1)
Ag. Chem. 1.1	Introduction to Soil Science	3 (2 + 1)
Ag. Ento. 1.1	Fundamentals of Entomology	2 (1 + 1)
PBG 1.1	Economic Botany	2 (1 + 1)
Hort. 1.1	Principles of Horticulture	2 (1 + 1)
Ag. Eco. 1.1	Principles of Agricultural Economics	2 (2 + 0)
Eng. 1.1	Comprehension and Communication Skills in English	2 (1 + 1)
PE 1.1	NSS/NCC/Physical Education (<i>Non-credit course</i>)	1 (0 + 1)
Total credit hrs.		20 (12 + 8)

Second Semester

Course No.	Course Title	Credit hrs.
Agron. 2.3	Field Crops-II (Rabi)	3 (2 + 1)
Ag. Ento. 2.2	Principles of Insect Control	2 (1 + 1)
Hort. 2.2	Production Technology of Fruit Crops	3 (2 + 1)
Maths. 2.1	Bio Mathematics	2 (2 + 0)
Pl. Path. 2.1	Introductory Plant Pathology	2 (1 + 1)
Ag. Engg. 2.1	Fundamentals of Agricultural Engineering	3 (2 + 1)
LPM. 2.1	Principles of Livestock & Poultry Production	2 (1 + 1)
Ag. Extn. 2.1	Fundamentals of Extension Edu. and Communication	3 (2 + 1)
P. E. 2.2	NSS/NCC/Physical Education (<i>Non-credit course</i>)	1 (0 + 1)
Total credit hrs.		21 (13 + 8)

Second Year

Third Semester

Course No.	Course Title	Credit hrs.
Agron. 3.4	Practical Crop Production (Kharif Crops)	1 (0 + 1)
Agron. 3.5	Farming Systems and Farm Management	2 (1 + 1)
Ag. Chem. 3.2	Soil Chemistry, Soil Fertility and Nutrient Management	3 (2 + 1)
Ag. Ento. 3.3	Pests of Field Crops & Stored Grain and their Mgt.	3 (1 + 1)
Pl. Phy. 3.1	Crop Physiology	3 (2 + 1)
Hort. 3.3	Production Technology of Vegetable Crops	3 (2 + 1)
Pl. Path. 3.2	Diseases of Field Crops and their Management	3 (2 + 1)
LPM 3.2	Dairy Cattle and Buffalo Production & Management	3 (2 + 1)
P. E. 3.3	NSS/NCC/Physical Education (Non-credit course)	1 (0 + 1)
Total credit hrs.		22 (13 + 9)

Fourth Semester

Course No.	Course Title	Credit hrs.
Agron. 4.5	Weed Management	2 (1 + 1)
Agron. 4.7	Practical Crop Production (Rabi Crops)	1 (0 + 1)
Ag. Chem. 4.3	Plant Nutrition, Manures and Fertilizers	3 (2 + 1)
Ag. Ento. 4.4	Pests of Horticultural Crops and their Management	3 (2 + 1)
PBG 4.2	Principles of Genetics	3 (2 + 1)
Ag. Stat. 4.1	Introduction to Computer Application	2 (1 + 1)
Pl. Path. 4.3	Diseases of Fruit and Vegetable Crops and their Mgt.	3 (2 + 1)
Ag. Engg. 4.2	Post-harvest Technology	1 (1 + 0)
P. E. 4.4	NSS/NCC/Physical Education (Non-credit course)	1 (0 + 1)
Total credit hrs.		19 (11 + 8)

Third Year

Fifth Semester

Course No.	Course Title	Credit hrs.
Agron. 5.8	Water Management including Micro Irrigation	3 (2 + 1)
Agron. 5.9	Organic Farming and Sustainable Agriculture	2 (1 + 1)
PBG 5.3	Principles of Plant Breeding	3 (2 + 1)
Hort. 5.4	Production Technology of Flower Crops and Gardening	2 (1 + 1)
Ag. Stat. 5.2	Agriculture Statistics	3 (2 + 1)
Ag. Micro. 5.1	Agricultural Microbiology	3 (2 + 1)
Ag. Engg. 5.3	Fundamentals of Soil Water Conservation and Engg.	3 (2 + 1)
Ag. Extn. 5.2	Entrepreneurship Development	2 (1 + 1)
Ag. Met. 5.1	Agricultural Meteorology	3 (2 + 1)
Total credit hrs.		24 (15 + 9)

Sixth Semester

Course No.	Course Title	Credit hrs.
Agron. 6.10	Vermicompost	4 (0 + 4)
PBG 6.4	Seed Production Technology	4 (0 + 4)
Hort. 6.5	Preservation and Value Addition in Horticultural Crops	4 (0 + 4)
Hort. 6.6	Green House Technology	4 (0 + 4)
P1.Path. 6.4	Mushroom Production Technology	4 (0 + 4)
	Educational Tour (<i>Non-credit course</i>)	
Total credit hrs.		20 (0 + 20)

Polytechnic in Agriculture, Diploma Program
Department wise Courses

Agronomy

Course No.	Course Title	Credit hrs.
Agron. 1.1	Introductory Agriculture and Principles of Agronomy	3 (2 + 1)
Agron. 1.2	Field Crops-I (kharif)	3 (2 + 1)
Agron. 2.3	Field Crops -II (Rabi)	3 (2 + 1)
Agron. 3.4	Practical Crop Production (Kharif Crops)	1 (0 + 1)
Agron. 3.5	Farming Systems and Farm Management	2 (1 + 1)
Agron. 4.6	Weed Management	2 (1 + 1)
Agron. 4.7	Practical Crop Production (Rabi Crops)	1 (0 + 1)
Agron. 5.8	Water Management including Micro Irrigation	3 (2 + 1)
Agron. 5.9	Organic Farming and Sustainable Agriculture	2 (1 + 1)
Agron. 6.10	Vermicompost	4 (0 + 4)
Total credit hrs.		24 (11 + 13)

Plant Breeding and Genetics

Course No.	Course Title	Credit hrs.
PBG 1.1	Economic Botany	2 (1 + 1)
Pl. Phy. 3.1	Crop Physiology	3 (2 + 1)
PBG 4.2	Principles of Genetics	3 (2 + 1)
PBG 5.3	Principles of Plant Breeding	3 (2 + 1)
PBG 6.4	Seed Production Technology	4 (0 + 4)
Total credit hrs.		15 (7 + 8)

Agricultural Chemistry and Soil Science

Course No.	Course Title	Credit hrs.
Ag. Chem. 1.1	Introduction to Soil Science	3 (2 + 1)
Ag. Chem. 3.2	Soil Chemistry, Soil Fertility and Nutrient Management	3 (2 + 1)
Ag. Chem. 4.3	Plant Nutrition, Manures and Fertilizers	3 (2 + 1)
Total credit hrs.		9 (6 + 3)

Agricultural Meteorology

Course No.	Course Title	Credit hrs.
Ag. Met. 5.1	Agricultural Meteorology	3 (2 + 1)
Total credit hrs.		3 (2 + 1)

Agricultural Entomology

Course No.	Course Title	Credit hrs.
Ag. Ento. 1.1	Fundamentals of Entomology	2 (1 + 1)
Ag. Ento. 2.2	Principles of Insect Control	2 (1 + 1)
Ag. Ento. 3.3	Pests of Field Crops & Stored Grain and their Management	3 (2 + 1)
Ag. Ento. 4.4	Pests of Horticultural Crops and their Management	3 (2 + 1)
Total credit hrs.		10 (6 + 4)

Agricultural Economics

Course No.	Course Title	Credit hrs.
Ag. Econ. 1.1	Principles of Agricultural Economics	2 (2 + 0)
Total credit hrs.		2 (2 + 0)

Agricultural Engineering

Course No.	Course Title	Credit hrs.
Ag. Engg. 2.1	Fundamentals of Agricultural Engineering	3 (2 + 1)
Ag. Engg. 4.2	Post-harvest Technology	1 (1 + 0)
Ag. Engg. 5.3	Fundamentals of Soil Water Conservation and Engg.	3 (2 + 1)
Total credit hrs.		7 (5 + 2)

Plant Pathology

Course No.	Course Title	Credit hrs.
Pl. Path. 2.1	Introductory Plant Pathology	2 (1 + 1)
Pl. Path. 3.2	Diseases of Field Crops and their Management	3 (2 + 1)
Pl. Path. 4.3	Diseases of Fruit and Vegetable Crops and their Mgt.	3 (2 + 1)
Pl. Path. 6.4	Mushroom Production Technology	4 (0 + 4)
Total credit hrs.		12 (5 + 7)

Extension Education

Course No.	Course Title	Credit hrs.
Ag. Extn. 2.1	Fundamentals of Extension Edu. and communication	3 (2 + 1)
Ag. Extn. 5.2	Entrepreneurship Development	2 (1 + 1)
Total credit hrs.		5 (3 + 2)

Horticulture

Course No.	Course Title	Credit hrs.
Hort. 1.1	Principles of Horticulture	2 (1 + 1)
Hort. 2.2	Production Technology of Fruit Crops	3 (2 + 1)
Hort. 3.3	Production Technology of Vegetable Crops	3 (2 + 1)
Hort. 5.4	Production Technology of Flower Crops and Gardening	2 (1 + 1)
Hort. 6.5	Preservation and Value Addition in Horticultural Crops	4 (0 + 4)
Hort. 6.6	Green House Technology	4 (0 + 4)
Total credit hrs.		18 (6 + 12)

Bio-Mathematics and Microbiology

Course No.	Course Title	Credit hrs.
Maths. 2.1	Bio-Mathematics	2 (2 + 0)
Ag. Micro. 5.1	Agricultural Microbiology	3 (2 + 1)
Total credit hrs.		5 (4 + 1)

Statistics and Computer Application

Course No.	Course Title	Credit hrs.
Ag. Stat. 4.1	Introduction to Computer Application	2 (1 + 1)
Ag. Stat. 5.2	Agriculture Statistics	3 (2 + 1)
Total credit hrs.		5 (3 + 2)

English

Course No.	Course Title	Credit hrs.
Eng. 1.1	Comprehension and Communication Skills in English	2 (1 + 1)
Total credit hrs.		2 (1 + 1)

Animal Production

Course No.	Course Title	Credit hrs.
LPM 2.1	Principles of Livestock & Poultry Production	2 (1 + 1)
LPM 3.2	Dairy Cattle and Buffalo Production & Management	3 (2 + 1)
Total credit hrs.		5 (3 + 2)

Non-credit courses

Course No.	Course Title	Credit hrs.
PE. 1.1	NSS / NCC / Physical Education	1 (0+1)
PE. 2.2	NSS / NCC / Physical Education	1 (0+1)
PE. 3.3	NSS / NCC / Physical Education	1 (0+1)
PE. 4.4	NSS / NCC / Physical Education	1 (0+1)
Total credit hrs.		4 (0 + 4)

REVISED
DISCIPLINE WISE DETAILS OF COURSE
CONTENT
FOR
POLYTECHNIC IN AGRICULTURE
OF
SAU'S OF GUJRAT

Year-2015-16

AGRONOMY

Agron. 1.1 Introductory Agriculture and Principles of Agronomy

Credits 3 (2+1)

Theory:

Art, Science and business of crop production, Basic elements of crop production, History of Agricultural Development, Chronological Agricultural Technology development in India. Soil groups, Value addition, Women in Agriculture roles, Agriculture: definition, meaning and its branches, Agronomy:-definition, meaning and scope of agronomy. Classification of field crops. Factors affecting on crop production, Agro-climatic zones of Gujarat. Tillage: Definition of tillage and tith. Classification of Tillage : Influence of tillage on physical properties of soil. Planting geometry and its effect on growth and yield. Cropping systems: Definition and types of cropping systems. Difference between dryfarming, dry land farming and rainfed farming. Problems of dry land agriculture.

Practicals:

1. Study of different hand tools
2. Acquaintance with field crops grown in crop cafeteria.
3. Identification and study of tillage implements and practice of ploughing/harrowing
4. Identification and study of seeding equipments and practice of different methods of sowing
5. Identification and calculation of manures, fertilizers and green manure crops
6. Identification of intercultivation implements and their practice
7. Practice of methods of fertilizer applications

Theory:

Name of crop, Local name, Scientific name and family. Origin, economic importance, soil and climatic requirements, cultural practices viz., selection of seeds, seed treatment, sowing method, seed rate, fertilizer recommendations, time and method of application of manures and fertilizers including bio-fertilizers. Thinning, gap filling, earthing up, interculturing, weed control measures, irrigation, crop rotation, inter-mixed/relay cropping, major insect-pests and diseases, harvesting, threshing, winnowing, cleaning, drying, storage, high yielding improved and hybrid varieties, yield, main and sub research stations.

Cereals—Major crops: rice, maize, sorghum, pearl millet and Minor crops: finger millet and Kodomillet. **Pulses**: pigeonpea, mung bean, urd bean, cluster bean and cowpea. **Oilseeds**: groundnut, castor, sunflower and sesame. **spices**— Fennel. **Fibre** crops: cotton and sunhemp. **Commercial crop**: tobacco. *Kharif* Forage and grasses crops: Jowar, Rajka bajara, Maize, napier, cowpea.

Practicals:

1. Identification of seeds and varieties of major *kharif* crops
2. Seed treatment of different *kharif* crops
3. Preparation of different methods of rice nursery
4. Study of different land configuration techniques
5. Practice of different methods of sowing of *kharif* crops
6. Visit/Preparation to crop cafeteria and record growth and yield attributing observations of *kharif* crops

Theory:

Name of crop, local name, botanical name and family. Origin, economic importance, soil and climatic requirements, cultural practices viz., selection of seeds, seed treatment, sowing method, seed rate, fertilizer recommendation, time and method of application of manures and fertilizers including bio-fertilizers, thinning, gap filling, earthing up, interculturing, weed control measures, irrigation, crop rotation, inter-mixed/relay cropping, major insect-pests and diseases, harvesting, threshing, winnowing, cleaning, drying, storage, preparation of produce for market, value addition, high yielding improved and hybrid varieties, yield, main and sub research stations. **Cereals**– Major crop: Wheat (irrigated and unirrigated), **Pulses**– Major crop: Chickpea and Indian bean. Minor crops: Lentil, peas. **Oilseeds**–Major crops: Mustard. Minor crops: Safflower and Linseed. **Spices**- Cumin, Fenugreek, Coriander, Dilseed and Ajvain. **Sugar crops**– Major crop: Sugarcane. **Regional medicinal crops**- Major crop: Isbgul, palma rosa. **Commercial crops** - Calcutti Tobacco, chicory and Potato. **Rabi Forage crops**:- Lucerne and oat.

Practicals

1. Seed bed preparation and sowing of wheat, sugarcane and cumin crops
2. Seed treatment of different *rabi* crops
3. Raising seedling beds
4. Top dressing of nitrogen in *rabi* crops and visit to fertilizer experiments
5. Identification of seeds and plants of *rabi* field crops
6. Study of yield contributing characters of wheat , chickpea and mustard
7. Working out quantity of required fertilizers from different sources for *rabi* crops
8. Judging of maturity symptoms of wheat, sugarcane and mustard
9. Visit/Preparation of crop cafeteria and record observations of *rabi* crops

Agron.3.4 Practical Crop Production (*Kharif* Crops)

Credits 1(0+1)

Crop planning, raising field crops during *kharif* season. Under this course, plot will be allotted to group of student will be allotted a plot from the time of land preparation until the harvest of crop depending upon the availability of the resources for raising suitable crop(s). For this purpose, a group of 5-6 students may be formed to carry out all field operations like seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect-pests and diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce. Each group will carry out all important field operations in group under the supervision and guidance of the course teacher. Necessary inputs will be supplied to the students in free of cost. The entire responsibility of planning and execution will rest with the student for raising specified credit hours and during spare time as per requirement of the agricultural operations for the crop in time. The net profit calculation.

Theory:

Cropping systems and Cropping scheme. Farming systems: definition, principles and components. Classification of farming system. Models of Integrated Farming Systems. Definition and objective of farm management. Types of farm and farm structure. Study of farm records and registers. Farm budget. Managing farm problems.

Practicals:

1. Preparation of cropping scheme
2. Study of dominant cropping systems of the area
3. Preparation of integrated farming system model for irrigated land
4. Preparation of farm layout with various components
5. Preparation of farm budget
6. Estimation of yield of various field crops
7. Study of farm records and farm transaction
8. Working out cost of cultivation
9. Preparation of calendar of operations for cotton crop

Introduction, damage caused by weeds and utilization of weeds, Classification of weeds and propagation of weeds, Crop-weed competition and allelopathy, Preventive methods of weed control, Physical, cultural and biological methods for weed control, Herbicidal (chemical) control of weeds. Benefits and limitation of herbicide, Methods of application of soil and foliage active herbicide treatments, Type of herbicide treatments on the basis of time of application, Weed control in major field and horticultural crops, Parasitic and problematic weeds and their control. shift of weed flora in cropping systems, Herbicide resistant crops.

Practicals:

1. Identification of weeds
2. Collection and preparation of common weeds
3. Practicing the physical method of weed control.
4. Herbicide label information
5. Common and trade name of herbicide.
6. Precautions in the use of herbicide.
7. Computation of herbicide doses
8. Demonstration of methods of herbicide application
9. Visit and recording of observations in weed experiment.

Agron.4.7 Practical Crop Production (*Rabi* Crops)**Credits 1(0+1)**

Crop planning, raising field crops during *Rabi* season. Under this course, plot will be allotted to group of student will be allotted a plot from the time of land preparation until the harvest of crop depending upon the availability of the resources for raising suitable crop(s). For this purpose, a group of 5-6 students may be formed to carry out all field operations like seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect-pests and diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce. Each group will carry out all important field operations in group under the supervision and guidance of the course teacher. Necessary inputs will be supplied to the students in free of cost. The entire responsibility of planning and execution will rest with the student for raising specified credit hours and during spare time as per requirement of the agricultural operations for the crop in time. The net profit calculation.

Theory:

Irrigation—definition and objectives. Water management definition. Advantages and disadvantages of irrigation. Water resources and irrigation development in Gujarat. Form of soil moisture: Physical classification and Biological classification of water. Soil moisture constant: MWHC, ME, FC, PWP, Hygroscopic co-efficient. Approaches for scheduling irrigation: Methods of irrigation in detail – surface methods (only definition and examples), flooding, check basin method, Basin method, Borderstrip method, Furrow irrigation, Sprinkler and drip irrigation (definition, advantages and disadvantages). Quality of irrigation water: SAR, ESP, RSC; Salinity hazards, Sodium hazards. Salinity and Sodium management process. Water management of different crops (rice, wheat, maize, groundnut, sugarcane, mango, banana and tomato). Drainage

Practicals:

1. Determination of bulk density
2. Determination of field capacity
3. Determination of PWP
4. Determination of soil moisture content by gravimetric method
5. Calculation of irrigation water requirement (Problems)
6. Different methods of irrigation
7. Installation and maintenance of micro irrigation system

Theory:

Scope, definition and Concept of organic farming. Objectives of organic farming. Importance of organic farming. Component of organic farming and their role in sustainable crop production. Principles of organic farming. Organic farming in relation to soil health and quality production. Nutrient management in organic farming. Disease and pest management in organic farming. Certification and accreditation process of organic product. Sustainable Agriculture: Introduction, definition, goal and concepts. Land degradation and conservation of natural resources. LEISA (low external input sustainable agriculture) and HEISA (high external input sustainable agriculture)

Practicals:

1. Study of different organic materials
2. Preparation of enriched Farm Yard Manure
3. Study of composting methods
4. Preparation of vermi compost
5. Study of recycling of farm waste
6. Study of green manuring
7. Visit to urban waste recycling unit
8. Study of bio fertilizer.

Under experiential learning programme on vermicompost 20 vermibeds for a batch of 5-6 students will be prepared and maintained

Topic of exposure

Opportunity analysis, background and context, Erection of vermished, Preparation of vermibed and inoculation with earthworm, -Management practices for maintaining micro climate i.e. temperature, humidity and protection from predators. -Preparation of vermiwash, Value addition through enrichment of vermicompost through bio-fertilizer, Ready for sieving, Bagging, packing and storage, Marketing / Linkages and Visit of commercial vermicompost units.

Requirements:

- 1.vermished and storage room
- 2.About 0.50 ha of land for erection of vermished and storage room
- 3.Materials:--Fresh animal dung
 - Farm waste/biogas slurry/city leaf -litter/city refuge/kitchen waste/forestry waste/industrial waste/waste paper and cotton cloth/any organic material residues.
 - Water – To maintain 40 -50 % moisture in the vermibed
- 4.Machinery, tools and equipments- Mostly hand tools designed specifically for vermiculture is needed. Mechanized sieve can be used on large scale basis.
5. Bottling unit for vermiwash.(3 mesh).
6. Earthworms- @350 earthworms per cu. mt. bed space is adequate to start with and build up the required population in about 2 to 3 cycles.
7. Others: Sewing machine, packing bags, racks, weighing machine, cupboard and patty items
- 8.Water tank.
- 9.Training of production unit-in-charge.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Ag. Chem. 1.1 Introduction to Soil Science

Credit 3(2+1)

Theory:

Soil: Pedological and edaphological concepts, Origin of the earth, Earth's crust; Composition: Rocks and minerals Weathering, Soil profile, Soil moisture constants, Movement of soil water, Infiltration, percolation, permeability etc. Soil- Definition and components of soil. Physical properties of soil - Soil texture, soil structure, density of soil, porosity of soil, soil colour, soil temperature and their role in soil fertility. Soil air- Definition and its importance, factors affecting the composition of soil air. Soil water- importance of soil water, physical classification of soil water and biological classification (only names). Soil pH and its effect on availability of nutrients and plant growth. Soils types in Gujarat. Role of organic matter in crop production. Soil colloids, Properties, nature, types and significance; Layer silicate clays, their genesis and sources of charges, Adsorption of ions, Ion exchange, CEC & AEC Factors influencing ion exchange and its Significance. C: N ratio.

Practicals:

1. Collection of representative soil sample for laboratory testing
2. Determination of particle and bulk density of soil
3. Determination of maximum water holding capacity of soil
4. Estimation of EC and pH of soil
5. Irrigation water quality analysis: EC, carbonate, bicarbonate, chloride.
6. Irrigation water quality analysis: Calcium, magnesium and sodium.
7. Recommendation for quality of irrigation water.

Theory:

Soil as a source of plant nutrients. Essential and beneficial soil fertilizers elements, forms of nutrients in soil, mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Measures to overcome deficiencies and toxicities.

Problematic soils

Problematic soils - acid, salt affected and calcareous soils, characteristics, nutrient availabilities. Reclamation of soil - mechanical, chemical and biological methods.

Soil fertility - Different approaches for soil fertility evaluation. Methods, Soil testing - Chemical methods, critical levels of different nutrients in soil. Plant analysis - DRIS methods, critical levels in plants. Rapid tissue tests. Indicator plants. Biological method of soil fertility evaluation.

Fertilizer recommendation

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

Practicals:

1. Estimation of available nitrogen in soil
2. Determination of available phosphorus in soil using spectrophotometer (Olsen's method)
3. Determination of available potassium in soil using flame photometer
4. Determination of gypsum requirement of soil
5. Determination of EC and pH of water
6. Determination of CO_3 , HCO_3 and Cl from water
7. Determination of Ca, Mg and Na from water
8. Sampling, processing and preparation of acid extract for the determination of elements from plant tissues
9. Determination of total nitrogen from plant sample by kjeldahl method
10. Determination of phosphorus from plant using spectrophotometer
11. Determination of potash from plant using flame photometer

Theory:

Introduction – Raw materials – Manures – Bulky and concentrated – FYM, Composts – Different methods, Mechanical compost plants, Vermicomposting, Green manures, Oil cakes, Sewage and sludge – Biogas plant slurry, Plant and animal refuges. Mineral nutrients-Definition of plant nutrients and soil fertility. Criteria of essentiality of an element, Classification of plant nutrients, Available forms of the nutrients in soil. Beneficial elements. Integrated nutrient management (INM). Types and roles of organic manures. Fertilizers- Classification of fertilizers with nutrient content. Methods of fertilizer application. Type of bio-fertilizers and their potential. Merits and constraints of bio-fertilizer use. Precautions for the use of bio-fertilizers.

Practicals:

1. Identification of manures and fertilizers and their nutrient content
2. Calculation of fertilizer quantity for different recommended doses.
3. Preparation of ppm and percentage solution of fertilizer.
4. Compatibility of fertilizers with pesticides.
5. Coating of fertilizers.
6. Study on application methods of bio-fertilizers.
7. Preparation of micro-nutrient solution for foliar application.

Theory:

Introduction, Position of insect in Animal Kingdom, Important characters of phylum Arthropoda and its classification up to class insect, Dominance of insects in animal kingdom, Economic importance of insect in agriculture, General organization of an insect body, Moulting, Metamorphosis, Classification of insect, Various systems of insect.

Practicals:

1. Methods of insect collection and preservation
2. Methods for preparing insect killing jar
3. External morphology of grass hopper
4. Classification of insects
5. Submission of well preserved collection of insects of different orders

Theory:

Definition and types of insect pests. Principles and methods of pest management viz., Natural control, Physical, Mechanical, Cultural, Biological & Chemical control. Host plant resistance, Biotechnological approaches and legal control. Modern concepts in pest management viz., Semiochemicals, Pheromones, Allelochemicals, Attractants, Repellents, Antifeedants, Chemosterilents, Genetic control. Integrated pest management. Formulation of insecticides

Practical:

1. Precautions for storage and safe handling of pesticides
2. First aid precaution and antidote for pesticide poisoning
3. Calculation and preparation of spray fluid
4. Preparation of poison baits for rodent, fruit fly and crab
5. Study of different types of sprayers
6. Study of different parts of typical sprayers
7. Study of nozzles
8. Study of different types of dusters and fumigators

Theory:

Details of marks of identification, host, nature of damage, life history and management of important pests of field crops Cereals- rice, maize, pearl millet, sorghum and wheat, Pulses-(pigeon pea, chickpea, green gram), Oilseeds- (groundnut, mustard, castor, soybean and sesamum), Cash crops – cotton, Tobacco and Sugarcane. Integrated pest management of cow pea, sunflower, safflower, sunhemp, cumin, fennel, pests of stored grain: Coleopteran and Lepidopteran pests, Importance of Rodents as pest in field crops.

Practical

1. Field visit to identify damaging stages of important pest and their nature of damage
2. Pest of cereals crops
3. Pest of pulses crops
4. Pest of oil seed crops
5. Pest of cash crops
6. Submission of properly preserved, well arranged and labeled specimens of important pests.

Theory:

Details of marks of identification, host, nature of damage, life history and management of important pests of horticultural crops-viz., Vegetables-(okra, brinjal, tomato, potato, cabbage, cauliflower, chilli, cucurbits & onion). Fruits (mango, banana, citrus, guava, pomogranate, aonla, sapota, papaya and coconut). sweet potato, Broccoli, custard apple, Ber, Pests of ornamental crops

Practical

1. Field visit to identify damaging stages of important pest and their nature of damage
2. Pest of okra
3. Pest of brinjal
4. Pest of tomato
5. Pest of potato
6. Pest of cabbage & cauliflower
7. Pest of chilly, cucurbits & onion
8. Pest of mango
9. Pest of banana
10. Pest of citrus
11. Pest of guava, pomogranate & aonla
12. Pest of sapota, papaya and coconut
13. Submission of properly preserved, well arranged and labeled specimens of important pests.

GENETICS AND PLANT BREEDING

PBG 1.1 Economic Botany

Credits 2(1+1)

Theory:

Introduction and history of economic plants, Classification and importance of economic plants. Agriculturally important crop plants: Cereals, pulses and oilseeds, vegetables, spices and condiments, fruits and nuts; fibre yielding plants, forage crop plants. Industrially important plants: Sugar, starch and cellulose plants; fumitory and masticatory plants; beverages, dyes and tannins, gums and resins, rubber; drug plants – medicinal plants, plant insecticides, wood and timber plants. Ethnobotany, common adulterants, toxins and teratogens.

Practicals:

1. Study of root and stem modifications.
2. Study of typical leaves of maize and china rose, types of venation, compound leaves and phyllotaxy.
3. Study of typical flower and other types of flowers.
4. Study of fruits and their classification.
5. Structure and types of seeds, and their germination.
6. Study of Bentham and Hookers Classification of flowering plants.

Theory :

Introduction: Definition of Plant physiology. Diffusion, Osmosis, Factors affecting diffusion, osmosis, Plasmolysis, Deplasmolysis, Imbibition, Factors affecting imbibition, Guttation, bleeding its differences, Photosynthesis: Significance-site of photo synthesis-light and dark reaction of Photorespiration-factors affecting phototosynthesis-respiration-mechanism of glycolysis-Krebs cycle- anaerobic respiration-respiratory quotient-compensation point. water relations:Importance of water, active and passive absorption, ascent of sap Transpiration: Definition,significance, antitranspirants,. factors affecting to transpiration. significance of C₃, C₄ and CAM pathway relationship of photosynthesis and crop productivity.Plant growth and development. Plant hormones- auxins-gibberellins-cytokinins-ethylene and abscisic acid. Photoperiodism and verbalization.

Practicals :

1. Measurement of stomatal frequency and index.
2. Study of leaf anatomy of C₃ and C₄ plants.
3. Commercial applications of plant growth regulators.
4. To demonstrate that light and CO₂ is necessary for photosynthesis.
5. To demonstrate that O₂ is produced during photosynthesis.
6. To demonstrate the phenomenon of diffusion by potassium permanganate crystal
7. Measurement the rate of transpiration by Ganong's Potometer method.

Theory:

Mendel's laws of inheritance and exceptions to the laws; Types of gene action, Multiple alleles, Pleiotropism, Penetrance and expressivity; Quantitative traits, Qualitative traits and differences between them. Gene expression and differential gene activation, Plant cell. Structure and function of cell organelles. Difference between bacterial, plant and animal cells. Major types of plant cells and tissues. Cell cycle and cell division i.e. Mitosis and Meiosis. Premendelian history of genetics in brief. Linkage and recombination. Study of mutations. DNA and its structure, function, types, modes of replication and repair.

Practicals:

1. Study of light microscopes.
2. Preparation and use of fixatives and stains for light microscopy.
3. Preparation of micro slides and identification of various stages of mitosis and meiosis cell division.
4. Monohybrid and dihybrid ratios.
5. Study of quantitative traits.
6. Study of mutations.

PBG 5.3 Principles of Plant Breeding**Theory:**

Life cycle of flowering plants. Pollination mechanisms of crop plants. Introduction, objectives and achievements of plant breeding, its relationship with other sciences. Plant introduction, domestication and acclimatization. Selection and hybridization in crop plants. Mass selection, Pure line selection. Study of F_1 , F_2 and segregating generations in important crop plants, back cross method, composit and synthetic varieties in important crop plants.

Practicals:

1. Plant Breeder's Kit. Collection and maintenance of germplasm of crop plants.
2. Selfing and crossing techniques, varietal descriptors in important crop plants like sorghum, wheat/rice, maize, bajra, cotton and castor.
3. Methods of selection and handling of segregating populations.
4. Method of hybrid seed production in important crop plants.
5. Field trials, maintenance of records and registers in plant breeding.

PBG 6.4 Seed Production Technology**Theory:**

Introduction and importance of seed production, goals and role of seed industry in India. Types of seed, seed structure and morphology. Characteristics of good quality seed, Seed Acts and types of seed sold in the market, (Labelled/TF and certified seeds). Classes of seed – nucleus, breeder, foundation and certified. Maintenance of varieties and seed multiplication. Maintenance of genetic purity during seed production. Seed standards prescribed as per the Indian Seeds Act. Seed production in wheat, rice, maize, sorghum, pearl millet, pigeonpea, gram, mung bean, groundnut, castor, sesamum, cotton, potato and onion. Seed testing, seed processing and storage.

Practicals:

1. Methods of seed production and visit of seed production plots of castor, bajra, maize, sorghum, wheat, groundnut and cotton crop etc.
2. Method of field inspection and rouging.
3. Visit of seed testing laboratory.
4. Visit of commercial seed processing and seed storage units.
5. Seed treatments.
6. Seed sampling procedure.
7. Physical purity analysis of seed samples.
8. Seed germination test.
9. Seed standards, prescribed in Indian Seed Act.
10. Identification of Seed certification tags.

HORTICULTURE

Hort.1.1 Principles of Horticulture

Credits 2(1+1)

Theory:

Introduction, definition, branches of horticulture and importance of fruits and vegetables in human diet. Scope, current situation and importance of horticulture in Gujarat/India. Propagation of horticultural crops, definition, types, classification, merits and demerits. Methods of propagations. Hormones- Role of hormones in horticultural crops. Principles of pruning and training - need, objectives and scope. Choice of trees and plants. Climatic zones of horticulture crops. Identification of medicinal plants.

Practicals:

1. Study of horticultural tools and different containers
2. Preparation of nursery beds and sowing
3. Study of potting and repotting
4. Study of propagation by seeds and seed treatment
5. Study of plant propagation by cutting and layering .
6. Study of propagation by budding and grafting
7. Study of different types of media and their uses in horticulture
8. Preparation of different hormone solution
9. Visit to commercial nurseries

Hort.2.2 Production Technology of Fruit Crops

Credits 3(2+1)

Theory:

Definition and importance of horticulture. Importance and scope of fruit crops. Area and production of different fruit crops in Gujarat and India. Selection of site, fencing and wind break for fruit crops. Planting system, high density planting, planning and establishment. Propagation methods and use of root stocks. Methods of training and pruning. Package of practices of major fruit crops viz., mango, banana, citrus, aonla, sapota and papaya. Minor fruit crops viz., guava, pomegranate, ber, custard apple, phalsa, coconut and date palm. Use of growth regulators in fruit production.

Practicals:

1. Layout and planting system – traditional and high density planting system
2. Identification of major and minor fruit crops.
3. Methods of training and pruning.
4. Study of irrigation methods in fruit crops
5. Methods of fertilizer application in fruit crops
6. Maturity indices of important fruit crops
7. Visit to local commercial orchards / research stations

Theory:

Definition of vegetable and importance of vegetable crops, area and production of different vegetable crops in Gujarat and India. Types of vegetable garden. Package of practices for **Fruit vegetable crops** viz., tomato, brinjal, chillies and okra. **Cucurbitaceous vegetable crops** viz., cucumber, bottle gourd, bitter gourd, small gourd, pointed gourd, watermelon. **Cole crops** viz., cabbage and cauliflower. **Bulbs vegetable crops** viz., onion and garlic. **Tuber crops** viz., potato and sweet potato and **root vegetable crops** viz., elephant foot, carrot, radish and beet root. **Leafy vegetable** viz., palak and fenugreek. **Pulse vegetable** viz., pea, cowpea and cluster bean. **Special vegetable** viz., drumstick and curryleaf.

Practicals:

1. Identification of important vegetable seeds and plants
2. Study of raising vegetable nursery
3. Transplanting of vegetable seedling in main field
4. Preparation of layout for cucurbitaceous crops
5. Study of harvest indices of different vegetable crops
6. Study of planning and layout of kitchen garden
7. Planting technique of tuber crops
8. Visit to commercial vegetable growers field and vegetable research station

Hort. 5.4 Production Technology of Flower Crops and Gardening**Credits 2(1+1)****Theory:**

Importance and scope of floriculture. Origin, area, production, varieties. package of practices of flower crops– rose, jasmine, chrysanthemum, meri gold, golden rod, gerbera, gladiolus and gaillardia. Different components of garden. Landscape and gardening. Use of trees, shrubs, climbers, palm, house plants and seasonal flowers in garden. Bonsai techniques.

Practicals:

1. Identification of different flowering plants
2. Identification of different ornamental plants
3. Study of propagation methods of flower crops
4. Lay out of ornamental garden
5. Planning and layout of lawns and its maintenance
6. Preparation of bouquet, garland and veni
7. Study of different flower arrangement
8. Visit to public and private gardens

Hort. 6.5 Preservation and Value Addition in Horticultural Crops

Credit 4(0+4)

Preservation of fruits and vegetables. Importance of preservation in national economy. Principles of different preservatives. Factors affecting the microbial deterioration of fruits and vegetables. Principles and methods of preservation of fruits and vegetables. Importance and scope of value addition in horticultural crops. Value addition in different fruits, vegetables and flower crops. Factors affecting ripening of fruits, and vegetables. Pre harvest factors affecting quality on post harvest shelf life of fruits and vegetables. Chemicals used for hastening and delaying ripening of fruits and vegetables.

1. Study of different types of tools & equipments used in preservation
2. Study of different types of preservatives
3. Canning of fruits and vegetables
4. Storage of canned products
5. Preparation of juice, squash, cordial and syrups
6. Preparation of jam and jelly
7. Preparation of candy and ketchup
8. Preparation of pickles
9. Study of different methods of drying of horticultural products, preservation and marketing
10. Visit to local processing units and packing industries

Hort.6.6 Green House Technology

Credit 4(0+4)

Introduction, types of green houses. Green house materials and equipments. Growing media – types of media, soil culture, soil pasteurization in peat moss and mixtures, rock wool and other inert media, nutrient film technique (NFT) / hydroponics. Planning and design of greenhouses. Maintenance of green house. Effect of green house environment on plant growth. Construction of low cost green houses. Irrigation systems used in greenhouses. Choice of crops for cultivation under greenhouses, Constraints of greenhouse cultivation.

1. Study of different types of green houses based on shape, construction and cladding materials.
2. The study of fertigation requirements for greenhouse crops and estimation of E.C. in the fertigation solution.
3. The study of various growing media used in raising of greenhouse crops and their preparation and pasteurization / sterilization.
4. Visit to commercial green houses.
5. Planning and maintenance of green house.
6. Cultivation of gerbera in green house.
7. Cultivation of dutch rose in green house.
8. Cultivation of Capsicum in green house.
9. Packing and marketing of flowers.
10. Sources of green house materials.

Maths 2.1 Bio Mathematics

Credits 2(2+0)

Theory

Functions and Limit : Definition of function, Examples, Concept and rules of limits, Differentiation: Definition, Derivation of constant function, Formula : x^n , a^x , $\sin x$, e^x , etc. Formula for sum, Product and quotient of functions. Chain rule, Derivation of parametric and implicit functions. Second order differentiation.

Integration : Introduction of integration, Formulas for standard functions as per formula x^n , a^x , $\sin x$, e^x , etc. Simple basic rules of indefinite integration. Definite integral, Lower limit, Upper limit and Properties of definite integral.

Ag. Stat.4.1 Introduction to Computer Application

Credits 2(1+1)

Theory:

Introduction to Computers, Anatomy of Computers, Input and Output Devices. Units of Memory, Hardware, Software and Classification of Computers. Personal Computers, Types of Processors,. Introduction to WINDOWS. Introduction to M.S Office: MS WORD, MS EXCEL, MS POWER POINT. Internet: World Wide Web (WWW), Concepts, Web Browsing and Electronic Mail.

Practicals:

1. Study of computer
2. How to create folder and short cuts
3. Study and use of MS WORD and its functions / commands
4. Study and use of MS EXCEL
5. Preparation of presentation in MS POWER POINT
6. Study and use of Internet & E-mail

Ag.Stat.5.2 Agricultural Statistics

Credits3(2+1)

Theory:

Introduction: Definition of Statistics and its use and limitations; Frequency distribution, Measures of Central tendency-Arithmetic mean. Measures of dispersion-Standard deviation, Standard error of mean, co- efficient of variation. Test of significance- Student't' test and 'F' test. Experimental design-Basic Principles of experimental design.Concept of ANOVA. Experimental Designs: Basic Designs, Completely Randomized Design (CRD), Layout and analysis with equal and unequal number of observations, Randomized Block Design (RBD), Layout and analysis, Split plot Design (SPT), Layout and analysis.

Practicals:

1. Preparation of frequency distribution (table)
2. Problems of measures of Central tendency
3. Measures of dispersion
4. Problems of test of significance (t-test)
5. Preparation of layout of CRD and RBD.

PLANT PATHOLOGY/MICROBIOLOGY

Pl. Path. 2.1 Introductory Plant Pathology

Credits 2 (1+1)

Theory:

Economic importance of Plant Pathology. General morphological characteristics of Fungi, Bacteria, Virus, Mycoplasma and plant parasitic Nematodes. Feedings habits of nematodes. Classification of Plant diseases. Principles of plant disease management. Methods of plant disease management- cultural methods, legal methods, biological methods, chemical methods and use of resistant variety. Prokaryotes: classification of prokaryotes according to Bergey's Manual of Systematic Bacteriology. General Characters of fungi, Definition of fungus, Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi.

Practicals:

1. Acquaintance with lab equipments.
2. Study of microscope and its maintenance
3. Preparation of the culture media .
4. Isolation of plant pathogens (bacteria and fungi)
5. Methods of preservation of diseased specimen (Dry and wet)
6. Preparations of Bordeaux mixture, Bordeaux paste

Pl. Path. 3.2 Diseases of Field Crops and their Management

Credits 3(2+1)

Theory:

Symptoms, favourable weather conditions and management of Bajra: Downy mildew, Ergot, Smut
Sorghum: Smuts, Anthracnose
Wheat: Rusts, Loose smut
Rice: Blast, Bacterial blight, Brown leaf spot
Maize: Maydis blight, Turcicum blight
Groundnut: Tikka, Collar rot
Castor: Wilt, Root rot
Cotton: Angular leaf spot, Wilt
Sesamum: Phyllody, Phytophthora blight
Tobacco: Damping off, Leaf curl, Mosaic Pigeonpea: Wilt, Sterility mosaic
Green gram: Powdery mildew, Yellow mosaic
Chickpea: Stunt virus, wilt
Cumin: Blight, Powdery mildew
Fennel: Alternaria blight, Ramularia blight

Practicals:

1. Field visit to study different diseases of above mentioned crops at regular intervals
2. Microscopic examinations of diseased specimen and their diagnosis.
3. Collection and dry preservation of diseased specimens and submission of disease album.

Pl. Path.4.3 Diseases of Fruits and Vegetable Crops and their Management**Credits 3(2+1)****Theory:**

Symptoms, favourable weather conditions and management of

1. Potato: Early blight, Late blight, Common scab
2. Tomato: Leaf curl, Root knot
3. Brinjal: Little leaf
4. Chilli: Leaf curl, Anthracnose
5. Okra: Powdery mildew, Yellow vein mosaic virus
6. Onion: Purple blotch
7. Cabbage: Club root
8. Cucumber: Powdery mildew, Downy mildew
9. Mango: powdery mildew, Malformation
10. Citrus:Canker, Gummosis
11. Banana: Panama, Cigatoka, Bunchy top
12. Papaya: Foot rot, Leaf curl
13. pomegranate: leaf spot and fruit spot
14. sapota: leaf spot

Practicals:

1. Field visit to study different diseases of above mentioned crops at regular intervals
2. Microscopic examinations of diseased specimen and their diagnosis.
3. Collection and dry preservation of diseased specimens and submission of disease album.

Ag. Micro. 5.1 Agricultural Microbiology**Credits 3 (2+1)****Theory:**

Introduction and importance of micro organisms. Growth and development of science of microbiology. Morphological, structural, cultural and physiological characters of bacteria. Importance and functions of micro organism in relation to decomposition of organic matter. Microbial fermentation and importance of microbes in soil, food, milk and sewage water. Role of microbes in Carbon, Nitrogen, Phosphorus and Sulphur cycle. Importance, production and application of biofertilizers .

Practicals:

1. Familiarities with microbiological instruments viz. autoclave, hot air oven, laminar air flow, incubator, deep freez etc.
2. Introduction and handling of microscope.
3. Preparation and sterilization of media, pure culture and staining of bacteria
4. Isolation of Rhizobium bacteria from root nodule of legume
5. Method of application of biofertilizers

Pl. Path. 6.4 Mashroom Production Technology**Credits: 4(0+4)**

Pure culture & spawn production & their maintenance. Mushroom culture technology. Post harvest handling of Mushroom. Preparation & Pasteurization of different substrates. Filling the beds/containers for growing Mushroom. Sterilization/ disinfections of substrates. Mushroom house equipments.

AGRICULTURAL ENGINEERING

Ag. Engg. 2.1 Fundamentals of Agricultural Engineering

Credits 3(2+1)

Theory:

Farm mechanization. Engine terminology. Tractors-type of tractors and their utility. Types of pumps and their utility. Types of biogas plants and its use. Renewable energy: Wind and solar energy. Soil erosion and their control measures including soil and water conservation structures. Selection of tractor, Tillage implements: primary and secondary tillage implements, implements for interculturing, seed drills, paddy transplanters, plant protection equipments, harvesting equipments. Operation cost and its calculation. Occurrence and movement of ground water, aquifer and its types. concept of heat and mass transfer, devices for cleaning, grading, milling and storage of farm produce

Practicals:

1. Study of 2-stroke and 4-stroke engine
2. Study of field operation of farm machinery with tractor
3. Visit of biogas plant
4. Visit of solar plant/ wind mills
5. Study of chain and cross staff surveying
6. Introduction to dumpy level for measurement of vertical distance
7. Visit of soil-water conservation structures

Ag. Engg. 4.2 Post Harvest Technology

Credits 1 (1+0)

Theory:

Introduction to post harvest technology of agricultural produce. Post harvest operations process for cereal, pulse and oil seed crops. Equipment used in post harvest operations. Study of cotton ginning. Post-harvest study of sugarcane. Study of cold storage and ware house. Drying, grain drying, types of drying, types of dryers. Storage, grain storage, types of storage structures. Fruits and vegetables cleaning. Grading, methods of grading, equipment for grading of fruits and vegetables.

Ag. Engg. 5.3 Fundamental of Soil, Water Conservation and Engineering

Credit 3(2+1)

Theory:

Surveying-survey equipment, chain survey, cross staff survey, plotting procedure, calculation of area of regular and irregular fields. Levelling- levelling equipment, terminology, methods of calculation of reduced levels, types of leveling, contouring. Soil and water conservation- soil erosion types and engineering control measures. Irrigation, flow irrigation and lift irrigation, water lifting devices (shallow and Deep well)

Practicals:

1. Acquaintance with chain survey equipment
2. Ranging and measurement of offsets
3. Chain triangulation
4. Cross staff survey
5. Plotting of chain triangulation
6. Plotting of cross staff survey
7. Leveling equipment-dumpy level, leveling staff, temporary adjustment and taking staff reading
8. Differential levelling
9. Profile levelling
10. Contour survey-grid method
11. Plotting of contours
12. Study of soil and water conservation measures

ANIMAL PRODUCTION

LPM 2.1 Principles of Livestock and Poultry Production

Credits 2(1+1)

Theory:

General discourse on origin, domestication and utility of farm animals and their role in Indian economy, Animal husbandry methods in India, common terms pertaining to different species of livestock, Utility classification of breeds of cattle. Familiarization with different breeds of cattle (indigenous and exotic) and buffaloes with special emphasis on breeds of Gujarat. Classification of breeds of sheep and goat. Introduction to common feeds and fodders, their classification and utility, Introduction to poultry industry in India (past, present and future status) Common terms pertaining to poultry production and management. Concept of mixed farming and its relevance to socio-economic conditions of farmers in India. Complimentary and obligatory nature of livestock and poultry production with that of agricultural farming. Importance of fisheries in India. Common terms pertaining to fish production.

Practicals:

1. Study of body parts and points of cattle, sheep, goat and poultry and their significance.
2. Measuring and weighing of farm animals.
3. Use of common restraints used in different animals
4. System of identification of livestock
5. Determination of age in farm animals
6. Identification of common feeds and fodders
7. Importance of eggs in human nutrition.

LPM 3.2 Dairy Cattle and Buffalo Production and Management

Credits 3(2+1)

Theory:

Importance of dairy industry in India. History and Importance of co-operative movement of dairy sector in India. Common terms pertaining to feeds, fodder and feeding management. Concepts of Indian feeding standards, Preservation and storage of fodder/forage as silage, Hay and Haylage. Feeds, fodder and water requirement of the different categories (age and sex wise) of cattle and buffalo. Scarcity feeding of bovines. Care and Management of various classes of dairy cattle and buffaloes. Selection and Pairing of bullocks, care and management of bullocks and breeding bulls. Summer management of buffaloes. Clean milk production and milk processing. Artificial insemination, its importance and procedure in dairy animals. Dairy herd calendar. Vaccination and deworming of dairy animals. Economics of dairy farming. Basic principles of preparation of projects for setting up dairy units at small, medium and large scale.

Practicals:

1. Judging of cattle and buffaloes by outward appearance
2. Calculation of water and feed requirement for dairy herd
3. Computation of ration
4. Preparation of hay and silage
5. Study of records on a dairy farm
6. Housing of dairy cattle and buffalo
7. Dairy herd health calendar
8. Demonstration of Sampling and testing of milk for fat and total solids
9. Visit to modern commercial dairy plant and cattle feed factory

AGRICULTURAL EXTENSION

Ag.Extn. 2.1 Fundamentals of Extension Education and Communication

Credits 3(2+1)

Theory:

Extension Education: Definition, need, scope, importance, philosophy process, function and principles. Teaching-learning process, Learning situations. Extension Teaching methods and its classification. Projected and non projected audio visual aids i.e. charts, graphs, poster, leaflet, cards etc. Method and result demonstration, field trip. Communication-Meaning, definition and importance. Elements of communication process and adoption process, ICT in agriculture. Concept of KVK, SSK, ATMA, ATIC, FTC and Kisan call centre, Agribusiness and Agri clinic. Agricultural Journalism–Meaning, Scope and Importance, Sources of news, Types, Merits and Limitations.

Practicals:

1. Identification of Audio-visual instruments and its classification
2. Preparation of Poster, Flash cards, Leaflets, folders-charts, graphs etc
3. Handling of Public Adress System
4. Preparing PPT for LCD projector.
5. Organization of method demonstration
6. Preparation of interview schedules for collecting information from farmers.
7. Preparation of interview schedules for collecting information of village.
8. Visit to SSK, ATIC, KVK and FTC etc.

Ag.Extn. 5.2

Entrepreneureship Development

Credits 2 (1+1)

Theory

Meaning and definition of Entrepreneurship, Characteristics of entrepreneurship, Entrepreneurial Competencies, Meaning and definition of Entrepreneur, Different roles of Entrepreneur, Types of entrepreneurs, Characteristics of ideal entrepreneurs, Identification of agricultural related entrepreneurial opportunities (Only examples) viz. Cultivation related, Inputs marketing related, Product marketing related, Processing and value additionrelated, Distributorship, Agent, Export Distributorship, Import Distributorship, Ethics in entrepreneurship, Preparation of project for small agricultural enterprise.

Practicals

1. Preparation of project for small agricultural enterprise
2. Visit to a successful agro-enterprise
3. Visit to successful poultry enterprise
4. Visit to vermicompost production enterprise
5. Visit to dairy enterprise
6. Exposure of Agro-service provider entrepreneur e.g. Pest control service provider or Kitchen garden service provider entrepreneur or Agro-export consultant

AGRICULTURAL ECONOMICS

Ag.Eco. 1.1 Principles of Agricultural Economics

Credits 2(2+0)

Theory:

Economics: Meaning, Definition, Divisions and importance of Economics. Agricultural Economics: Definition: Basic Concepts: Goods, Service, Utility, Value, Price, Wealth, Welfare. Wants: Meaning, Characteristics, Classifications of Wants and Importance. Theory of consumption: Law of Diminishing Marginal utility. Definition, Assumption, Limitations, Importance. Consumer's surplus: Definition, Importance. Demand: Definition, Kinds of Demand, Demand schedule, Demand Curve, Law of Demand and elasticity of demand. Nature & Factors of Production. Laws of Returns, costs & cost curves. Market & Market forms. Welfare Economics: Meaning. National Income: Concepts, Measurement. Public Resource: Meaning, Services Tax, Meaning, Classification of Taxes: Canons of Taxation, Inflation: Meaning, Definition, Kinds of inflation.

AGRICULTURAL METEOROLOGY

Ag. Met.5.1 Agricultural Meteorology

Credit 3(2+1)

Theory:

1. Meaning and importance of Meteorology and agricultural meteorology.
2. Weather and climate
3. Influence of weather on agricultural production.
4. Characteristics of Indian monsoon.
5. Rainfall characteristics and artificial rainmaking.
6. Influence of drought and frost on agricultural production.
7. Global warming and impact of climate change on agriculture.
8. Types of weather forecasting.
9. Agro climatic zones of Gujarat.
10. Climatic hazards in crop production-Droughts and frost.

Practicals:

1. Study of different types of observatories
2. Layout plan of an agromet observatory
3. Measurement of air temperature and study of Stevenson screen
4. Study of soil and grass minimum thermometers
5. Measurement of precipitation
6. Measurement of evaporation
7. Measurement of wind speed and direction
8. Measurement of relative humidity
9. Study of radiation measuring instruments
10. Measurement of atmospheric pressure

Theory:

Topic 1: Introduction to Communication

- 1.1 Importance of Communication
- 1.2 Types of Communication – verbal and non-verbal
- 1.3 Essentials of good communication
- 1.4 Barriers to Communication

Topic 2: Grammar

- 2.1 Articles
- 2.2 Prepositions
- 2.3 Tenses
- 2.4 Modal Auxiliaries
- 2.5 Common Errors in English

Topic 3: Increasing Vocabulary

- 3.1 Words confused and misused
- 3.2 Synonyms and Antonyms
- 3.3 One Word Substitutions
- 3.4 Idioms and their use
- 3.5 Word Formation

Topic 4: Translation

- 4.1 Translation of commonly used scientific and technological terms in Hindi/Gujarati to English and English to Hindi/Gujarati
- 4.2 Translation of individual simple sentences from Hindi/Gujarati to English and English to Hindi/Gujarati

Topic 5: Correspondence

- 5.1 Personal Letters
- 5.2 Application Writing

Topic 6: Paragraph Writing

- 1.1 Paragraphs on general topics e.g. My hobby, favourite leader, visit to exhibition etc. (Not more than 200 words)

Practicals:

Topic 1: Spellings and Use of Dictionary

- 1.1 Elementary knowledge of spellings rules
- 1.2 Correction of the wrong spellings
- 1.3 Knowledge of using dictionary
- 1.4 Arrangement of words in dictionary order

Topic 2: Listening Skills

- 2.1 Importance of Listening Skills
- 2.2 Listening to short talks, speeches, lectures, conversations, etc. from
- 2.3 Exercises on Listening Comprehension

Topic 3: Speaking Skills

- 3.1 Importance of Speaking Skills
- 3.2 Spoken English practice by using audio-visual aids
- 3.3 Oral Presentations on a given topics

NON CREDIT COURSES

PE 1.1, 2.2, 3.3 & 4.4: Physical Education

4(0+1)

Definition, aims and objectives and principles of Physical Education, Definition Tournament, Compulsory participation in any one of the games viz., Outdoor games-Volleyball, Kabaddi, Kho-Kho, etc. and Indoor games-Chess. Warming up and conditioning exercise are compulsory for each student.

OR

National Cadet Core 1.1, 2.2, 3.3 & 4.4 (NCC)

4(0+1)

Introduction and aim of NCC, Military history and Organization, System of NCC Training. Foot Drill, Arm Drill, Guard of Honour, Ceremonial Parade, Weapon Training - Rifel, LMG, Stern machine Carbine. Field Training — Field Craft, Battle Craft, Fire control and Fire discipline orders Tactics.

OR

National Service Scheme 1.1, 2.2, 3.3 & 4.4

4(0+1)

NSS Historical Back Ground, Emblem history, Aim and objectives of NSS; NSS volunteer; Duties of NSS volunteers, Education and Recreation; Programmes for working during emergencies; Environment enrichment and Conservation; Health; Family Welfare and Nutrition programme.