RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

DEPARTMENT OF AGRICULTURAL SCIENCES

CHOICE BASED CREDIT SYSTEM CURRICULUM SYLLABUS
FOR DIPLOMA IN AGRICULTURE PROGRAMME
SUBJECT CODE = 22

FOR DIPLOMA COURSE IN AGRICULTURE UNDER
RADHA GOVIND UNIVERSITY

Implemented w.e.f.
Academic Session 2025-26 & onwards

Syllabus for Diploma in Agriculture
YEAR & SEMESTER WISE DISTRIBUTION OF COURSES

Department /	Title of the Course	Credits	
I Semester	**Ist Year**	**T**	**P**
Agron. 1.1	Introductory Agriculture and Principles of Agronomy	1	1
Agron. 1.2	Field Crop Production -I (kharif)	2	1
Ag. Chem. 1.1	Fundamentals of Soil Science	2	1
Ag. Ento. 1.1	Fundamentals of Entomology	1	1
PBG 1.1	Economic Botany	2	1
Hort. 1.1	Principles of Horticulture	1	1
Eng. 1.1	Comprehension and Communication Skills in English	1	1
Maths 1.1	Biomathematics	2	0
P.E. 1.1	NSS/NCC/Physical Education (Non credit course)	0	1*
	TOTAL	**20 (12+7+1*)**	
II Semester	**Ist Year**	**T**	**P**
Agron. 2.3	Crop Production -II (Rabi)	2	L
Ag. Chem. 2.2	Soil chemistry, soil fertility and nutrient management	2	1
Ag. Ento. 2.2	Principles of Insect control	1	1
Pl. Path. 2.1	Introductory Plant Pathology and Nematology	2	1
LPM -2.1	Principles of Live stock& Poultry Production	1	1
Ag. Engg. 2.1	Fundamentals of Agricultural Engineering	1	1
Ag. Eco. 2.1	Principles of Agricultural Economics	2	0
Ag. Met. 2.1	Agricultural meteorology	2	1
P.E. 1.2	NSS/NCC/Physical Education (Non credit course)	0	1*
	TOTAL	**21(13+7+1*)**	
III Semester	**IInd Year**		
Agron. 3.4	Organic Farming and Sustainable Agriculture	1	1
Agron. 3.5	Practical Crop Production (Kharif crops)	0	1
Ag. Chem. 3.3	Plant nutrition, manures and fertilizers	2	1
PBG 3.2	Principles of genetics	2	1
Ag. Ento. 3.3	Pests of field crops and their management	1	1
Pl. Path. 3.2	Diseases of field crops and their management	1	1
LPM 3.2	Dairy Cattle and Buffalo Production & Management	2	1
Hort.3.2	Production technology of fruit crops	1	1
P.E. 2.1	NSS/NCC/Physical Education (Non credit course)	0	1*
	TOTAL	**19 (10+8+1*)**	

Course No	Title of the Course	Credits	
IV Semester	**IInd Year**	**T**	**P**
Agron. 4.6	Water Management	2	1
Agron. 4.7	Weed management	1	1
P1.Path.4.3	Diseases of fruits and vegetable crops and their management	1	1
Pl. Phy. 4.1	Crop Physiology	1	1
Ag. Ento. 4.4	Pests of fruit and vegetable crops and their management	1	1
Hort. 4.3	Production Technology of Vegetable Crops	1	1
Ag. Engg. 4.2	Post harvest technology	1	1
Ag. Stat. 4.1	Introduction to computer application	1	2
P.E. 2.2	NSS/NCC/Physical Education (Non credit course)	0	1*
	TOTAL	**19 (9+9+1*)**	
V Semester	**IIIrd Year**	**T**	**P**
Agron. 5.8	Farming Systems and farm management	1	1
Ag. Extn.5.1	Fundamentals of Extension Education and communication	2	1
Ag. Stat. 5.2	Agriculture statistics	1	1
Hort. 5.4	Production Technology of Flower Crops and Gardening	1	1
PBG 5.3	Introductory Plant Breeding	2	1
Ag. Micro. 5.1	Agricultural Microbiology	1	1
Ag. Engg. 5.3	Fundamentals of soil water conservation and engineering	2	1
	TOTAL	**17 (10+7)**	
PRACTICAL WORK EXPOSURE **			
VI Semester	**IIIrd Year**	**Practical**	
PBG 6.4	Seed Production Technology	4	
Hort. 6.5	Preservation and Value Addition in Horticultural Crops	4	
P1.Path. 6.4	Mushroom Production Technology	4	
Hort. 6.6	Green House Technology	4	
Agron. 6.9	Vermicompost	4	
Educational Tour*		4	
	TOTAL	20	

DISCIPLINE WISE DETAILS OF COURSE CONTENT

AGRONOMY

Agron. 1.1 Introductory Agriculture and Principles of Agronomy Credits 2(1+1)

Theory:

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 tilth. 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 dry farming, 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

Agron.1.2Field Crop Production -I (kharif) Credits 3(2+1)

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, earthting 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.

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

Agron. 2.3 Crop Production -II (Rabi) Credits 3(2+1)

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, earthling 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. **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 Organic Farming and Sustainable Agriculture Credits 2(1+1)

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.

Practicals:

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

Agron.3.5 Practical Crop Production (Kharif Crops) Credits 1(0+1)

Practical:

Crop planning, raising field crops during *kharif* season. Under this course, plot will be allotted to group of students 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.

Agron. 4.6 Water Management **Credits 3(2+1)**

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

Agron.4.7 Weed Management **Credits 2(1+1)**

Theory:

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.

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.5.8 Farming Systems and Farm Management **Credits 2(1+1)**

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

Agron.6.9 Vermicompost **Credits 4 (0+4)**

Practical:

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/cityrefuge/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 Fundamentals of Soil Science Credit 3(2+1)

Theory:

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. Salt affected soils:- Nature and classification, characteristics, detrimental effects of soil salinity and alkalinity and their reclamation. Soils types in Gujarat. Role of organic matter in crop production.

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.

Ag. Chem. 2.2 Soil Chemistry, Soil Fertility and Nutrient Management Credit: 3(2+1)

Theory:

Plant nutrients:-

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.

Problemetic soils

Problemetic 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

Ag.Chem.3.3 Plant Nutrition, Manures and Fertilizers Credit 3(2+1)

Theory:

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.

PLANT BREEDING AND GENETICS

PBG 1.1 Economic Botany **Credits 3(2+1)**

Theory:

Introduction of botany, major groups of plants and branches of botany. Habit and duration of flowering plants. Characteristics of stem and root, regions of roots, types of buds on stem/ branches, various modifications of stem and root. Leaf of dicot and monocot plants, types of venation, compound leaves, arrangement of leaves on stem or branches and modifications of leaves. Types of branching and inflorescences in plants. Morphology of parts of flower and classification of flower. Pollination and fertilization in plants. Study of ovary, ovule, fruits and it's classification. Seed, types and structure of seeds

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.

PBG 3.2 Principles of Genetics **Credits 3(2+1)**

Theory:

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. Mendel's principles. Linkage and recombination. Study of mutations. Study of quantitative traits in plants.

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.

Pl. Phy. 4.1 Crop Physiology **Credits 2(1+1)**

Theory :

Introduction: Definition of Plant physiology, structure and functions of cell and cell organelles. Photosynthesis: Significance-site of photo synthesis-light and dark reaction of Photorespiration- factors affecting photosynthesis-respiration-mechanism of glycolysis-Krebs cycle-anaerobic respiration- respiratory quoetient-compansation point. water relations: Importance of water, active and passive absorption, ascent of sap Transpiration: Definition, significance, anti-transpirants,. factors affecting to transpiration . Plant growth and development. Plant hormones- auxins-gibberellins-cytokinin's-ethylene and abscisic acid. Photoperiodism and verbalization.

Practicals :

(1) Measurement of stomatal frequency and index.
(2) Study of leaf anatomy of C_3 and C_4 plants.
(3) Commercial applications of plant growth regulators.
(4) To demonstrate that light and CO_2 is necessary for photosynthesis.
(5) To demonstrate that O_2 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.

PBG5.3 Introductory Plant breeding **Credits 3(2+ 1)**

Theory:

Life cycle of flowering plants. Pollination mechanisms of crop plants. Introduction and objectives of plant breeding, its relationship with other sciences. Plant introduction, domestication and acclimatization. Selection and hybridization in crop plants. Pure line selection. Study of F_1, F_2 and

segregating generations in important crop plants and composit 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.

PBG6.4 Seed Production Technology Credits 4(0+4)

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

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.3.2 Production Technology of Fruit Crops Credits 2(1+1)

Theory:

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.

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. Maturityindicesof important fruit crops
7. Visit to local commercial orchards / research stations

Hort. 4.3 Production Technology of Vegetable Crops Credits 2(1+1)

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.

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 cucurbitaceaous 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, chrysenthemum, 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.

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.

ENTOMOLOGY

Ag. Ento. 1.1 Fundamentals of Entomology **Credits 2(1+1)**

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

Ag. Ento. 2.2 Principles of Insect Control Credits 2(1+1)

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, Pheromens,Allelochemicals, Attractants, Repellents, Antifeedents, Chemostrerilents, 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

Ag. Ento. 3.3 Pests of Field Crops and their Management Credits 2(1+1)

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.

Practicals:

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.

Ag.Ento.4.4 Pests of Fruit and Vegetable Crops and their Management

Credits 2(1+1)

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)

Practicals:

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.

AGRICULTURAL EXTENSION

Ag.Extn. 5.1 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.

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.

AGRICULTURAL ECONOMICS

Ag.Eco. 2.1 Principles of Agricultural Economics **Credits 2 (2+0)**

Theory:

Economics: 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

STATISTICS AND COMPUTER APPLICATION

Ag. Stat.4.1 Introduction to Computer Application Credits 3(1+2)

Theory:

Definition of computer-History and Evolution of computer. Introduction to WINDOWS. Introduction to M.S Office: MS WORD, MS EXCEL, MS POWER POINT. Introduction to Internet and E-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 Credits:-2(1+1)

Theory:

Statistics-its meaning, definition and importance in agriculture. 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, Analysis of research data using procedure of CRD and RBD.

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.

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 sectorin 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 calender. Vaccination and deworming of dairy animals. Economics of dairy farming. Basic principles of preparation of

projects for setting up dairy units at small, medium a 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

PLANT PATHOLOGY

Pl. Path. 2.1Introductory Plant Pathology and Nematology Credits 3 (2+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.

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 2(1+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, Phytopthora 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

Credits2(1+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

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

Practicals

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 2(1+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. Basic principles of surveying and levelling with use of chain and cross staff and dumpy level. Soil erosion and their control measures including soil and water conservation structures.

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 2 (1+1)

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

Practicals:

1. Study of different cleaner
2. Study of different shellers
3. Study of different graders
4. Study of different threshers
5. Visit to agricultural product processing industries
6. Visit to ware houses

Ag.Engg.5.3 Fundamental of Soil Water Conservation and Engineering Credit 3(2+1)

Theory:

Surveying-survey equipment, chain survey, cross staff survey, ploting 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.

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

AGRICULTURAL MICROBIOLOGY

Ag. Micro. 5.1Agricultural Microbiology **Credits 2 (1+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

AGRICULTURAL METEOROLOGY

Ag. Met.2.1 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 fore casting.
9. Agro climatic zones of Gujarat.

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. Measurment of precipitation
6. Measurment 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

Bio Mathematics

Maths 1.1 **Credits 2(2+0)**

Theory

Calculu:

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 formulax^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.

Comprehension and Communication Skills in English

Eng. 1.1 Comprehension and Communication Skills in English **Credits 1(0+1)**

Theory:

Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other

competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

Practical:

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussion.

NON-CREDIT COURSES

PE 1.1, 1.2, 2.1 & 2.2: 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, 1.2, 2.1 & 2.2 (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 Tactices.

OR

National Service Scheme 1.1, 1.2, 2.1 & 2.2 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 program.