

Hemchandracharya North Gujarat University,
Patan

Community College

Programme on

Advanced diploma in Agriculture and Soil Sciences

Offered at

Pramukh Swami Science and H.D. Patel Arts College

Sarva Vidyalaya Campus, Kadi

Semester I

Course Code	Course Title	Credit		Total	Marks		Total
		Th.	Pra/Field		Th.	Practical	
AS 101	Principals of Agronomy and meteorology	3	4	7	80	120	200
AS 102	Fundaments of Soil sciences, soil fertility and Management	3	4	7	80	120	200
AS 103	Economic botany and botany of Field Crops	3	4	7	80	120	200
AS 104	Irrigation water Management	3	4	7	80	120	200
AS 105	Computer	0	2	2		100	100
	Total Credit			30	320	580	900

Semester II

Course Code	Course Title	Credit		Total	Marks		Total
		Th.	Pra/Field		Th.	Practical	
AS 201	Soil Fertility and Nutrient management	3	4	80	120	80	200
AS 202	Agricultural Zoology	3	4	80	120	80	200
AS 203	Fundamentals of Plant pathology	3	4	80	120	80	200
AS 204	Agronomy of Field Crops - I (Rabi crops)	3	5	80	120	80	200
AS 205	Agricultural Statistics		2		100		100
	Total Credit			30	580	320	900

Semester III

Course Code	Course Title	Credit		Total Th.	Marks		Total
		Th.	Pra/Field		Practical	Th.	
AS 301	Weed management	3	4	80	120	80	200
AS 302	Farm Layout, development, management and field plot technique.	3	4	80	120	80	200
AS 303	Plant disease and their management	3	4	80	120	80	200
AS 304	Agronomy of Field Crops - II (Rabi crops)	3	5	80	120	80	200
AS 305	Seed production technology		2		100		100
Total Credit				30	580	320	900

Semester IV

Course Code	Course Title	Credit		Total Th.	Marks		Total
		Th.	Pra/Field		Practical	Th.	
AS 401	Integrated Pest Management	3	4	80	120	80	200
AS 402	Horticulture	3	4	80	120	80	200
AS 403	Organic Farming, Green house and poly-house technology	3	4	80	120	80	200
AS 404	Farm structure power machinery and Post harvest technology	3	5	80	120	80	200
AS 405	Extension Education		2		100		100
Total Credit				30	580	320	900

AS 101 Principles of Agronomy & Metereology

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examixnation for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continu ous evaluati on	End term evaluation	Contin uous evaluati on	End term evaluation	
AS 101	Principles of Agronomy & Metereology	4	3	90	30	40	40	200

Theory

- Agriculture definition, meaning and scope of Agronomy:
- Agro-climatic zones of India and Gujarat.
- Classification of crops. Crop rotation principles and advantages, cropping pattern, cropping schemes, multiple cropping and mixed cropping principles and advantages, intercropping types and advantages and assessment. Relay cropping, paira cropping and crop interactions.
- Selection of seed, sowing methods, tillage and its objectives, types and effect of tillage on soil, tillage implements and harvesting.
- Agricultural meteorology: Weather and climate, micro-climate, weather elements & their influence on different crops,
- Wind: factors affecting, cyclones and anticyclones and Formation and classification of clouds, Introduction to monsoon.
- Earths' atmosphere, Composition and structure, climate change : causes, effect on ecosystem, crop production, remedial measures and global warming,

Practical

- Identification of field crops and under utilized crops and their growth stages;
- Study of tillage implements; Practice of ploughing; Practice of puddling;

- Study of seeding equipments;
- Different methods of sowing;
- Study of inter-cultivation implements and practice;
- Site selection for Agromet observatory;
- Identification and study of meteorological instruments : Measurement of temperature; Measurement of rainfall; Measurement of evaporation (atmospheric/soil); Measurement of atmospheric pressure
- Measurement of wind direction and speed and relative humidity.

Reference Books

1. Principles of Agronomy - T.Y. Reddy and G. H. Sankar Reddi
2. Principles of Agronomy - S. R. Reddy
3. The Nature and Properties of Soil - N.C.Brady and Ray R. Weil
4. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde
5. Soil Conditions and Plant Growth – E.W.Russel and E.J. Russell
6. Agrometeorology and remote sensing - D.D. Sahu
7. Text book of Agricultural Meteorology - Edited by M.C. Varshney
8. Introduction to Agrometeorology - H.S.Mavi
9. Crops and Weather – S. Venkataraman and A. Krishnan (ICAR)
10. Climate, Weather and Crops in India – D. Lenka

AS 102 Fundamentals of Soil Sciences, Fertility & Management

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 102	Fundamentals of Soil Sciences, Fertility & Management	4	3	90	30	40	40	200

Theory

- Soil definition and concepts of Soil. Physical properties of Soil: Soil texture, structure, density, porosity, consistency, colour, temperature and their effects on fertility
- Soil air- definition and its importance of soil air, factors affecting composition of soil air.
- Soil water- definition and its importance of soil water, retention of water by soil, physical classification of soil water & biological classification (only names).
- Soil reaction- soil pH and effects on availability of nutrients and plant growth.
- Saline and alkaline soil- Nature and classification, characteristics, detrimental effects on soil salinity and alkalinity and their reclamation methods. Organic matter- composition of plant residues, decomposition of organic matter, maintenance of soil organic matter and characteristics of humus.
- Soil morphology and soil formation. Soil classification (only). Soils of Gujarat
- Features of good soil management, problems of supply and availability of nutrients, relation between nutrient supply and crop growth, Criteria of essentiality of nutrients, Essential plant nutrients-their functions, nutrient deficiency symptoms, transformation and dynamics of major plant nutrients.

Practical

- Soil sampling
- Determination of bulk density
- Maximum water holding capacity
- Estimation of physical parameters- Determination of pH, EC of soil water extracts, Determination of soil moisture content
- Estimation of chemical parameters- Determination of organic C, total N, available N, P, K and S in soils
- Determination of total N, P, K and S in plants, Interpretation of interaction effects and computation of economic and yield optima.

Reference of Books

1. Fundamentals of soil soil- Sahai, V.N. Kalyani Publishers, New Delhi.
2. Chemistry of the soils – F. Bear
3. Soils and soil fertility – C.M. Thomson and F.R. Troeh
4. Soil fertility and fertilizers – S.L.Tisdale, W.L.Nelson, J.D. Beaton and J.L. Havlin

AS 103 Botany of Field Crops and Their Economic Importance

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 103	Botany of Field Crops and Their Economic Importance	4	3	90	30	40	40	200

Theory

- Introduction to botany, its branches, its relationship with other sciences
- Habit of the plant- herbs, shrubs, tree, climbers.
- Morphology of stem (characteristics, forms, part and branching of stem), leaf (definition, parts and shape of leaf), root (Characteristics, region, types, modifications, functions and adaptation of root), inflorescence (definition, types and special types) flower (definition, parts and function of flower, calyx, corolla, androecium, gynoecium, ovule), fruits (development, classification, common fruits and their edible parts) and seeds with reference to crop plant (development, embryo, endosperm and their parts- cotyledons, germination and dispersal of seeds). Pollination, its types and mechanisms (definition, kinds of pollination, pollinating agents, merits and demerits of self and cross pollination).
- Economic botany- introduction and history, classification and importance of economic plants (cereals, pulses, oil seeds, spices, vegetables, condiments, fruits- nuts, fiber yielding plants, forage crop plants, industrial important plants, fumitory – masticatory plants, beverages, dyes – tannins, gums, resins, rubber, medicinal plants, plant insecticides, wood and timber plants. Ethnobotany, common adulterants, toxins and teratogens.

Practicals

- Study of parts of angiospermic plants.
- Study of seed and seed germination
- Study of root types and modification
- Study of leaf type and venation
- Study of floral anatomy and study of various parts.
- Study of various type of fruits.
- taxonomic status of food plants
- Study of industrial plants and drug plants
- Identification and extraction of phytochemicals and valuable plant products
- Study of agricultural and industrial uses of plants

Reference Books

1. College Botany- A.C. Dutta
2. Economic Botany- Pandey and Sinha
3. Introduction to taxonomy of angiosperms – Tyagi and Kshetrapal
4. Economic botany in the tropics-S.L. Kocchar.
5. Taxonomy of Angiosperms.- V. Singh and V.K Jain.

AS 104 Irrigation of water management

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 104	Irrigation of water management	4	3	90	30	40	40	200

Theory

- Irrigation- Definition and objectives.
- Water resources and irrigation development in Gujarat.
- Approaches for scheduling irrigation.
- Method of irrigation in detail , Water source, Water lifting devices - pumps (shallow and deep well), capacity, power calculations. Water conveyance systems, open channel and underground pipeline. Irrigation methods - drip and sprinkle irrigation systems.
- Irrigation quality of water and its management ,Water management of different crops(rice, wheat, maize,groundnut,sugarcane, mango, banana and tomato)
- Agriculture drainage-its importance and management.

Practical

- Calculation of irrigation water requirement.
- Study of different methods of irrigation.(drip and sprinkler)
- To workout cost estimation of drip irrigation system.
- Workout cost estimation of drip irrigation system
- Maintenance of micro irrigation system.
- Study of centrifugal pumping system and irrigation water measuring devices;
- Uniformity of water application in drip and sprinkler systems
- Study of soil and water conservation measures.

Reference Books:

1. Irrigation- Theory and Practice by Michael, A.M
2. Manual on Irrigation Agronomy- Mishra, R.D and Ahmed, M.
3. Water use efficiency – Stanhili, G.,
4. Land & Water Management Engineering – V.V.N. Murty
5. Soil Erosion and Conservation – R.P. Tripathy and H.P. Singh
6. Water use Efficiency in Agriculture- Giriapa

AS- 105 Introduction to Computer & Its Applications

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam		Total Marks
		Practical	Theory	Practical		
				Continuous evaluation	End term evaluation	
AS 105	Introduction to Computer & Its Applications	2	-	100	--	100

Tutoruials

- Defination of Computer- History and Evolution of computer – Introduction to WINDOWS, Introduction to MS WORD, Introduction to MS EXCEL, Introduction to MS powerpoint, Introduction to M.S Office, Introduction to Internet and email.

Practicals

- Introduction/ Study of computer
- How to create folder and shortcuts.
- Introduction to MS WORD and its functions/ commands.
- Introduction to MS POWERPOINT
- Introduction to Internet and Email.

Reference books

1. Comdex computer course kit-Gupta Vikas, Dreamtech Press, New Delhi.
2. Microsoft office 2003- Singh Vishnu

Semester II

AS 201 Soil fertility & nutrient management

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 201	Soil fertility & nutrient management	4	3	90	30	40	40	200

Theory

- Soil fertility and productivity-factors affecting, features of good soil management, problems of supply and availability of nutrients, relation between nutrient supply and crop growth,
- Mineral nutrients- definition of plant nutrients and soil fertility, criteria of essential of an element, classification of plant nutrients, available form in which nutrients occur in soil, non essential and useful elements, integrated nutrient management.
- Criteria of essentiality of nutrients, Essential plant nutrients-their functions, nutrient deficiency symptoms, transformation and dynamics of major plant nutrients.
- Fertilizers- classification of fertilizers with nutrient content, Methods of fertilizer application, Commercial fertilizers, composition, relative fertilizer value and cost, residual effects and fertilizer use efficiency, fertilizer mixtures and grades, agronomic, chemical and physiological methods of increasing fertilizer use efficiency nutrient interactions, organic fertilizers and its advantages.
- Time and methods of manures and fertilizers application, foliar application and its concept, relative performance of organic and inorganic manures, economics of fertilizer use, integrated nutrient management.

- Bio-fertilizer- type of bio-fertilizers and their potential, phosphor-solubilising bacteria (PSB), Nitrogen fixing bacteria, symbiotic nitrogen fixers, non-symbiotic nitrogen fixers, merits of biofertilizer uses, constraints to the use of biofertilizers, precautions for the use of biofertilizer, , use of vermin compost and residual waste in crops.

Practicals

- Determination of total N, P, K and S in plants,
- Interpretation of interaction effects and computation of economic and yield optima.
- Identification of fertilizers and their nutrient content.
- Compatibility of fertilizer with pesticides.
- Coating of fertilizers.
- Application and seed treatment of bio-fertilizers.
- Preparation of micro-nutrients solution with line for foliar application.

Reference Book

1. Chemistry of the soils – F. Bear
2. Soils and soil fertility – C.M. Thomson and F.R. Troeh
3. Fundamentals of soil – Sahay, V.N. Kalyani publishers. New Delhi.
4. Soil fertility and fertilizers – S.L. Tisdale, W.L. Nelson, J.D. Beaton and J.L. Havlin

AS 202 Agricultural Zoology

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 202	Agricultural Zoology	4	3	90	30	40	40	200

Theory

- Introduction, classification of animal kingdom, branches of zoology, important characters of different phylum and its classification up to class with examples.
- Life cycle of important animal/ parasites (plasmodium, trypanosome, liver fluck, tape worm etc)(Preliminary introduction to structure and functions of different external and internal parts of one typical animal in each phylum/class).
- Introduction to agricultural important of different phylum.

Practicals

1. Classification of animal kindom.
2. Charectors of different phylum and typical animals of different phylum
3. Identification of important animals particularly of agricultural importance under different phylum.

Reference books

1. Economic zoology-P.D Srivastava.

AS 203 Fundamentals of Plant pathology

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 203	Fundamentals of Plant pathology	4	3	90	30	40	40	200

Theory

- History of plant pathology and nematology.
- Introduction, important plant pathogenic organisms, different groups, fungi (up to classification), bacteria, fastidious vesicular bacteria, phytoplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites with examples of disease caused by them.
- General morphology and characteristics of plant parasitic nematodes, their feeding habits and life cycle of root-knot nematode in detail.
- Economic importance, symptoms, cause, epidemiology, disease cycle and integrated management of disease of rice, sorghum, bajra, maize, wheat, sugarcane, turmeric, ginger, tobacco, groundnut, sesamum, sunflower, cotton, redgram, blackgram, greengram, tea, soyabean.

Practical

- Plant disease symptom identification and preservation of disease samples.
- Study of symptoms, etiology, host-parasite relationship and specific control measures of the following crop diseases.
- Presentation of disease samples survey and collection of diseases of rice, sorghum; diseases of wheat, bajra and maize; diseases of sugarcane, turmeric and tobacco; diseases of groundnut, castor and sunflower; diseases of sesamum and

- cotton; diseases of redgram, greengram, blackgram, bengalgram and beans; Field visits at appropriate time during the semester.
- Isolation of plant pathogens(bacteria and fungi)
 - Pathogenicity tests. (Koch' postulate)
 - Extractions of nematodes from soil and host tissues.
 - Rating for fungal and nematode diseases.

Note: Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.

Reference Book:

1. Plant Pathogens : The Fungi - R. S. Singh
2. An Introduction to Fungi- H. C. Dubey
3. Principles of Plant Pathology - R. S. Singh
4. Plant Pathology - R. S. Mehrotra
5. Introductory mycology(fouth edition)- C. J.Alexopolous, C.W.Mims and M. Blackwell.
6. Plant pathology –(third edition)- G.N. Agarios.

AS -204 Agronomy of Field Crops – 1

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 204	Agronomy of Field Crops – 1	4	3	90	30	40	40	200

Theory

- Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices viz., selection of seeds, seed treatment, sowing method, rate, time and method of application of manures and fertilizers including biofertilizers, thinning, gap filling, earthing up, interculturing, weed control measures, irrigation, crop rotation intermixed or relay cropping, major insect, pests and diseases, harvesting, threshing, winnowing, cleaning, drying, storage, preparation of product for market, value addition, high yielding improved and hybrid varieties, yield of rabi crops
- Main and sub main research stations.
- Cereals: wheat, barley; Pulses: chickpea, lentil, peas, french bean; Oilseeds: rapeseed and mustard, safflower and linseed; Sugar crops: sugarcane and sugar beet, Commercial crops: potato, chicory and tobacco.
- Spices- Cumin, coriander, dil seed and ajwain (ajman) .
- Forage crops: berseem, Lucerne, Japanese mustard and oat.

Practical:

- Seed bed preparation and sowing of wheat, sugarcane and mustard crops.
- Seed treatment of different rabi crops.
- Raising seedlings of tobacco.
- Identification of seeds and plants of rabi field crops.
- Calculations on seed rate; Top dressing of nitrogen in wheat and study of fertilizer experiments on wheat and mustard;
- Identification of weeds in wheat and grain legumes, application of herbicide and study of weed control experiments;
- Morphological characteristics of wheat, sugarcane, chickpea and mustard; Yield contributing characters of wheat;

- Yield and quality analysis of sugarcane, chick pea and mustard, judging the maturity stage of rabi crops. Important agronomic experiments of rabi crops and visit to research stations related to rabi crops.

Reference Book:

1. Modern Techniques of raising field crops - Chida Singh
2. Crop management under rainfed and irrigated condition - S.S.Singh
3. Agronomy of field crops - S.R.Reddy
4. Text book of field crop production - Edited by R. Prasad (ICAR)

AS 205 Agricultural statistics

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam		Total Marks
		Practical	Theory	Practical		
				Continuous evaluation	End term evaluation	
AS 205	Agricultural statistics	2	---	100	--	100

Tutorials

- Statistics-its meaning, definition and importance in agriculture- frequency distribution, measures of central tendency- arithmetic mean.
- Measures of dispersion- standard deviation, variance, standard error of mean, coefficient of variation.
- Test of significance- Student 't' test and 'F' test.
- Experimental design-basic principles of field experiments-planning field experiments- size and shape of plots-Arrangements of plots and blocks-Analysis of CRD and RBD.

Practicals

- Problems related in topics covered in theory

Reference books

1. Basic Statistics –BL Agarwal
2. Statistics for Agricultural science- G. Nageshwar Rao
3. A handbook of Agricultural Statistics- SRS Chandel
4. A textbook of Agricultural Statistics-R. Rangswami
5. Principles and procedure of Statistics- RGD Steel and J.H. Torrie
6. Statistical Procedure for Agricultural Research-K.A. Gomez and A.A. Gomez.

Semester III

AS 301 Weed Management

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continu ous evaluati on	End term evaluation	Contin uous evaluati on	End term evaluation	
AS 301	Weed Management	4	3	90	30	40	40	200

Theory

- Weeds- definition and terminology, classification, losses caused, utilization, crop-weed association, crop-weed competition, critical period of weed competition.
- Methods of weed control- physical, cultural, chemical and biological.
- Integrated weed management.
- Herbicides- classification, advantages- limitations, precautions in use of herbicide. Methods of application. Trade & common name of herbicides.
- Weed management in major field and horticultural crops. Aquatic and problematic weeds and their control.

Practicals

- Identification of weeds
- Collection and preparation of herbarium of weeds
- Herbicide label information
- Computation of herbicide doses
- Study of use of herbicide application appliances
- Demonstration of method of herbicide application
- Study of control of problematic weeds
- Control of parthenium, parasitic weeds, aquatic weeds
- Weed control in non-cropped areas
- Visit to on going weed control experiments

Reference books

1. Aquatic weeds-their manace and control –O.P. Gupt
2. Scientific weed management in the tropics and sub-tropics- O.P.upta
3. Maual of weed control- N.C. Joshi
4. Principles of weed science- V.S.Rao
5. Principles of Agronomy- T.Y. Reddy and G.H.S. Reddi
6. Introduction to Allelopathy- S.S. Nawal, R. Palaniraj, S.C. Sati
7. Fundamental of weed Science- L. Robert
8. Allelopathy in crop production- S.S. Nirwal

AS 302 Farm Layout, Development Management and Filed Plot Technology

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 302	Farm Layout, Development Management and Filed Plot Technology	4	3	90	30	40	40	200

Theory

- Surveying: survey equipment, chain survey, cross staff survey, plotting procedure, calculations of area of regular and irregular fields. Levelling - levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring.
- Farm power and mechanization. Engine terminology and related numerical. Tractors type of tractors and their components and power transmission system. Economics of tractor operation.
- Energy source- introduction, classification , energy from biomass-types of biogas plant-constructural details, biogas production and its utilization.

Practical

- Acquaintance with chain survey equipment;
- Levelling equipment - dumpy level, levelling staff, temporary adjustments and staff reading;
- Differential leveling;

Reference Books

1. A Text Book of Surveying and Levelling – P.C. Purnima
2. Land & Water Management Engineering – V.V.N. Murty

AS 303 Plant Diseases & Their Management

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 303	Plant Diseases & Their Management	4	3	90	30	40	40	200

Theory

- Occurrence, economic importance, symptoms, favorable weather conditions, disease cycle and management of important diseases of bajra, sorghum, wheat, rice, maize, groundnut, sesamum, mustard, castor, cotton, tobacco, sugarcane, potato, brinjal, chilli, tomato, pigeon pea, chick pea, cumin, okra, cucurbitis, banana, mango, papaya and citrus
- Significance of plant disease management
- Principles of plant diseases management- Avoidance of pathogens, exclusion of inoculums, eradication of pathogens, protection, host resistance.
- Methods of plant diseases management- cultural, legal, biological, chemical methods and use of resistant variety.
- Integrated disease management. Disease forecasting. Plant protection appliances. Precautions in handling & storage of pesticides.

Practicals

- Field visit to study different diseases of above mentioned crops at regular intervals
- Microscopic examinations of diseased specimen and their diagnosis
- Collection and dry preservation of diseased specimens and submission of diseased album
- Preparations of Bordeaux mixture, Bordeaux paste & different concentrations of various fungicides
- Methods of applications of various fungicides
- Types and use of plant protection appliances

Reference book

1. Plant Disease- R.S. Singh
2. Diseases of crop plants in India- G. Rangswami
3. Diseases of edible oil seed crops- S.J. Kolte
4. Fungicides in plant disease control- YL Nene and PN Thapliyal

AS 304 Agronomy of Field Crops-II

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 304	Agronomy of Field crops	4	3	90	30	40	40	200

Theory:

- Name of the crop, its synonym, botanical name and family.
- Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices viz., selection of seeds, seed treatment, sowing method, rate, time and method of application of manures and fertilizers including biofertilizers, thinning, gap filling, earthing up, interculturing, weed control measures, irrigation, crop rotation intermixed or relay cropping, major insect, pests and diseases, harvesting, threshing, winnowing, cleaning, drying, storage, preparation of product for market, value addition, high yielding improved and hybrid varieties, yield of crops.
- Main and sub main research stations.
- and yield of kharif crops,
- Cereals – rice(kharif summer), maize, sorghum, pearl millet and minor millets; Pulses : pigeonpea, mungbean, uradbean and horsegram; Oilseeds: groundnut, sesame, niger and soybean.
- Fibrecrops: cotton, jute and sun hemp.
- Commercial crop-Bidi tobacco

Practical:

- Identification of seeds and varieties of major kharif crops.
- Seed treatment of different *Kharif* crops.
- Preparation of different methods of rice nursery.
- Practice of transplanting of rice- SRI
- Practice of sowing of pigeon pea, maize, groundnut and cotton.

- Visit to crop cafeteria and record periodical growth and yield attributing observations of kharif crops.
- Practice of after care operations in kharif crops.

Reference Book:

1. Modern Techniques of raising field crops - Chida Singh
2. Crop management under rainfed and irrigated condition - S.S.Singh
3. Agronomy of field crops - S.R.Reddy
4. Text book of field crop production - Edited by R. Prasad (ICAR)
5. Principles and practices of Crop production – P.C.Das

AS 305 Seed production Technology

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam		Total Marks
		Practical	Theory	Practical		
				Continuous evaluation	End term evaluation	
AS 305	Seed production technology	2	--	100	--	100

Tutorials

- Introduction and importance of seed production. Seed structure and morphology. Seed viability and dormancy. maintenance of genetic purity during seed production, isolation, roughing techniques, selfing.
- Seed quality-physical and genetic. Characteristics of good quality seed. Classes of seeds, hybrid seed (F₁), nuclear seed, breeder seed, foundation seed, certified seed.
- Production of hybrid seeds of important crops-maize, bajra, cotton, castor and jowar.
- Seed production of self pollinated crops.
- Seed classification- Plants of seed production- procedure, field inspection and seed law.

Practicals

- Field visit of seed production plot.
- Field visit of plant seed testing laboratory.
- Study of roughing and isolation.
- Methods of seeds production-bajra, wheat, maize, castor, vegetables crops.
- Study of seed germination, seed vigour and seed viability.
- Study of seed sampling-principles and procedure.
- Study of seed purity analysis.
- Identification of seed certification tags and its importance.

Reference books

1. Seed technology – R.L Agarwal
2. Principles of seed technology- P.K. Agarwal
3. Seed technology-D. Khare and M. Bhale.
4. Seed production- Principles and practices- M.B. McDonald and O. Copeland.
5. Principles of seed certification and testing- N.P. Nema

Semester IV
AS 401 Integrated Pest Management

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 401	Integrated Pest Management	4	3	90	30	40	40	200

Theory

- Biology nature of damage and management of insect pests of major field crops like rice, wheat, maize, sorghum, ragi, sugar cane, cotton, jute, pulses, groundnut, mustard, sunflower, sesamum, castor, commonly grown vegetable crops of Odisha belonging to cucurbits, colecrops and solonaceous crops, sweet potato etc. Pest of coconut, cashewnut, coffee and their management.

Practical

- Identification of crop pests with symptoms of damage in major crops belonging to cereals, pulses, oil seeds, fiber crops, sugar cane, important vegetables and plantation crops.

Reference Book

1. Insect pest of India and S.E Asia – A.S.Atwal
2. Elements of Economic Entomology – B.V.David
3. Insect and mites of crops in India – MRGK Nair
4. Agricultural insect pests and their control V.B.Awasthi

AS 402 Horticulture

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 402	Horticulture	4	3	90	30	40	40	200

Theory

- Principles of horticulture, definition, branches of horticulture and role of fruits and vegetables in human diet.
- Scope, current situation and importance of horticulture in India.
- Propagation of horticultural crops, definition, types, classification, merits and demerit-Sexual propagation (Seed propagation) and asexual propagation (Vegetative propagation).
- Hormones- Role of Hormones in Horticultural crops. Principles of pruning and training- need, objectives and scope.
- Choice of trees and plants.

Practicals

- Study of horticultural tools and different containers
- Preparation of nursery beds and sowing
- Study of potting and repotting
- Study of propagation by seeds and seed treatment.
- Study of plant propagation by cutting and layering and budding.
- Study of propagation by budding and grafting
- Study of different types of media and their uses in horticulture
- Identification of horticultural plants.
- Practices of trimming and pruning in fruit crops.
- Visit of commercial nursery.

Reference books

1. Advances in horticulture . fruits (Volume 1-4) Singh Ranjit.
2. Fruits- Tropical and Sub tropical-T.K Bose, S.K Mitra.
3. Basic Horticulture- Jitendra Singh
4. Introduction to horticulture-N.Kumar.

AS 403 Organic Farming, Green house and Poly house Techniques

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 403	Organic farming, green house and polyhouse techniques	4	3	90	30	40	40	200

Theory

- Organic farming – Definition, relevance, biological nutrient management- Organic manures, vermicompost, green manure, organic residue, biofertilizer soil ammendments, Integrated pest and weed management- use of biocontrol agents, bio pesticides etc. Organic certification in brief.
- Integrated farming system- definition, goal, components, factors affecting ecological balance, land degradation, soil health management, models of IFS for rainfed and irrigated conditions and different categories of farmers.

Reference Book

1. Farming system : Theory and Practice - S.A.Solaimalai
2. Organic Farming : Theory and Practice- S.P.Palaniappan and K.A. Annadurai
3. A hand book of Organic Farming by A.K.Sharma

AS 404 Farm Structure, Power Machinery and Post Harvest Techniques

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam				Total Marks
		Practical	Theory	Practical		Theory		
				Continuous evaluation	End term evaluation	Continuous evaluation	End term evaluation	
AS 404	Farm Structure, Power Machinery and Post Harvest Techniques	4	3	90	30	40	40	200

Theory

- Primary (Mould board plough, Disc plough) and secondary tillage (Cultivator and harrows) implements, Field operation of line sowing equipment (Seed drill, transplanter), SRI method of planting with marker, Repair and maintenance of tractor, power tiller and matching implements, Operation, use and maintenance of sprayers and dusters, Operation and maintenance of harvesting tools (improved sickle, power reaper), Operation and maintenance of pedal operated thresher, power thresher-cum-winnower, and Axial flow thresher.

Practical

- Adjustment and Operation of primary tillage implements (MB plough, Disc plough etc.), Adjustment and Operation of secondary tillage implements (Cultivator and Harrow), Field operation of seed drill, field operation of paddy transplanter), Paddy transplanting in SRI method using marker, Operation of manual and power weeder (Cono, Mandua and low land power weeder), Adjustment and operation of tractor, power tiller with matching implements, Precautionary measures in operation of sprayers and dusters, Operation of axial flow thresher, Operation of pedal operated, power operated and axial flow thresher.

- Moisture content determination of food grains. Study of cleaners and graders. Study of different types of dryers. Study of different storage structures. Visit to Rice mill, Dall mill and oil mill.

Reference Books

1. Principles of Agricultural Engineering, Vol: I by A.M.Michael and T.P.Ojha
2. Post harvest technology of cereal, pulses and oil seeds, A Chakraverty

AS 405 Extension Education

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 80 marks and End Term Examination conducted by University examination for 120 marks.

Subject Code	Subject Title	Credits		Exam		Total Marks
		Practical	Theory	Practical		
				Continuous evaluation	End term evaluation	
AS 405	Extension Education	2	--	100	---	100

Tutorials

- Definition, need and principles of Extension education.-Latest trends in Agriculture.
- Extension Teaching Methods and classification according to use and form (only).
- Detail studies of different teaching methods- Poster, leaflet, flash card. Method demonstration, result demonstration and field trip.
- Communication- meaning and importance of communication- elements of communication- communication skills, verbal, writing, correspondence skills.
- Concept of KVK, ATMA, Kisan call centre and ATIC.

Practicals

- Identification of audio visual aids and its application
- Preparation of flash cards, leaflets, folders etc.
- Use of OHP and P. A. system
- Organization of method demonstration.
- Power point presentation
- Preparation of interview schedules to collect profile of the farmers.
- Visit of extension centres- KVK or SSK or IC centres or EEI or NGO' or exhibition or Farmer's fair and result demonstration or front line demonstration.

Reference books

1. Dimension of Agriculture Extension-N.B Chauhan, B.S. Patel and R.C. Patel
2. Education and Communication for Development- O.P. Dhama and O.P. Bhatnagar.
3. Extension Education in community development- Directorate of Extension Education.
4. Handbook of Extension Education- O.S Rathore, S.D. Dhakar, M.S. Chauhan, and S.N. Ojha.
5. Extension, Communication and Management- Ray, G.L.
6. Extension Education-Reddy, A.A.
7. Text book on Agricultural Communication process and methods- A.S Sandhu.