माँ विंध्यवासिनी विश्वविद्यालय, मीरजापुर

Maa Vindhyavasini University, Mirzapur

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FACUALTY O F AGRICULTURE

Academic Regulation For:

I B.Sc (Honours) Agriculture Program Duration:

Program Duration:

Minimum 8 Semesters (4 Academic Years)

Maximum 14 Semesters (7 Academic years)

Minimum eligibility requirement *for admission:*

*Pass in *1* o+2 examination having 50% marks in agate for general category and '45% for SC/ST in Agriculture or Science:

Mode of Admission:

College may follow entrance examination or merit at 10+2 or acombioation.

Reservation of Seats:

Reservation of seats shall be governed by the rules of State Government.

Semester Duration:

The duration of 110 working days, consisting of 95 instructional days and *15* examination days.

Credit Definition:

One credit is defined as one-hour Lecture/2 hours Job/3hours field work per week.

Attendance:

*75 percent minimum attendance is compulsory to appear in examination.

*Relaxation in minimum attendance requirement should be given. only exception. case like indoor hospitalization/sports activities.

5% relaxation may be-granted by principal and above that only VC can relax. Less than *65%* attendance will: ever allowed appearing in exam Course Curriculum and minimum credits requirement:

' The Academic Curriculum of MGK VP approved based 01 yth dean committee report of IC.AR

WEIGHTAGE TO VARIOUS TYPES OF EXAMINATIONS:

During a semester, the *instructor* in-charge of a particular course shall hold one midterm test in accordance with the Regulations for examinations. The weight age given to these tests will be as follows

Examinations	Course with practical Of	Course without Practical only Either Theory or practical
Mid terms	20	2D
Practical	30	-
Final Examinations	50	@;0

For practical one internal examiner from within the University and other external examiner other than college will be appointed by University in consultation with convener of the subject.

Promotion & Grading:

1. Grade point in each subject will be calculated by dividing the marks scored out of 100 (Including theory, practical and midterms) by 10.
2. If grade point in any subject is less than 5.00 candidate will be treated as unclear in that subject.
3. A candidate cannot be promoted to IIIrd > Vth & VIIth Semester if he carries more than two paper sums cleared in odd semester papers similarly, he will not be promoted to IVth, VIth and VIIIth semester if he carries more than two papers unclear din everr semester papers
4. Candidates having more than two papers unclear in odd/even -semester will be detained from promotion as per rules and shall be treated as year back to clear the papers
5. Candidate may appear in theory or practical or both examinations as back paper by paying fees prescribed by University.

6. After clearing all the papers final grades will be awarded on the basis of OGPA as given below.

Grade Point:

Ten (10) points grading system should be adopted with minimum grade Point Average (GPA) of 5.00 for passing a subject and overall grade point Average (OGPA) of 5.50 for Obtaining a degree.

OGPA	Division
5.S:5.999	Pass
6.0-6.999	II
7.0-7.999	I
8.0-Above	1" with Distinction

GP= Marks scored (particular subject) / 10.

TGP= GP x Credit (particular: subject)

GPA...: -L Total Grade Points (TGP) score dirotal Credits (For partic1:1lar Semester)

CGPA. - Tol Gt: _de Points (TGP) Scored (total Course credits (dual semester)

OGPA-: E Total Points Scored (after excluding failure Points)/Course Credits.

Percentage= OGPA X 100/10.

GP= Grade Point

TGP= Total Grade Points

GPA = Grade Points Average

CGPA = Cumulative Grade Points Average

OGPA = Overall Grade Point Average

AGR :Agronomy.

GPB : Genetics and Plant Breeding.

SSC :Soil Sciece and Agricultura1 Chemistry.

HOR :Horticulture.

EXT :Agricultural Extension.

SCW :Soil and Water Conservation.

AHD :Animal Husbandry and Dairy Science.

AEC :Agricultural Econimcs.

RC : Remedial Courses.

NGC-111 :NSS/NCC /Physical Education and Yoga Practices

ENT :Entomology.

PP : Plant Pathology.

NGC-121 :Human Values and Ethics.

STA- 211 :Statistical Methods.

STA-221 :Agri-informatics.

ENG :Agricultural Engineering.

Elective -1 (Vth Semester)

AHD-312 :Food Safety and Standards.

SCW EXT/-312 :System Simulation and Agro Advisory.

HOR-312 :Protected Cultivation.

AEC-312 :Agriculture Business Management.

GPB-312 :Commercial Plant Breeding.

ENT/SSC-312 :Agro Chemicals.

Elective -2 Mth Semester)

HOR-322 :Hi-tech Horticulture.

AI:h>-322 :Fishery and Poultry management.

EiT-322 :Agriculture Journalism.

HOR-323 :Land Scapmg.

ArlR-322 :Weed Management.

EhissC-322 :Biopesticides and Bio

1st Semester			
Course Code	Course Name	Credit Hours	Page No.
AGR-111	Fundamentals of Agronomy	3(2+1)	
GPB-111	Fundamentals of Genetics	3(2+1)	
SSC-111	Fundamentals of *Soil* Science	3(2+*1*)	
HOR-111	Fundamentals of Horticulture	2(1+1)	
EXT-111	Rural Sociology & Educational Psychology	2(1+*1*)	
SCW-111	Introduction to Forestry	2(1+1)	
AHD-111	Introductory Animal Husbandry	3(2+1)	
AEC-111	Comprehension & Communication Skills in English	2(1+1)	
RC-111/1	Agricultural Heritage	1(1+0)	
RC-111 2	Introductory Biology/Basic Agriculture I	2(1+1)	
RC-111/3	Elementary Mathematics/Basic Agriculture	2(1+1)	
NGC- 111	NSS/NCC Physical Education & Yoga Practices	2(0+2)	

II Semester		
GPB-J 21	Fundamentals of Crop Physiology	3(2+1)
SSC-121	Fundamentals of Plant Biochemistry	3(2+1)
ENT-121	Fundamentals of Entomology-I	3(2+1)
AEC-121	Fundamentals of Agricultural Economics	2(1+1)
AGR-121	Principles of Organic Farming	2(1+1)
PP-121	Fundamentals of Plant Pathology	3(2+1)
HOR-121	Production Technology for Vegetables and Spices	3(2+1)
EXT-121	Fundamentals of Agricultural Extension Education	3(2+1)
AHD-121	Mille Processing and Safety Issues	3(2+1)
NGC-121	Human Values & Ethics (Non Gradial)	1(1+0)

III Semester			
AGR-211	Crop Production Technology -1 (Kharif crops)	2(1+1)	
AGR-212	Practical Crop Production -1 (Kharif crops)	2(0+2)	
GPB-211	Fundamentals of Plant Breeding	3(2+1)	
SSC-211	Agricultural Microbiology	2(1+1)	
AEC-211	Agricultural Finance and Co-Operation	3(2+1)	
ENG-211	Farm Machinery and Power	3(2+1)	
PP-211	Principles of Integrated Disease Management	3(2+1)	
SCW-211	Environmental Studies & Disaster Management	3(2+1)	
STA-211	Statistical Methods	2(1+1)	
AHD-211	Dairy Science	3(2+1)	
	[illegible]	[illegible]	

IV Semester		
AGR-221	Crop Production Technology - II (Rabi crops)	2(1+1)
AGR-222	Practical Crop Production - II (Rabi crops)	2(0+2)
GPB-220	Principles of Seed Technology	3(2+1)
SSC-221	Problematic soils and their Management	2(1+1)
ENG-221	Renewable Energy and Green Technology	3(2+1)
HOR-221	Production Technology for Ornamental Crops, MAPs and Landscaping	3(2+1)
EXT-221	:Entrepreneurship Development and Business Communication	2(1+1)
STA-221	Agri- Informatics	2(1+1)
AHD-221	Poultry Production & Management	3(2+1)
SWC-221	Fundamentals of Soil and Water Conservation	2(1+1)
ENT-221	Fundamentals of Entomology-II	3(2+1)

	V Semester	
AGR-31 1	Rain fed and dry land Agriculture	2(1+1)
GPB-311	Crop Improvement-I (Kharif crops)	2(1+1)
ENT-311	Pests of Crops and Stored Grain and their Management	3(2+1)
AEC-311	Agricultural Marketing Trade & Prices	3(2+1)
ENG-311	Protected Cultivation and Secondary Agriculture	3(2+1)
PP-311	Diseases of Field and Horticultural Crops and their Management-I	3(2+1)
HOR-311	Production Technology for Fruit and Plantation Crops	3(1+2)
EXT-311	Communication Skills and Personality Development	3(2+1)
AEC-311	Intellectual Property Rights	1(1+O)
SCW-311	Introductory Agro-meteorology and climate change	3(2+1)
	Elective-l (AHD-312/ENT/SSC-31 2/HOR-312/AEC-312/GPB-312/ SCW/EXT-312)	3(2+1)

	VI Semester	
AGR-321	Farming System& Sustainable Agriculture	2(1+1)
GPB-321	Crop Improvement-I I (Rabi crops)	2(1+1)
SSC-321	Manures, Fertilizers and Soil Fertility Management	3(2+1)
AEC-321	Farm Management, Production & Resource Economics	2(1+1)
PP-321	Diseases of Field and Horticultural Crops and their Management-II	3(2+1)
HOR-321	Post-harvest Management and Value Addition of Fruits and Vegetables	2(1+1)
SCW-321	Watershed and Wasteland Management	2(1+1)
ENT-321	Beneficial insects and Pest of Horticultural Crops and their Management	3(2+1)
ENG-321	Geo-informatics and Nanotechnology	2(1+1)
AHD-321	Principles of Food Science & Nutrition	3(2+1)
	Elective-2(HOR-322/ AGR-322/ EXT-322/ HOR-323/ AHD-322/ ENT/SSC-322)	3(2+1)

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Elective Courses: A student can select two elective courses out of the following offered during 5th and 6th semesters.

VII Semester (Elective -1)			
S.N.	Courses	Course Code	Credit Hours
1	Food Safety and Standards	AHD-312	3(2+1)
2	Protected Cultivation	HOR-312	3(2+1)
3	System Simulation and Agro Advisory	SEW /EXT -312	3(2+1)
4	Agricultural Business Management	AEC-312	3(2+1)
5	Commercial Plant Breeding	GPB-312	3(2+1)
6	Agro Chemicals	ENT/SSC-	3(2+1)

vith Semester (Elective -2)			
S.N.	Courses	Course Code	Credit Hours
1	Hi-tech Horticulture	HOR-322	3(2+1)
2	Fishery and Poultry Management	AHD-322	3(2+1)
3	Agricultural Journalism	EXT-322	3(2+1)
4	Land Scaping	HOR-323	3(2+1)
5	Weed Management	AGR-322	3(2+1)
6	Biopesticides and Biofertilizers	ENT/SSC-322	3(2+1)

VII[h] Semester

RAEW 411(I)-Rural Agricultural Work Experience(RAWE) Component-I			
RAEW	Village Attachment and University/ KVK/ Research Institute (Component I)	No. of weeks	Credit hours
(i)	General Orientation & On Campus Training activities to be performed to facilitate for	2	14
(ii)	Village attachment	4	
(iii)	Universities/ College/KVK/ Research Station	4	
Total weeks and credit hours for RAWE [RAE(V)]		10	14
:411{IJ)- Agro -Industrial Attachment (Component II)			
(i)	Plant Clinic	4	6
(ii)	Project report preparation, presentation and evaluation	6	
Total weeks and credit hours		10	6

Total Credit Hours under RAWE =20

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. ELP'tli,!"Iodulcs fQr Skill Development and Entrepreneurship: A Student has register 20 credits opting for two modules of (O+/O) credits each (total 20 credit from the package of modules in the VIIIth sero.

Sr. No.	'fitle of the module	Credits
1.	Production Technology for Bioagents arid Biofertilizer	0+10
2.	SeedPrOduction and Technology	o+JO
3.	Mushroom Cultivation Technology	0+IO
4.	Soil, Plant, Water and Seed Testing	0+10
5-	Connnerc.ial Beekeeping	*1O
6.	Poultry Production Technol9gy	0+10
7h	Commercial Horticulture	o+lO
8;	Floriculture and Lands<;aping	0+10
9.	Food Processing	0+10
10.	Agriculture Waste Management	0+10
II.	Organic Production -i:ecl mology	:o+10
12	Commercial" Sricµlture	0+10

VIIIth semester

Agro Industrial Attachment

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for03 weeks.
- Industries include Seed/Sapling production, Pesticides-insecticides. Post- harvest-processing - value addition, Agri-finance institutions. etc.

Activities and Tasks during Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry
- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the iindustry
- Documentation of the activities and task performed by the students
- Performance evaluation appraisal and ranking of students

ELP 4i1, Evaluation of Experiential Learning Programme

Sr. No.	Parameters	Max. Marks
1	Project Planning and Writing	10
2	Presentation	10
3	Regularity	10
4	Monthly Assessment	10
5	Output delivery	10
6	Technical Skill Development	10
7	Entrepreneurship Skills	10
8	Business networking skills	10
9	Report Writing Skills	10
10	Final Presentation	10
	Total	100

Discipline-wise summary of credit hours

Sr. No.	Croup	Credits
1	Agronomy	17
2	Genetics & Plant Breeding	16
3	Soil Science & Agricultural Chemistry	13
4	Entomology	12
5	Agricultural Economics	11
6	Agricultural Engineering	11
7	Plant Pathology	12
8	Horticulture	13
9	Agricultural Extension	9
10	Soil conservation	12
11	Statistics. Computer Application and I.P.R.	5
12	Animal Husbandry and Dairying	13
13	English	2
14	Remedial Courses*	5
15	NSS1NCC/Physical Education & Yoga Practices**	2
16	Human Values and Ethics**	1
	Total	154+6 credits elective = 160
	RAWE	20 + 20
	ELP	
	Grand Total	160+20+20 200

DEPARTMENT OF AGRONOMY

Course Code	Course Title	Credit Hours
AGR-111	Fundamentals of Agronomy	3(2+1)
AGR-121	Principle of Organic Farming	2(1+1)
AGR-131	Crop Production Technology-I (Kharif Crops)	2(1+1)
AGR-212	Practical Crop Production-I (Kharif Crops)	2(0+2)
AGR-221	Crop Production Technology-II (Rabi Crops)	2(1+1)
AGR-222	Practical Crop Production-II (Rabi Crops)	2(0+2)
AGR-311	Rain Fed and Dryland Agriculture	2(1+1)
AGR-321	Farming System and Sustainable Agriculture	2(1+1)

AGRONOMY

AGR-111 1.Fundmcn tals of 4gronomy 3(2+1)

Th eory

Aonomy and its scope. seeds and sowing, tillage and tilth, crop density and geometry, *Crop nutntion*, manures a d fi. n ei izers, n utn ent use effic1cncy.Cv ater resou rces, soil-plant-water reJat10nship crop water re qwrement, water use efficiency, Imgation- scheduling and methods *quality* of *irrigation* watii} Weeds- importance. classification, crop weed competition, weed management- principles and methods, herbicides- classification, selectivity and resistance, *P Wid.wJ* allelopathy. Growth and development of crops, factors affecting growth and development, crop rotatioJ? and *its principles,*

Practical

Identification of crops, seeds, fertilizers, *pesticides* and tillage implements. Identification of weeds in crops, Methods of herbicide and fertilizer application. Study of yield contributing characters and yield estimation. Numerical exercises on fertilizer requirement, plant *population*. herbicides and water requirement, Study of soil moisture measuring devices, Measurement of *irrigation* water.

AGR-121 2. Principles of Organic Farming i(1+1)

Theory

Organic farming, *principles* and importance. Organfo nutrient resources and its fortification; Restrictions in nutrient use; insecticide, fungicide, *herbicide:* Certification process and standards and promotion of organic fam:iiil g.

Practical

Visit of organic farms to study the various components and their utilization: Preparation of enrich compost, vermicompost, Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Quality aspect, grading. packaging and handling.

AGR-21i 3. Crop Production Technology-1 (Kharif Crops) 2(1+1) ...,

Theory

OrigiD geographical distribution, economic importance. soil and climatic requirements. varieties, cultural practices and yield of Kharif crops, rice, maize, sorghum, grain and fodder, pearl millet and finger millet, *pigeoifPea,* mung bean and urd b an; til, groundnut. and soybean; cotton &j te; cowpea, luster'b

Practical

Rice nursery preparation transplanting of rice, sowing of soybean, pigeon pea and mung bean. Maize, groundnut and Cotton. Effect of seed size on germination. Effect of sowing depth on germination of kharif crops, identification of weeds in kharif season crops. top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of kharif season crops, study of crop varieties and important agronomic experiments at experimental farm.

AGR-212 4. Practical Crop Production-I (Kharif Crops) 2(0+2)

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising. sowing. nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production. mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation.net returns per student as well as per team of 8-10 students.

AGR-221 5. Crop Production Technology-II (Rabi crops) 2(1+1)

Theory

Origin, geographical distribution,economic lmporfance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; wheat, barley, chickpea, peas.rapeseed, mustard, sunflower, sugarcane; tube crop-Potato. Forage crops-berseem, lucerne and oat.

Practical

Sowing methods of wheat and sugkcane, identification of weeds in rabi season crops. Numerical problems on seed requirement of rabi crop. Study of yield contributing characters of *rabi* season crops, study of important agronomic experiments of rabi crops at experimental farms. Study of rabi forage experiments.

AGR-222 6. Practical Crop Production-11(Rabi Crops) 2(0+2)

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising. sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation.net returns per student as well as per team of 8-10 students.

AGR-311 7. Rain fed and D1lmu.l Agricultu re: 2(1+1)

Theory

Rainfed and drylnnd agriculture-Introduction.types and history. Problems & prospects of rainfed agricu lture in lndin.Soil and climatic conditions prevalent in rainfcd areas. Drought: types, effect of water deficit on physic-morphological characteristics of the plants. Mechanism of crop adoption under moisture deficit conditions. Efficient utilization of water through soil and crop management practices, management of crops in rainfed areas. Contingent crop planning for abenant weather conditions. Precision agriculture; concepts and techniques: their issues and concerns for Indian agriculture.

Practical

Studies on climatic classifications, studies on rainfall pattern in rain fed areas of the country. Studies on cropping pattern of different dry land areas in the country and demarcation of dry land area on map of India. Interpretation of metrological data and scheduling of supplemental irrigations on the basis of evapo-transpiration demand of crops effective rainfall and its calculations.

AGR-321 - 8. Farming System and Sustainable Agriculture 2(1+l)

Thcory

Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Sustainable agriculture-problems and its impact on agriculture. conservation agriculture strategies. HEIA, LELA and LEISA and its techniques for sustainability, Integrated farming system components of IFS and its advantages, farming system and environment.

Practical

- Tools for deterinining productions & efficiencies in cropping and farming systems.
- Indicator of stainability of cropping & Fanning systems
- .Site.spcific development ofIFS models for different agro-climatic zones.
- Visit of If S models in diffeent agro climatic zones of nearby state Universities/Institutes and farmer fields.

DEPARTMENT OF GENETICS AND PLANT BREEDING

Course Code	Course Title	Credit Hours
GPB- 111	Fundamentals of Genetics	3(2+1)
GPB-121	Fundamentals of Crop Physiology	3(2+1)
GPB-211	Fundamentals of Plant Breeding	3(2+1)
GPB-221	Principles of Seed Technology	3(2+1)
GPB-311	Crop Improvement - I (Kharif Crops)	2(1+1)
GPB-321	Crop Improvement - II (Rabi Crops)	2(1+1)

Course wise Syllabus

GPB-111 Fundamentals of Genetics 3(2+1)

Theory

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; special types of chromosomes. Chromosomal theory of inheritance; cell cycle and cell division - mitosis and meiosis. Chi-square test; Dominance relationships, gene interactions; Multiple alleles, pleiotropism and pseudo alleles. Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics. Linkage and its estimation. crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, use of haploids, diploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CLB technique.mutagenic agents and induction of mutation. Qualitative & Quantitative traits. Polygenes and continuous variations, multiple factor hypothesis. Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material (DNA). Protein synthesis. Transcription and translational mechanism of genetic material.

Practical

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, di hybrid, tri hybrid.test cross and back cross, Experiments on epistatic interactions including testcross and back cross, Practice on mitotic and meiotic cell division. Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two-point test cross and three-point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.

GPB-121 Fundamentals of Crop Physiology 3(2+1)

Theory

Introduction to crop physiology and its importance in Agriculture; Plant cell:an Overview: Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology; Mineral nutrition of Plants:Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3. C4 and CAM plants; Respiration:Glycolysis. TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators:Physiological roles and agricultural uses. Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological gro param -Ouc ti .

Practical

Study of plant cells, structure and distribution of stomata. imbibition's. osmosis, plasmolysis, measurement of root pressure. rate of transpiration, Separation of pbotosynthepc pigments through paper chromatography , Rate of transpiration, pho.tosynthesis. respiration, tissue test for mineral nutrients, estimation of relative water content Measurement of photosynthetic C02 assimilation by Infra-Red Gas Analyses (lRGA).

GPB-211 Fundamentals of Plant Breeding 3(2+1)

Theory

Historical development;,. concept nature md role of plant breeding,-major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility-genetic consequences. Domestication, Acclimatization and Introduction: Centers of origin/diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self-pollinated crops -mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept Concepts of population genetics and Hardy- Weinberg Law; Genetic basis and methods of breeding cross pdlinated crops. modes of selection; Population improvement Schemes-Ear to row method, Modified Ear to Row. recmrent selection. Heterosis and inbreeding depression. development of inbred lines and hybrids, composite and synthetic varieties; Br ding methods in asexually propagated crops. clonal selection and hybridization : Maintenance of breeding records and data collection; Wide hybridization and pre-breeding ; Polyploidy in relation to plant breeding. mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross-pollinated crops. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids. Emasculation and hybridization techniques in self & cross-pollinated crops. Consequences of inbrding on genetic structure of resulting populations . Study of male sterility system. Handting of segregation populations. Methods of calculating mean, range. variance. standard

deviation, heritability. Designs and their analysis in plant breeding experiments/

GPB-221 PrjncjpJes of Seed Technology 3(1+2)

Theory

Seed and seed production technology: itroduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production. Seed quality; Definition and Characters of good quality seed, different classes of seed. Foundation and certified seed production of impollant cereals, pulses. oilseeds, fodder and vegetables. Seed certification. phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983. Varietal identification through Grow Out Test. History and development of Seed Industry in India. Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing, Private and public sectors and their production and marketing strategies.

Practical

Seed production in major cereals: Whea Rice, Maize, Sorghum and Bajra. Seed production in major pulses: Urd, Mung. Pigeon pea. Lentil, Gram, field bean, pea. Seed production in major oilseeds: Rapeseed and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability. etc. Seed and seedling vigour test. Genetic purity test: Grow out test. Seed certification: Procedure. Field inspection, Preparation of field inspection report. Visit to seed production farms, seed testing laboratories and seed processing plant.

GPB-311 Crap Improvement - I (Kbarif Crops) 2(1+1)

Theory

Centers of origiil. distribution of species. wild relatives in different cereals (Rice, Maize, Sorghum and Pear[millet); pulses (Pigeon pea, Urdbean and Mungbean); oilseeds (Groundnut); fibre (Cotton). Importan concepts of breeding self-pollinated and cross pollinated. Maj or eeding objectives and procedures including conventional and modem innovative approaches for deveiopment of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress and quality (physical, cbemi Cal, nutritional); Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeon pea.

Practical

Floral biology, emasculation and hybrjdization techniques in different crop species; viz., Rice, Maize, Sorghum, Pearl millet, Pigeon pea, Urd bean, Mungbcan, Groundnut, Cotton crops. Maintenance breeding of diffeent kharif crops: Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed prod uction and hybri d seeds production in Kharif crops; Estimation of heterosis.inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to A 1CRP plots of different field crops.

GPB-321 Crop Improvement - II (Rabi) 2(1+1)

Theory

Centers of origin, distribution of species, wild relatives in different crops: cereal (Wheat); pulses (Chickpea, Pea); oilseeds (Rapeseed and Mustard, Sunflower); cash crop (Sugarcane); vegetable crop (Potato, Tomato); Major breeding objectives and procedures including conventional and modem innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Hybrid seed production technology of rabi crops. Ideotype concept and climate resilient crop varieties for future. [23]

Practical

Floial biology, emasculation and hybridization techniques in different crop species namely

Wheat, Chickpea.pea, Rapeseed Mustard, Sunflower, Tomato: Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in Rabi crops: Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments: Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

DEPARTMENT OF SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Course Code	Course Title	Credit Hours
SSC-111	Fundamentals of Soil Science	3(2+I)
SSC-121	Fundamentals of Plant Biochemistry	3(2+I)
SSC-211	Agricultural Microbiology	2:(1+1)
SSC-221	Problematic Soils and their Management	2(1+1)
SSC-321	Manures, Fertilizers and Soil Fertility Management	3(2+1)

SOIL SCIENCE & AGRICULTURAL CHEMISTRY

SSC-111 1. Fundamentals of Soil Science 3(2+1)

Theory

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy. Classification of soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange problem and plant growth. Soil temperature; source, amount and flow of heat in soil: effect on plant growth. Soil reaction- pH, EC, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity. base saturation; soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel method. Determination of soil pH and electrical conductivity. Study of soil map. Estimation of organic matter content of soil. Estimation of CO_3 and HCO_3 in soil water.

SSC-121 2. Fundamentals of Plant Biochemistry 3(2+1)

Theory

Biochemistry-introduction, scope and Importance in agriculture. Carbohydrate: Importance and classification of Mono-saccharides, Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; lipids. Proteins: Importance of proteins and classification; Structures. Amino acid-definition, calcification and important function. Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; classification of vitamin structure role and its deficiency symptoms. Introduction to allosteric enzymes. Nucleic acids: Importance and classification- Structure of Nucleotides. Metabolism of carbs: Glycolysis.

Practical

Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Paper chromatography Mono-saccharides. Estimation of Ca, CaO and $CaC0_3$ in HCL extract. Eslimatin of reducing and non reducing in cane sugar and juggary.

SSC-211 3.Agricultural Microbioloi:>Y 2(1+1)

Theory

Introduction of Microbial world :Prokaryolic and eukaryolic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination-transformation, conjugation and transduction. plasmids, transposon. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- Symbiotic, Associative and Asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: biofertilizers, biopesticides. Microbial degradation of organic matter in soil. Cellulose decomposing micros for composed preparation & vermin composed. Soil organisms: macro and micro organisms,their beneficial and harmful effects.

Practical

Introduction to microbiology laboratory and its equipments; principles of microscopy. Methods of sterilization Nutrional media and their preparations. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes. Methods of isolation and purification of microbial cultures.Isolation of Rhizobium from legume root nodule. Isolation of Azotobacter from soil. Isolation of Azospirillum from roots. Isolation of BGA. Staining and microscopic examination of microbes.

SSC-221 4. Problematic Soils and their Management (New) 2(1+1)

Theory

Soil quality and health, DistFibution of Waste land and problem soils in India. Their categorization based on properties. _ eclamation and management of Saline and Sadie soils, salt affected soil, Acid soils. Acid Sulppate soils. Flooded soils, &Polluted soils. Irrigation water - qaμty and standards, utilizatioi;i of saline water in agriculture. Remote sensing and GIS in diaosis and management of pr_g· em soils. Land capability and classification, land suitability clasifiction. Problematic soils under different Agro-ecosystems.

Practical

Determination of pH &Ee in soil and water. Lime and gypsum requirement in soil, ESP and SAR in Soils. Application of emote sensing and GIS in delineating problematic soil in LIP. Visit problematic soil in U.P.

SSC-321 S. Manurs, Fertilizers and Soil Fertility Managemen t 3(2+1)

Theory

Introduction, importance and classification of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic. potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments. Fertilizer Storage, Fertilizer Control Order. Plant nutrition, criteria of essentiality, critical limit's role.deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Soil fertility evaluation.Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis.rapid plant tissue tests. Indicator plants.Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

Estimaion of soil_organic carbon, Etimation of available N availble P, available K; available S-available Ca and Mg and available Zn in soils. Estimation of N. P & K in plants. Manures and fertilizers. Elementary idea of determination micro nutrients.

ENTOMOLOGY

Sr. No	Course code	semester	Name of papers	Credit hrs.
1	ENT-121	II	Fundamentals of Entomology-I (Insect Morphology and Taxonomy)	3 (2+I)
2	ENT-221	III	Fundamentals of Entomology-II (Insect Ecology and Concept of IPM)	2 (1+1)
3	ENT-311	V	Pests of Field Crops & Stored Grain and their Management	3 (2+I)
4	ENT-321	VI	Beneficial Insects and Pest of Horticultural Crops and their Management	3 (2+1)

ENT-121 1.FUNDAMENTALS OF ENTu lnu.L vu. 1 -•

(INSECT l\fORPHOLQGY & TAXOl PMY)

Theory Classification of phylum Aithropoda upto classes. Relationship of class ln.secta *ith* other classes of Arthropoda Mor bology; Strncture and fimctions of insect cuticle and moulting. Body segmentation. Structure of Head, thorax and abdomen. Strucre and modi:fi ca ti ons *o1* insect antennae month parts, legs, wing venation, mod lfrcattons an d \Vflg coupling apparatus. Structure of male and female genital organs. Metamorphosis and diapause in insects. Types oflarvae and ppae. Structure and functions of digestive, circulatory, excretory, respiratory nervous. secretary (Endocrine) and rproductive systems irr insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes and chemoi: _cceptors. *Syst.ematics :* Taxonomy- - portance, history and aevelopment and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Oenus; Family and Order. Classification of class Insecta µpto-Orders; basic groups of present da iasects wi1h speciat emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae. Dictyopt.era: Mantidae, Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Herniptera: Pentatomi.dae, Coreid.ae:' _Cimicidae. vuhocoridae.J:,ygaeidae, Cicadellidae, Delphacidae, A pbidida Coccida.e, Lophoph ldac, .Alcurodidac Pseudocoe cidae; Neoroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, *Sphingidite, Pyra l idae,* Gelechiidae, Aictiidae, Saturnidae, Bombycid.ae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidac, Bruchidae, Sca,mbaeidae; Hymenoptera: Tem:hridinidae, Apidae. -.. Trichogrammatidae, ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyi idae, Tacbinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

Practical

Methods of rollction and preservati n of ins _inclmfi g_"immature_ stages: Extemal features of Grasshopper/Blister beetle: Types of insect antennae. mouthparts and legs; Wing venation, types of wings and Wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and Temale reproductive systems in inseetS {Grasshopper); Study of characte!S of orde Oithoptera. Dictyoptera, Odonata, Isopera, Thysanoptera, Hemipr I. :epi ra/etiro¢era, Coleoptera, Hymenoptera, Diptera and

ENT-221 **2. FUNDAMENTALS OF ENTOMOLOGY-II** 2(1+1)

(INSECT ECOLOG_Y & CONCEPTS OJ? IPM),

Theory

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors- tcmpcraturc, moisture, humid ity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors - food competition, natural and environmental resistance.

IPM:

Categories of pests. Concept of IPM, Practices, scope and limitations ofIPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chem ical control- importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones. attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes. Survey, surveillance and forecasting of insect pests. Safety issues of pesticides uses.

Practical

Sampling techniques for estimation of insect popu lation and damage. Insecticides and their formulations. Pesticide appliances and their maintenance.

ENT-311 **3. PESTS OF FIELD CROPs, STORED GRAINS AND THEm MANAGEMENT** 3(2+1)

Theory

General account on nature and type of damage by following insect pests arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics. nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other portant arthropod pests(mites) of various field crops. Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. li:isect pests, mites, rodents, birds and microorganisms associated with stored grain and their riianagernent. Storage structure and methods of grain storage and fundamental principles of gr store 11?-anagement.

Paddy: *Leptocorisa varicroms, Hieroglyphus Spp., Nilaparvata lugens, Nephotetix, spp.. Mythimna separata.*

Jowr Maize: *Chilopartellus. Atherigona variasoccata, Scirpophaga excerpatalis. Chilo infuscatelles*

Sugarcane: *Tqp borer, Pyrilla arly Shoot borer and whitefly*

Cotton :*Pectiliaphora gossypiella. Earias Spp , Sylepta derogata, Dysdercus Spp Bemisia tabacz. Amrasca bzgutulla .*

Oilseeds: *Lipaphis e1ysimi, AthaUaproxima Bagrada Cruciferanm, Dasyneura lini* Pulses: *Helico'verpa armigera Agrotis Spp..'Etiella zinckenella*

Pests of Stored Grains: *Sitophilus 01yzae, Trogoderma granarium, Sitotroga cereafe/la, Callosobruchus chinensis.*

Polypbagous pests:*Odontotermes obesus, Holotrichia consanguinea, Spilosoma obliqua, Spodoptera litura, Amsacta Spp*

Practical

Identification of different types of damage. Identificatiqn and study of life cycle and seasonal history of various insect pests attacking field crops and their produ ce. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different method s. Assessment of losses due to insects. Calculations on the doses of insecticides application technique.Fumigation of grain store I godown.Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory. Department of Food., Delhi. Visit to nearest FCI godowns.

ENT-321 4. BENEFICIAL INSECTS & PESTS OF HORTICULTURAL CROPS AND THEffi MANAGEMENT .. 3 (2+1)

Theory

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivati on, mulberry varieties,methods of harvesting and preservation of leaves. Rearing of mulberry silkworm, rearing appliances, mounting and harvesting of cocoons. Pests and diseases of silkworm, management , and methods of disinfection. Importance of beneficial insects. bee keeping, pollinating plants and their cycle, bee biology, commercial methods of rearing, equipment used and seasonal management. Bee pasturage. bee foraging and communication. Insect pests and diseases of honey bee. Species of lac insect, morphology, biology. host plant and lac production _ Processing oflac - seed lac, button lac. Shellac and lac- products. Identification of major Brin8?"1, Okra , Tomato, Gowd

le crops. Fruit crops -Mango , itrus..'. ple and

parasitoids and predators commonly used in biological control. S.cientific name, Order, family, host range, distribution, biology and nature of damage and management of Vegetables crop-

co

Banana.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking horticultural crops - vegetable crops, fruit crops, and plantation gardens . Visit to orchards and gardens. Mulbcry cultivation, mulberry varitics and methods of harvesting and preservation of leaves. Types of silkworm, voltinism and biology and rearing of silkworm and equipment. Honey bee species and castes of bees.Beekeeping appliances and seasonal management. Bee enemies and diseases. Bee pasturage, bee foraging and communication. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to sericulture, beekeeping., lac culture and natural enemies.

DEPARTMENT OF AGRICULTURAL ECONOMICS

Course Code	Course Title	Credit Hours
AEC-121	Fundamental of Agricultural Economics	3(2+1)
AEC-211	Agricultural Finance and Co-Operation	3(2+I)
AEC-311	Agricultural Marketing, Trade and Prices	3(2+1)
AEC-321	Farm Management, Production and Resource Economics	2(1+1)

AGRICULTURAL ECONOMICS

AEC-121 1. Fundamentals of Agricultural Economics 3 (2+1)

Theory

Economics: Mearung, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory, Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: Factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: concepts, short run and long run cost curves. Supply: Stock vis supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, .wage, interest and profit. National income: Meaning and importance, concepts of national income accounting and approaches to measurement, difficulties in measurement. Money: Meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Rolein modem economy, types of banks, functions of commercial and central bank, credit creation policy.

Practical.

Elasticity of demand, Cost Principle, Evaluation and Apportionment of costs. Cost of production of major Crops. Determination of various measures of farm income, Survey of at least two farmers and analysis of their cost and returns.

AEC-211 2. Agricultural Finance and Co-Operation 3(2+1)

Theory

Agricultural Finance- maning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: eaning, definiti9n, need, classification. Credit analysis; 4 R's, and 3C's of .credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks. Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and *unit* cost. An introduction to higher financing institutions - RBI. NABARD. ADB, IMF, world bank. Insurance and Credit

Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements - Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms - SWOT analysis. Agricultural Cooperation - Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, Farming cooperatives, cooperative warehousing.

Practical

Determination of most profitable level of capital use.Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management. schemes and procedures. Estimation of credit requirement of farm business - A case study. Preparation and analysis of balance sheet - A case study. Preparation and analysis of income statement - A case study. Appraisal of a loan proposal - A case study. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products. Seminar on selected topics.

AEC-311 3.Agricultural Marketing, Trade and Prices 3(2+1)

Theory

AgrictilturaI'Marketing: Coricepts and definitions of market, marketing:agricultural marketing, market structure, marketing mix and market segmentation. classification and characteristics of agricultural markets; demand&supply. Producer's surplus -meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; market promotion -advertising, personal selling, sales promotion and publicity _ their meaning and merits & demerits. Marketing process and functions: marketing process-concentration, dispersion and equaliz.ation; physical functions -storage, transport and processing; facilitating functions -packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products. Unit-N Marketing efficiency; marketing costs and margins, price spread, Role of Govt. in agricultural marketing; Public sector institutions- CWC, SWC & FCI; their objectives and functions. Agricultural prices and policy: Minimum support price, meaning and functions of price; need for agricultural price policy; Present status and prospects of international trade in agri-com.modities; GA and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

I · Pracfical

Plotting and sludy of demand and supply curves and calculation of elasticities; Study of relatinship between market arrivals and prices of some selected commodities: Computation f marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by difTercnt agencies, identification of marketing channels for selected commodity. collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit lo market institutions - NAFED. SYNC, - CWC, cooperative marketing society, etc. lo study their organization and functioning; Application of principles of comparative advantage of international trade.

AEC-321 4. Farm Management, Production and Resource Economics 2(1+1)

Theory

Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type. use of production function in decision-making on a farm, factor-product. factor-factor and product-product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage. Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income. net farm income, family labor income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm. various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting, appraisal of farm resources, selection of crops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies.

Practical ·

Preparation of fann layout. Detennination of cost of fencing of a farm. Computation of depreciati6h. st of fann assets. 'Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Detennination of most profitable level of inputs use in a farm production process. Deiermination of least cost combinatirl of inputs. Selection of most profitable enterprise co_mbination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resow:ces in India.

DEPARTMENT OF AGRICULTURAL ENGINEERING

Course Code	Course Title	Credit Hours
ENG-211	Fann Machinery and Power	3(2+1)
ENG-221	Renewable Energy and Green Technology	3(2+1)
ENG-311	Protected Cultivation and Secondary Agriculture	3(2+1)
ENG-321	Geo-Informatics, Nano Technology	2(1+1)

AGRICULTURAL ENGINEERING

ENG-211 1.Farm Machinery and Power 3(2+1)

Theory

Status of Farm Power in India, Sources of Fann Power, LC. engines, working principles of LC. engines. comparison of two stroke and four stroke cycle engines Study of different components of 1.C. engine, l.C. engine terminology and solved problems, Familiarization with different systems of l.C. engines: Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor, ram iliarization with Power transmission system :clutch, gear box, differentia1 and final drive of a tractor, Tractor types, Cost analysis of tractor power and attached implement, Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations. Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment. Familiarizat ion with harvesting and threshing equipment.

Practical

Study of different components of I.C. engine. To study air cleaning and cooling system of engine.Familiarization with clutch, transmission, differential and final drive of a tractor, _Fainiliarizat on with lubricaton and fuel supply system of engine, Familiarization with 9rake, steering, hydraulic control system of engine, Learning of tractor driving. Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of pimary and secondary tiliage hi;plements: mould plou 'dis plough and disc harrow. Familiarizat ion. th seed-cum-fertilizer drill their seed metering mechanign and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment. Familiarization with harvesting and threshing machinery.

ENG-221 -2. Renewable Energy and Green Technology 3(2+1)

Theory

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with iomass utilization for bio-fuel production and their application, Familiarization with types of bio-gas plants and gasifiers. bio-gas. bio-alcohol, bio-diesel and bio-oil production and thei.J:'utilization as bio-energy resource, introduction of solar energy, collection and their application, Fiarization with solar energy gadgets: solar cooker, solar water heater,

a p p lication of solar energy: solar drying, solar p o nd, solar distillation, introduction of wind

ene e .SJ

Practical

Familiarization with renewable energy gadgets. To study bio-gas plants, To study gasifier, To study the production process of bio-diesel, To study briquetting machine, To study the production process of bio-fucls. Familiariution with different solar enrgy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

ENG-311 3.Protected Cultivation and Secondary Agriculture 3(2+1)

Theory

Green house technology: Introduction, Types of Green Houses: Plant response to Green house environment, Planning and design of greenhouses. Design criteria of grn house for cooling and heating purposes. Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air green house heating systems, green house drying.

Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals. pulses and oilseed, their application in PHT equipment design and operation. Drying and dehydration; moisture measurement, EMC, drying theory, various drying method. commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer. re-circulatory dryer and solar dryer). Material handling equipment: conveyer and elevators, their principle, working and.selection.

Practical

Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of green house equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

ENG-321 6. Geo-informatics and Nano-technology 2(1+1)

Theory

Geo-infonnatics- definition concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies: Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions; Nanotechnology, definition, concepts and techniques, brief introduction about nan scale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors. Use of nanotechnology in frtilizer, plant protection for scaling-up fartp productivity.

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Practica l

Introduction to GIS software, Introduction to image processing software. Visual interpretation of remote sensing imag s. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation.. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fe1tility based on GIS. Creation of producti vity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation. characterization and applications of nanoparticies in agriculture. Projects formulation and execution related to precision farming.

DEPARTMENT OF PLANT PATHOLOGY

Course Code	Course Tit'le	Credit Hours
PP-121	Fundamentals of Plant Pathology	3(2+1)
PP-211	Principles of Integrated Disease Management	3(2+1)
PP-311	Diseases of Field and Horticultural Crops & their Management-I	3(2+1)
PP-321	Diseases of Field and Horticultural Crops & their Management-II	3(2+1)

PLANT PATHOLOGY

PP-121 1. Fundamentals of Plant Pathology 3(2+1)

Theory

Introduction: Importance of plant diseases, scope and objective of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concept in Plant Pathology, Pathogenesis. Impmtant Plant pathogenic organism- fungi, bacteria, fastidious vesicular bacteria. Phytoplasmas, Spiroplasmas, viruses. Viroids and nematodes with example of diseases caused by them. Diseases due to abiotic causes.

Fungi: general character, definition of fungus, somatic structures, type of fungus thalli, fungal tissues. modifications of thallus, reproduction (Asexual and Sexual). Nomenclature, Binomial system of nomenclature. rules of nomenclature, classification of fungi, key to divisions, sub-divisions. orders and classes.

Bacteria and mollicutes: general morphological characters, basic methods reproduction. Viruses: nature of propertie, struqtu{e aJ?d transipission. tudy"9f phanerogarnic plant parasits.

Practical

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and koch's postulates. General study of different structure of fungi, study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Study of phanerogamic plant parasites. Identification of plant parasitic nematodes.

PP-211 2. Principles of integrated Disease Management 3(2+1)

Theory

Categories of diseases, IDM: Introduction, hitory, importance, concepts, principles and tools jf IDM. Economic importace of. diseases and Methods of detection and diagnosis of and diseases. Calculation and dynamid,' f economic injury level and importance of Economic ilire hoiC! leve1. Methods of contri ost p larit resistce, cu l tura l, mechanical, physica1. legislative. biological and chen;iical. control. Survey surveillance and forecasting of diseases. afety issues in fungicide uss. p Jiical, social and legal inlplication of IDM.

Practical

Methods of diagnosis and detection of plant diseases; Methods of plant disease measurement, Assessment of crop yield losses, calculations based on economics ofIDM, Identification of bio-control agents, different predators and natural enemies. Identification and nature of damage of important diseases and their management. Plan & assess preventive strategies (IDM module) and decision making, crop monitoring attacked by diseases Farmers fields visit.

PP-311 3. Diseases of Field and Horticultural Crops & their Management-I 3(2+1)
Theory

Symptoms, etiology, disease cycle and management of major diseases of following crops:
Rice:- Blast, Brown, sheath blight, Bcaterial blight and khaira disease.
Maize:- Downy mildew, Groundnut:- Early& late leaf spot, Pigeonpea:- Wilt sterility mosiac. Green gram:-Cercospora leaf spot, Yellow mosaic.
Tobacco: Mosaic. Horticultural Crops: Guava:-Wilt, Anthracnose. Banana; - panama wilt, Bunchy top, Papaya:-Foot rot and Leaf curl
Cruciferous vegetable: Brinjal:-Sclerotinia and little leaf, Tomato:-Early and late blight Okra:-Yellow ven mosiac Beans:-Anthracnose and Bacterial blight, Ginger- Soft rot.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium Note: Students should subt 10 pressed and well-mounted specens.

PP-321 4. Diseases of Field and Horticultural Crops & their Management-II 3(2+)
Theory

Symptoms. etiology. disease cycle and management of major diseases of following crops:
Field Crops:
Wheat:Rusts, loose smut, powdery mildew.
Sugarcane: red rot and grassy shoot
Sunflower: Sclerotinia stem rot and A.ltemaria blight:
Mustard: white rust, downy mildew; Gram: wilt and Lentil: Rust and wilt; Cotton: wilt and black arm; Pea: Downy mildew, powdery mildew. Horticultural Crops: Mango:malformation, powdery mildew; Citrus: canker and gummosis; Grape vine: Downy mildew powdery mildew; Apple: scab and Fire blight; Peach: leaf curl; Cucurbits:downy mildew,powdery mildew; Onion and garlic: purple blotch and stemphylium blight; Chilli: anthracnose and leaf curl: Turmeric: leaf spot; Coriander; stem gall: Marigold: Botrytis blight; Rose: powdery mildew; Potato:Early and late blight an potato mosaic.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium Note: Students should submit 10 pressed and well-mounted specimens.

DEPARTMENT OF HORTICULTURE

Course Code	Course Title	Credit Hours
HOR-111	Fundamentals of H0 lticulture	2(1+1)
HOR-121	Production Technology for Vegetables and Spices	3(2+1)
HOR-221	Production Technology for Ornamental Crops, MAP's and Landscaping	3(2+1)
HOR-311	Production Technology for Fruits and Plantation Crops	3(2+1)
HOR-321	Post-harvest Management - nd value Addition of Fruits and Vegetables	2(1+1)

HORTICULTURE

HOR-111 1. Fundamentals of Horticulture 2(1+1)

Theory

Horticulture-Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures; principles of orchard establishment; Principles and methods of training and pruning and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; use of plant growth regulators in horticulture, irrigation, essential plant nutrients fertilizers and its applications-method.

Practical

Identification of garden tools .Identification of horticultural crops. Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation Layout and planting or orchard plants. Training and pruning of fruit trees transplanting and care of vegetable seedlings making of herbaceous and shrubbery borders. Preparation of potting mixture potting and repotting. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

HOR-121 2. Production Technology for Vegetable and Spices (2+1)

Theory

Importance of vegetables and spices in human nutrition and nati6na1 'economy;types of vegetable gardening brief about origin, area, production improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting yield and new storage, physiological disorders, disease, pest management and seed production of important Tomato, Brinjal, Chilli & Capcicum, Cucmber, melons, gourd, pumpkin, pea, cole crops (cabbage, cauliflower, knol-khol). Bulb crops (onion, garlic).Root crops (carrot, radish, beetroot). Tuber crops (potato). Leafy vegetables (amaranthus, palak). Classific".'-tion of spices. Brief about botanical feature, climate and soil, varieties, cultivation practices such as time of sowing, planting, propagation method, transplanting technique, planting distance, fertilizer requirement, irrigation, weed management, harvesting and yield, post-harvest technology, plant protection of important spices (black pepper, cardamom, ginger, turmeric, coriander, fenugree cumin, clove, cinnamon)

Practical .

Identification of vegetables and spices crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables ad spices. Fe lilizers applications, raising of nursery of vegetable and spices. Seed extracti on. Harvesti n g & preparation for market. Economics of vegeta bles and spices cultivation.

HOR-221 3.Production Technology for Ornamental Crops, MAPs and Landscaping 3(2+1)

Theory

Importance and scope of ornamental crops, medicinal and aromatic plants and landscapi ng and its contribution in Indian economy.. Principles ofland scaping. Landscape uses of Annuals and Herbaceous border. Trees; Avenue, Specimen etc.Shrubs & Shrubberies, Hedge & edge, Topiary, Bonsai, Climbers, Foliage, Cacti and Succulents, Bulbous plants, Palms, ferns. Style and types of garden. Lawn making and maintenance. Production technology of important cut flowers like Rose, Gerbera, Carnation, Lily(Lilium) and Orchids under protected condition. .G ladiolus, Tuberose, & Chrysanthemum under open conditions. Package and practices ofloose flowers like Marigold and Jasmine. Production technology of important medicinal and aromatic plants (MAPs) like-Sarpagandha, Ashwagaiidha, Asparagus, Aloe,opium, Isabgol, Periwinkle, Lemongrass, Citronella, Palmarosa, Geranium, Mint, Vitever, Ocimum. Processing and value addition in Ornamentals & MAPs prod uce.

Practical

Identification of Ornamental plants and MAPs. nursery raising, propagation method, study of morphological characters of different Ornaments and MAPs. Training and pruning of Ornamental plants & MAPs. Planning and layout of garden. Protected structures - care and maintenance. Intercultural operations in flowers and MAPs. Harvesting and post harvest handling of cut ; loose flowers & MAPs, extraction of essentials oils.

HOR-311 4. Production Technology for Fruit and Plantation Crops 3(2+1)

Theory

Importance and scope of fruit and plantation crop industry in India; High density planting; Use of root:Stocks; Producti on technologies for the cultivation of major fruits crops; Mango, Banana, Citrils, Grape, Guava, Li chi, Papaya, Apple, Pear, Peach, Plum Walnut, Almond and; minor fruits-Aonla, Ber, Date, Pineapple, Pomegranate, Jackfruit, Strawberry,. Production and processing technologies for the cultivation of major Plantation crops- Coconut, Areca nut, Ca5h w, Tea, Coffee & Rb?er. ., «la--

Practical

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops, including micro-propagation. Description and identification of fruit. Preparation of plant bio regulators and their uses, pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

HOR-321 5. Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)

Theory

Importance of post harvest technology of fruits, vegetables and ornamental crops. Extent and possible causes of post harvest losses; Pre- harvest factors affecting postharvest quality, maturity and selflife of fruits, vegetables and ornamental crops. Ripening and changes occurring during ripening; Respiration and factors affecting respiration rate; role of ethylene; harvesting and field handling; Storage (ZECC, cold storage, CA. MA, and hypobaric); Value addition concept; Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve. candy - Concepts and Standards; Fermented and non-fermented beverages. Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables - Concept and methods, osmotic drying. Canning - Concepts and Standards, packaging of products.

Practical

Applications of different types of packaging, containers for shelf life extension. Effect of temperature Ort shelflife and quality of produce. Demon5fration of chilling and freezin injury in vegetables and fruits. Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products-physico-chemical and sensory. Visit to processing unit/ industry.

DEPARTMENT OF AGRICULTURAL EXTENSION

Course Code	Course Title	Credit Hours
EXT-111	Rural Sociology & Educational Psychology	2(1+1)
EXT-121	Fundamentals of Agricultural Extension Education	3(2+1)
EXT-221	Entrepreneurship Development and Business Communication	2(1+1)
EXT-311	Communication Skills and Personality Development	2(1+1)

AGRICULTURAL EXTENSION

EXT-111 1. Rural Socfology & Educational Psychology 2(1+lf

Theory

Sociology and Rural sociology: Definition and scope. its significance in agriculture extension, Social Ecology, Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development. Rural Leadership: concept and definition, types of leaders inrural context. Educationa l psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective. psycbomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Practical--

To conduct socioeconomic survey of rural area. Programme for rural development. Study of social change in rural area. Field trip and tours.

EXT-121 2. Fundamentals of Agricultural Extension Education **3(2+1)**

Theory

Education: Meaning, definition & Types: xtension Education- meaning, definition, scope and process; objtives and principles of-Extension Education; Eon Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts hL. pre-independence era (Sriniketfil4 Martbandam, F.irka Development Scheme, Gurgaon Experiment,, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture\ evelopment programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, NAIP, etc.).

Rural Development concept, meaning, definition: various rural development programmes launched by Govt. of India. Monitoring and evaluation: concept and definition, <transfer of technofogy: concept and models, capacity building orextension personnel; extension teaching methods: meaning, classification, individual, group and.mass contact methods IC'.f Applications in TOT.

Practical

Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; peparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skiUs exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the *villa.geisl* farmers: to study organization and functioning ofDRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning: exposure to mass media: visit to community radio -an .television studio for understanding the process of programme production; script writlng, writing for print and electronic media, developing script for radio and television.

EXT-221 3.Entrepreneurship Development and Business Communication 2(1+1)

Theory

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Anal}'sis & achievement motivation, Government policy and programs and institution.$ for enireprene"urship development Impact of econolDic refonns on Agribusiness/ entel]Jrises, Entrepreneurial Development Process; Business Leadership Skills; Developing organizatio Skill (controlling, supervlsing, problem solving, monitoring &. evaluation), Developing Managerial skills, Busines Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quty manageent, Project Planning Formwation and report preparation; Financing of enterprise, O:mortunities for agri-entrepreneurship and rural enterprise. Venture capital: concept, meaning, mzp and examples:

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<\sSe.Ssfuii:fntrepieneUrial iraitS;pri:>lilifil §Qlvllig skills, managrial skills and achievement u-w•ion. exercise iri creativity, timtj; audit throilgb planning, momtonng and supernslon, fication and selection of business idea; preparation of business plan and proposal writing, i : iz prnenip developme t dentreprene

EXT-322 **4. Communication Skills and Personality Development** **2(1+1)**

Theory

Communication: meaning and definition: Principles and process of communication. models and barriers to communication; Verbal and nonverbal communication. Communication Skills:Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences. Diffusion: concept, meaning, process and stages of adoption as well as its categories. Innovation :consequences and decision process.

Practical

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

DEPARTMENT OF SOIL CONSERVATION

Course Code	Course Title	Credit Hours
SCW-111	Introduction to Forestry	2(1+1)
SCW-211	Enviromnental Studies and Disaster Management	3(2+1)
SCW-221	Fundamental of Soil and Water Conservation	2(1+1)
SCW-311	Introductory Agro-lneteorology & Climate Change	3(2+1)
SCW-321	Watershed and Wasteland Management	2(1+1)

SOIL CONSERVATION

SCW-111 *1.* Introduction to Forestry 2(1+1)

Theory

Introduction - definitions of basic terms related to forestry, objectives of silviculturc, forest classification. salient features ofJndian Forest Policies. Foret regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppcmg, root suckersArtificial regcneration-obJectives, choice between natural & artificial regeneration .Essential preliminary considerations. Tending operations - weeding, cleaning, thinning - mechanical. ordinary and advance thinning. Forest menstruation - objectives diameter measurement instniments used in diameter measurement; measurem;nt of volume of felled nd standing trees, age determination of trees. Agroforestry - definitions. importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast grov.ring tree species of the region.

Practical

Identification of tree-species.Diameter measurements using calipers and tape.Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

SCW-211 2. Environmental Studies and Disaster Management 3(2+l)

Theory

Multidisciplinary nature of environmental studies Definition, scope and importance. Natural resourcesand associated problems. 'a) Forest resources: Use and over-exploitation, deforestation and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water. floods. drought. c) Mineral resources: Use and exploitation. d) Food resources: World food problems, chru:ges caused by agriculture and overgrazing, effects of modern agriculture. e) Land resources: Land as a resource, land degradation. Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem. Producers, consumers and decomposers, Energy flow in the ecosystem. Food chains. Food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem. Biodiversity and its conservation:-Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. Biodiversity at global. National and local levels. Threats to biodiversity: habitat loss. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution7}\later conservation,rain water harvesting. Environmental ethics: Issues and possible ol tions, climate change, global wanning, acid rain, ozone layer depletio1:1, Wasteland reclamation. n ironment.J?rotection Act: · revention and Control of Pollution) Act. Water (Prevention and control ofPollution) Act. Ildlife Protection Act. Forest Conservation Act.. Environment and human health.

Disaster Management

Natural Disnsters- Menning nnd nature Or 11ul11rnl disasters, their types and effects. Floods, drought. eyelone. carthqunkcs. lnnd slidcs, volcnnic cruptio11s, Man Mac.le Di sasters- Nuclear diasters.biological disasters. b1ilding lire, forest fire. Disast r Ma nagemen t- Effect lo m iratc natural disaster at nntionnl and global levels.International strategy for disaster rcduclion.Concepl of disaster management, national disaster management framework.

Practical

Pollution case stll dies. Case Studies- Field work: Visi t to a local area lo document environmental assets river/ forest.' grassland/ hill/ mountain, visit to a local polluted sitc- Urban/Rural/Industrial/ Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

SCW-221 3.Fundamental of Soil and Water Conservation 2(1+1)

Theory

Introduction to Soil and Water Conservation. causes of soil erosion. Definition and agents of soil erosion.water erosion: Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principles of erosion control:Introduction to contouring. strip cropping. Contour bund. Graded buud and bench terracing. Grassed water ways and their design. Water harvesting and its techniques. Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion co trol and its control measures.R,un off meaning and definition, types, factor affecting of runoff.

Practical

General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Mea.Sur6ment of soil loss.Preparatiori of contour maps. Design of grassed water ways. Design of contour bunds. Design of graded hunds. Design of bench terracing system. Problem on wind erosion.

SCW-311 4. Introductory Agro-meteorology & Climate Change 3(2+l)

Theory

Agricultural meteorology and its scope; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of willd daily and seasonal vriation of wind speed, cyclone, anticyclone, Nature and properties of solar radiatfon. solar constant depletion of solar radiation, short wave. Longwave and thermal radiation,'net radiation, cii.bedo: .Atmospheric temperature, temperature inversion, lapse rate;daily and seasonal vafiations of temperature, Atmospheric humidity, concept of saturatio vapor pressure,prp9ess of c nd sation, cloud; Precipitation. process of precipitation. types of predpitation such as rain. snow. Cloud formation and classification: Artificial rainmaking. Monsoon-mchsm and impoi:tance in Indian agriculture, Weather hazards - droght, floods frost, tropi2 cyciries and extreme weather conditions such as heat-wave and cold-wave. Agnculture aild: eatheirlatins; Mooificationi of crop microclimnte. Weather forecasting- types of weather 'forecasni.nd their u§es. Climate change. climatic variability, global

Practical

Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and measurement of sunshine duration. Measurement of maximum and minimum air temperatures.its tabulation, trend and varjation analysis. Measurement of soil temperature and computation of soil heat flux.Determination of dew point temperature.Measurement of atmospheric pressure and analysis of atmospheric conditions.Measurement of wind speed and wind direction.Measurement.tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration.Computation of PET and AET.

SCW-321 5.Watershed and wasteland Management 2(1+1)

Theory

Watershed management -Concept, need, principles & components of integrated watershed management. Factors effecting watershed management nmoff soil and water management socio-economic concept of watershed. People participation in watershed management. Policy approaches. Wasteland management. Definition and types of degraded and wasteland. Distribution and extent of watershed in India & Uttar Pradesh. factors responsible for land degradation, characteristics of different types of degradation & wasteland. Problems of degraded land in Uttar Pradesh. Appropriate techniques for management of different types of degraded & wasteland, (saline alkaline soil, aCid soil,water logged soil),

Practical

Characterization and delineation of model watershed.Field demonstration on soil & mi ture conservation measures:Field demonstration on cons; ction of water harvesting structures.Visit tQ rainfed research station/wat<:<_rshed.

DEPARTMENT OF STATJSTICS, COMPUTER APPLICATION AND IPR

Course Code	Course Title	Credit Hours
STA-211	Statistical Methods	2(1+1)
STA-221	Agri-Informatics	2(1+1)
STA-311	Intellectual Property Right	1(1+0)

STATISTICS, COMPUTER APPLICATION AND IPR

STA-211 1. Statistical Methods 2(1+1)

Theory,

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data., Measures of Central Tendency & Dispersion. Definition of Probability. Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions, Definition of Correlation. Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations. Introduction to Test of Significance, One sample & two sample test t for Means. Chi-Square Test of Independence of Attributes in 2 x 2 Contingency Table. Analysis of One Way Classification. Introduction to Sampling methods. Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement. Use of Random Number Tables for selection of Simple Random Sample.

Practical

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Dispersion (Ungrouped Data). Measures of Dispersion (Grouped Data). Moments, Measures of Skewness & Kurtosis (Ungrouped Data). Moments, Measures of Skewness & Kurtosis (Grouped Data). Correlation & Regression Analysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test. Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2x2 contingency table. Analysis of Variance One Way Classification. Analysis of V-ariance Two Way Classification. Selection of random sample using Simple Random Sampling.

STA-221 2. Agri-Informatics 2(1+1)

Theory Introduction to Computers. Operating Systems. definition and types, Applications of MS-Offic-e for document creation & Editing. Data presentation, interpretation and graph creation, statistical analysis, mat1lematical expressions. Databas, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations.

e-Agriculture, concepts and applications. Use of ICT in Agriculture. Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price. postharvest management etc; Geospatial technology for generating valuable agri-information. Decision support systmf, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using IT tools.

Practical

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Foldrs, File Managem ent. Use of MS-WORD and MS Power-p'oint for creating, editing and ' presenting a scientific Document MS-EXCEL - Creating a spreadsheet ,u sc of statistical tools, writing expressions. creating graphs, analysis of scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introdu ction to World Wide Web (WWW). Introdu ction of programm ing languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hand s on Decision Support System. Preparation of contingent crop planning.

STA-311 3. Intellectual Property Rights 1(1+0)

Theory

Introduction and meaning of intellectual property, brief introduction to GATT, WTO. Types of Intellectual Property and legislations covering IPR in India:- Patents, Copyrights, Trademark, Industrial design. Patent Cooperation Treaty, Patent search and patent database. Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeder's rights, Registration of plant varieties under PPV& Act 2001, breeders, rsear er and farmers rights. Inemati nal, ty on plant gentic re-oce; for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features.

DEPTMENT. OF ANIMAL H USBADRY AND DAIRY SCJENCE

Cou rse Code	Course Title	Credit Hours
AHD-111	Introductory Anim al husbandry	2(1+])
AHD-121	Dairy Processing and Safety Issues	3(2+])
AHD-211	Dairy Science	3(2+1)
AIID-221	Poultry production and management	3(2+1)
AHD-321	Principles of Food Science and Nutrition	2(1+1)

ANIMAL HUSBANDRY AND DAIRY SCIENCE

AHD-111 1. Introductory Animal husbandry 2(1+1)

GENERAL : Importance of livestock in Agriculture and Economy. *Dairying* under specialized and mixed farming.

DAIRY CATTLE AND BUFFALOES MANAGEMENT :Cattle and buffalo Breeds. Breeding methods & systems, Care and Management of pregnant and milch cow, Raising of calves, Management of heifers and bulls. Milking methods and principles, Clean milk production, Feeds and feeding, Conservation of fodder.

PIG MANAGEMENT : Importance, Important breeds, Raising of piglets up to age of slaughter, General aspects of breeding, Care of sow and boar.

SHEEP AND GOAT MANAGEMENT : Importance, Important breeds, Raising of kids and lambs, Breeding, Feeding of goats and sheep.

Practical

Study of external body parts, Study of phenotypie and physiological difference between cow and buffaloes. Estimation of body weight by measurements, Identification of animals. Castration, Deborning, Estimation of cost of milk production, Problems on computation of ration, casting and throwing, Grooming, Scheme of fodder production round the year, Recording... temperature, pulse rate and respiration rate of animals.

AHD-121 2. Dairy Processing and Safety Issues 3(2+1)

GENERAL : Definition of food, Constituents of foods : Water, Carbohydrate, Fat, Protein, Vitamins and Minerals with reference to milk, Detailed composition of milk and colostrum.

FOOD PROCESSING :Pasteurization, Sterilization, Bactofugation, Uperization, Stassanization. U.H.T. pasteurization and Homogenization of milk, Neutralization of milk, Cream, Coding and chilling of milk.

Manufacturing of common dairy product viz. Cream, Butter, Ghee, Dahi, Yoghart, Shrikhand& Jee-cream.

Manufactyring of Khoa, Evaporated milk, condensed milk, WMP, SMP, Paneer, Cheese, Chhena, Cheddar cheese.

FOOD SAFETY :Definition, Importance, Scope, Hazards and risks. Food safety management, HACCP ,ISO Series, TQM-Concept and need for quality component of TQM.Bnsic water tests.

Practical

1. Demostraction of Cream separation.
2. Preparation of indigenous dairy products viz. Dahi. Chhena. Khoa, Paneer, Cream, Ghee, shrikhand.
3. Water quality analysis.
4. Problem on neutralization of milk and cream.
5. Preparation of plants for implementation of HACCP and ISO series,
6. Problems on over run.
7. Calculation of Ice cream mix.

AHD-211 3.DAIRY SCIENCE 3(2+1)

GENERAL :Concept of Dairying, Dairying in India. Dairy production statistics.Cleaning and sanitization of dairy equipment.

Dairy cooperatives, Functioning of dairy cooperatives societies, Functioning of Anand Pattern, White revolution, Objectives and achievements of operation flood.

Milk and its secretion, Transportation and milk distribution, pricing policy of milk.platform tests, Filtration. Straining and Clarification of milk.Standardization, Milk adulteration and its detection, Common preservatives of milk and their detection, Legal *standards* of milk.Factors affecting the quality and quantity of *milk,* Nutritive value of milk and milk product.

Basic principles of refrigeration and cold storage of milk and milk product.Common adulterants of ghee, khoa and their detection.

Practical

1. Sampling of milk.
2. C.0.B. Test
3. M.B.R. Test
4. Sediment test.
5. Problems on Standardization.
6. Detection of adulterants viz. water, starch, sucrose, urea, detergent and refined oil
7. Problems on adulteration.
8. Hansa Test.
9. Detection of preservatives.
10. Alcohol test.
11. Acidity of milk.

AHD-221 4. Poultry production and management 3(2+1)

GENERAL : Importance of poultry industry in India, Poultry.

BREEDING :Male and female reproductive system of chicken, Breeds and strains of broilers and layers of chicken. duck and quails, General aspects of breeding for better egg production and body weight gain. Selection and culling, Artificial insemination.

GENERAL MANAGEMENT :Establishment of poultry farm. Housing and equipment, incubation and hatching of eggs, Broiler and layer management. Lighting schedule for poultry.

FEEDS AND FEEDING :Digestion, Digestive system of chicken. Feed ingredients, Availability of CP and ME in ingredients. Feed processing. Formulation of feed viz. Starter. Grower, Layer, Finisher and Breeder ration, FCR, CP ratio.

HEALTH MANAGEMENT :Vaccination schedule for poultry, Common poultry diseases, i.e. Ranikhet, Marex, Chicken pox, Gumboro, Infectious bronchitis and CRD. Control of internal and external parasites.

POULTRY PRODUCTS :Preservation and storage of eggs, Grading of eggs. Egg powder, Slaughtering and processing of chicken, Marketing of poultry prod

Practical

Neat and clean diagram of hen showing external body parts.structure of egg, Formulation of ration viz. Broiler starter ration, Broiler finisher ration. Chick starter ration, Grower ration, Layer ration and Breeder ration. Vaccination scnedule for broiler and layers.Debeaking, Candling of eggs.Dissection of bird fir showing internal body parts.

AHD-321 S.Principles of Food Science and Nutrition 2(1+1)

GENERAL :

Definition of.food and food science.Composition of food, Foods of animal origin, Digestive system of Rkffiants.Definition, Chemistry and Function of Carbohydrate, Fat, P?teiJ?.S and Water.equ?-ement.Availability.Functions and Nutritional deficiency disease of minerals and vitamins.Flavours and colours used in food. Food microbiology with special reference to mlk, Physic Chmical properties of milk.

Composition and processing of egg, meat and chicken, feed additives, antibiotics, enzymes and hormones.

Practical

1. Sampling of milk.
2. Specific gravity of milk by lactometer.
3. Water quality test.
4. Study of Nutritional dclicientic conditions.
5. Study of Nutritional disorders.
6. Quality parameters for egg, meat and chicken.
7. Fat test by Gerber's method.
8. T.S. & S.N.F. percentage by Richmond's scale and formula.

DEPARTMENT OF ENGLISH

Course Code	Course Title	Credit Hours
NGC-112	Comprehension and Communication Skills in English	2(1+1)

ENGLISH

NGC-112· Comprehcnsion and Co . . Skil Js in EnG T Jish 2(1+1)
mmumcat1on

Theory

War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English - Spoken English and broken English G.B. Shaw. 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 Discussions.

REMEDIAL COURSES

REM-111 **1. Agricultural Heritage** **1(1+0)**

Theory

Introduction of Indian agricultural heritage; Ancient agricultural practices. Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modem era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

REM-112 **2. Introductory Biology / General Agriculture-I** **2(1+1)**

Introductory Biology

Theory

Introduction to the living world, diversity and characteristics oflife, origin of life, Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division. Morphology of flowing plants. Seed and seed germination. Plant systematic- viz; Brassicaccac, Fabaccac and Poaceae. Role of animals in agriculture.

Practical

Morphology of flowering plants - root, stem and leaf and their modifications. Inference, flower and fruits. Cell, tissues & cell division. Internal struce of root, stem and leaf Study of specimens and slides. Description of plants - Brassicaccae. Fabaceac and Poaceae.

General Agriculture-1

Theory

Agriculture of Intermediate standard including Agronomy, Soil Science, Horticulture, Plant Pathology.

Practical

Identification of field crops and weeds, Identification of Horticultural crops. Known about soil texture and structure, Identification of Indian soil. Collection of disease specunen.

REM-113 3.Elementary Mathematics /General Agriculture-II 2(1+1)

Elementary Mathematics

Theory

Straight lines :Distance formula, section formula (intern!and external division). Equation of co-ordinate axes, Equation of Jines parallel to axes, .Two *po int* fonn of equation of line, Normal form of equation of line,General form of equation of line, Angles between two straight lines, Parallel Jines, Perpendicular lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is knoW!t. General equation of a circle, Equation of circle passing through three given points, on it), Logarithmic differentiation (Simple problem based on it),). Matrices and Determinants: Definition of Matrices, Addition. Subtraction, Multiplication

Practical

Distance formula,area of triangle and quadrilateral, equation of circle whose center and radius is known, function.

General Agriculture-II

Theory

Agriculture of Intermediate standard including Ag. Engg. Animal Husbandry and economics.

Practical

.Study of different farm machinery and tools. Study of different breeds of cow, buffalo, and poultry .Study of demand and supply.

NON-GR.A.DIAL COURSES

NGC-111 NSS/NCC/Physical Education & Yoga Practices 2(0+2)

Theory

Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society. Following activities are to be taken up under the NSS course:

- Introduction and basic components of NSS:Orientation
- NSS programmes and activities
- Understanding youth
- Community mobilization
- Social harmony and national integration
- Volunteerism and shramdan
- Citizenship, constitution and human riglits
- Family and society
- Importance and role of youth leadership
- Life competencies
- Youth development programmes
- Health, hygiene and sanitation
- Youth health. lifestyle, HIV AIDS and first aid
- Youth and yoga
- Vocational skill development
- Issues related environment
- Disaster management
- Entrepreneurship development
  FomiuJation of production oriented project
- Documentation and data reporting
- Resurce mobilization
- Additional life skills
- Activities directed by the Central and Stat

All the activities related to the National Service Scheme course is distributed under four different courses viz., National Service Scheme I, National Service Scheme II, National Service Scheme Ill and National Service Scheme IV each having one crcdil load. The entire four courses sllould be offered cntinuously for two years. A student enrolled in NSS course should put in at least 60 hours of social work in different activities in a semester other than live regular one day camp in a year and one special camp for duration of 7 days at any semester break period in the two year.Different activities will include orientation lectures and practical works.Activities directed by the Central and Slate Government have to be performed by all the volunteers of NSS as per direction.

SYLLABUS

Semester I

NGC-112 National Service Scheme 1lntrocluction and basic components of

Orientation:

history, objectives, principles. symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

NSS programmes and activities

Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GUJ, coolination with different_agencies and maintenance of diary.

Understanding youth

Definition, profile.profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

Community mobilisation

Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

Social harmony and national integration

Indian history and culture, role of youth in nation building, conflict resolution and peace-building

Volunteerism and shramdan

Incllan tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

Citizenship, constitution and human rights

Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information Family and society

Cor{cept of family, community Ris and other community based organisa ions) and society

Semester I:

NGC- 113 National Cadet Corps

1. Aims. objectives. organization of NCc'and NCC song. DG's cardinals or discipline.
2. Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
3. Sizing, numbering. forming in three ranks, open and close order march and dressing.
4. Saluting at the halt, getting on parade, dismissing and falling out.
5. Marching, length of pace. and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear.
6. Turning on the march and wheeling. Saluting on the march.
7. Marking time, forward march and halt.
8. Changing step, fomlation of squad and squad drill.
9. Command and control, organization, badges of rank, honours and awards
10. Nation Building- cultural heritage, religions, traditions and customs of India. National integration.
11. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.
12. Leadership traits, types of leadership. Character/personality development.
13. Civil defense organiZation, types of emergencies. fire fighting. protection.
14. Maintenance of es ential services, disaster management, aid during development projects.
15. Basics of social service, weaker sections of society and their needs, NGO's and their contribution. contribution of youth owards social welfare and family planning.
16. Structure and function of human body, diet and exercise, hygiene and sanitation.
17. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.
18. Adventure activities
19. Basic principles of ecology. envirorlmental conservation, pollution and its control.
20. Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, rlf defense.

Semester 1:

NGC-114 Physical Education and Yoga Practices 2(0+2)

1. q"eaching of skills of Football·- demonstration. practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
2. Teaching of different skills of Football - demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
3. Teaching of advance skills of Football - involvement of all the skills in game situation with teaching of rules of the game
4. Teaching of skills of Basketball - demonstrntion, practice of the skills, correction of skills, involvement in game situation
5. Teaching of skills of Basketball - demonstration, practice of the skills, involvement in game situation
6. Teaching of skills of Basketball - involvement of all the skills ingame situation with teaching of rule of the game
7. Teaching of skills of Kabaddi - demonstration, practice of the skills, correction of skills, involvement in game situation
8. Teaching of skills of Kabaddi - demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of advance skills of Kabaddi - involvement of all the skills in game situation with teaching of rule of the game
10. Teaching "cff skills of Ball Badminton - demonstration, practice of the §kills, correction of skills, involvement in game situation
11. Teaching of skills of Ball Badminton - involvement of all the skills in game situation with teaching of rule of the game
12. Teaching of some of Asanas - demonstration, practice, correction and practice
13. Teaching of some more of Asanas, - demonstration_ practice, correction and practice
14. 'Teaching of skills of Table Tennis - demonstration, practice of skills, correction and practice and involvement in game situation
15. Teaching of skills of Table Tennis - demonstration, practice of skills, correction and practice and involvement in game situatiOIJ-
16. Teaching of skills of Table Tennis - involvement of all the skills in game situation with teaching of rule of the game
17. Teaching - Meaning, Scope and irbportance of Physical Education
18. Teaching - Definition, Type of Tournaments
19. Teaching - Physical Fitness and Health Education

20. Construction and laying out of the track and field (*The girls will have Tcnnikoit and Throw Ball).

1. Teaching of skills of Hockey - demonstration practice of the skills and correction.
2. Teaching of skills of Hockey - demonstration practice of the skiI Is and correction. Ad involvement of skills in games situation
3. Teaching of advance skills of Hockey - demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
4. Teaching of skills of Kho-Kho - demonstration practice of the skills and correction.
5. Teaching of skills of Kho-Kho - demonstration practice of the skills and correction. Involvement of the skills in games situation
6. Teaching of advance skills of Kho-Kho - demonstration practice of the skills and correct ion. Involvement of all the skills in games situation with teaching of rules of the game
7. Teaching of different track events - demonstration practice of the skills and correction.
8. Teaching of different track events - demonstration practice of the skills and correction.
9. Teaching of different track events - demonstration practice of the skills and correction with competition among them.
10. Teaching of different field events - demonstration practice of the skills and correction.
11. Teaching of different field events - demonstration practice of the skills and correction.
12. Teacrung of different field event - demonstration practice of the skills and correction.
13. Teaching of different field events - demonstration practice of the skills and correction with - comp tion among them.
14. Teaching of different asanas - demonstration practice and correction.
15. Teaching of different asanas - demonstration practice and correction.
16. Teaching of different asanas - demonstration practice and correction,
17. Teaching of different asanas - demonstration practice and correction.
18. Teaching of weight training - demonstration practice and correction.
19. Teaching of circuit training - demontration practice and correction.
20. Teaching of calisthenics - demonstration practice and correction.

Note:

- Compulsory Uniform: Half pants, Tee Shirts, Shoes and socks all white (Girls will have white Tee Shirt and Track pants)
- The games mentioned in the practical may be inter changed depending on the season and

NGC-121 **Human Value and Ethics** **1(1+0)**

Theory

Values and Ethics-An Introduction.Goal and Mission of Life.Vision of Life.Principles and Philosophy. Self Exploration.Self Awareness.Se! f Satisfaction.Decision Making.Mot ivat ion.Sensitivity.Success.Selfless Service.Case Study of Ethical Lives.Positive Spirit.Body, Mind and Soul.Attachment and Detachment.Spiri tuality Quotien t.Examination .

ELECTIVE COURSES

AEC-312. I. Agri-business Management 3(2+1)

Theory

Transfomlation of agriculture into agribusiness, various stakeholders and components of agribusiness systems.Importance of agribusiness in the Indian economy and New Agricultural Policy· Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement.procedures to set up agro based industries. Constraints in establishing agro-based industries.Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan. Steps in planning and implementation.Organization staffing, directing and motivation.Ordering, leading, supervision, communications.cont rol. Capital Management and Financial management of Agribusiness. Financial statements and their importance.Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Cosµmer l:iehavior analysis, Product Life_ Cycle (PLC).Sales &. Distribution Management .Pricing policy, various pricing ethds.Project Management-definition, project cycle, idetification, formulation, appraisal, implementation, monitoring and evaluation.Project Appraisal and evaluation techniques.

Practical

Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets:grains. fruits, vegetables, flowers. Study of product markets.retails trade commodity trading, and value added products. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribus ness Finance Limited, NABARD.Preparations of projects and Feasibility reports for agribusiness entrepreneur.Appraisal/evaluation techniques of identifying viable project-Non-discounting techniques.Case study of agro-based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique fir selection of viable project.Internal rate of return.

ENT/SSC-312 2. Agrochemicals 3(2+1)

Theory

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health. merits and demerits of their uses in agriculture. management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides.Fate of herbicides.Fungicides-Classification-Inorganic fungicides-characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride.Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and rnaneb.

Systemic fungicides- Benomyl.carbox in, oxycarboxin, Metalaxyl, Carbendazim. characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroidsNeonicotinoids. Hiorationals.Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant.IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate. ammonium nitrate, ammonium chloride, urea. Sfow.reiease N- fertilizers. Phosphatic fertilizers: feedstock and manu facturing of single superphosphate. Preparation of bone meal and basic slag.Potassic fertilizers: Natural sources of potash, manufacturing of potassiumchloride, potassium sulphate and potassium nitrate. Mixed and complex fertilizers: Sources and compatibility-preparation of major, secondary and micronutrient mixtures. Complex fertilizers:Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing.Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Practical

Sampling of fertilizers and pesticides.Pesticides application technology to study about various pesticides appliances.Quick tests for identification of common fertilizers.Identification of anion and cation in fertilizer.Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available kinmarket Estimation of nitrogen in Urea. Estimation of water soluble P20s and citrae soluble P20s in single super phosphate.Estimation of potassium in-Muraite of Potash/ Sulphat o Potash by flame photometer.Determiria_tion of copper content in copper oxychloridc .Determination of sulphur content jn sulphur

GPB-312 3.Commercial Plan t Breeding 3(2+1)

Theory

, Types of crops and modes of plant reproduction.Lin e development and maintenance breeding in self and cross pollinted crops *(A/BIR* and two lie system) for development of hybrids and seed production.Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower. cotton pigeon pea. Brassica etc.Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breed ing: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Practical

Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using *A/BIR* and two line system. Leaming techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques For optimizing hybrid seed production. Concept of rouging in seed production plot.Concept of line its multiplication and purification in hybrid seed production.Role of pollinators in hybrid seed production .Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops.Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality seed management.Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.

HOR-323 4. Landscaping 3(2+1)

Theory

Importance and scope oflandscaping.Principles oflandscaping, garden styles and types. terrace gardening, vertical gardening. garden components, adornments, lawn making. rockery .water garden. walk-paths, bridges, other constructed features etc. gardens for special purposes. Trees: selection.propagation. planting !emes, canopy management, shrubs and herbaceous perennials: selection. propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme. Other garden plants: palms, fems, grasses and cacti succulents. Pot plantS; selection. arrangement, management Bio-aesthetic planning: definition. need, planning: landscaping of urban and runiJ areas, Peri-urban landcapifig, Landscaping of schools, public places like bus statio, ifalway station, tobips, river ban.ks, hospitals, play grounds, airports. industries, institutions.Bonsai: principles and man "1.ent, lawn: establishment and maintenance. *J\D* application.

(7

Practical

Identification of trees, shrnbs, annuals, pot plants; Propagation of trees, shrubs and annuals, care. and maintenance of plants. potting nnd repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of fonnal gardens, infonnal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/ parks/ institutes.

ARD-312 5.Food Safety and Standards $3(2+1)$

Theory

Food Safety - Definition.Importance, Scope and Factors affecting Food Safety.Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards.Management of hazards - Need.Control of parameters.Temperature control.Food storage.Product design.Hygiene and Sanitation in Food Service Establishments- Introduction.Sources of contamination and their control.Waste Disposal.Pest and Rodent Control.Personnel Hygiene.Food Safety Measures.Food Safety Management Tools- Basic concepts.PRPs, OMPs, SSOPs etc.HACCP .ISO series. TQM - concept and need for quality. components of TOM. Kaizen. Risk Analysis. Accreditation and Auditing.Water Analysis, Surface Sanitation and Personal Hygiene.Food laws and Standards- Indian Food Regulatory Regime, FSSA.Global Scenario CAC. Other laws and standards related to food. Reeent concerns- New ruid Emerging Pathogens. Packaging, Product labeling and Nutritional labeling.Genetically modified foods\ transgenics.Organic foods.Newer approaches to food safety.Recent Outbreaks.Indian and International Standards for food products.

Practical

Water quality analysis physico-chemical and microbiological.Preparation of different types of media.Microbiological Examination of different food samples.Assessment of surface sanitation by swab/rinse method.Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for implementation of FSMS - HACCP, ISO: 22000.

ENT/SSC-322 6.Biopcstici<lcs& Biofcrtilizcrs 3(2+1)

Theory

History and concept of biopesticides.Im porlance.scopc and poten tial of biopcsticide. Definitions, concepts and classification of biopcsticides viz. pathogen, botan ial pestic ides, and biorationales.Botanicals and their uses.Mass production tech nology of bio-pesticidcs. Virulence, pathogenici ty and symptoms of cntomopathogcn ic pathogens and nematodes.Methods of application of biopest icides.Mcthods of quali ty control and Techniq ues of biopesticidcs.Impedi ments and limitation in production and use of biopesticide. Biofertilizers - Introduction. status and scope. Stru cture and characteristic features of bacteria l bioferti lizers- Azospirill um, Azotobacier, Pseudomonas.Rhizobium and Franlcia; Cynobacterial biofertilizers- Anabaena .Nostoc, Hapalosiphon and fungal biofe ltilizers- AM mycorrhiza and ectomycorhiza.Nitrogen fixation -Free living and symbiotic nitrogen fixation.Mechanism of phosphate soluhilization and phosphate mobilization, K solubilization. Producti on technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCC) specifications and quality control of biofertilizers. Application technology for seeds', seedlings, tubers, sets etc. Biofertilizers -Storage, shelflife, quality control and marketin g. Factors influencing the efficacy of biofertilizers.

Practical

·Isolation and ptirification of iinportant biopcsticides: Trichoderma Pseudomonas; Bacillus, Metarlozium etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopatho genic entities in field condition.Quality control of biopesticides. Isolation and purification of Azaspirillum ,Azotobacter, Rhizobium. P-solubi lizers and cyanobacteria.Mass multiplication and inoculums production of biofertili zers. lso ation of AM fungi -Wet sieving method and sucrose gradient method. .Mass production of AM inoculants.

HOR-312 7. Protected Cultivation 3(2+1)

Tbery

Protected cultivation: importance d scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house.Greenhou se esi, environment control,artificial lights, Automation.Soil preparation and m gementSubstra te mangement.Types of benches and containers.Irrigation and fertigation management.Propagation and production ·of quality planting materjal of horticultural crops. Greenhouse culti ation of important horticultural crops-rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, si:rawbeny, pot plants, etc. Cultivation of economically important medicinal and aromatic plants.Offseason production of flowers and vegetables.Insect pest and

Practical

Raising of seedlings and saplings under protected conditions, use of protrays in quality pJantfog material production, Bed preparation and planting of crop for production, Inter cultural operation. Soil EC and pH rneasurem nt, Regulation of irrigation ad fertilizers through drip, fogging ad misting.

HOR-322 8.Hi-tech. Horticulture 3(2+1)

Theory

Introduction & importance;Nursery management and mechanization; micro propagation of hollicultural crops; Modem field preparation and planting methods.Protected cultivation: advantages, controlled conditions, method and techniques, Micro in-igation systems and its components; EC.pH based fertilizer scheduling, canopy management, high density orcharding. Components of precision fanning: Remote sensing. Geographical Information System (GIS), Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA), application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce. Practical Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation. EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

AGR-322 9. Weed Management 3(2+1)

Theory

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.Herbicide classification.concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity.Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.Concept of herbicide mixture and utility in agriculture.Herbicide compatibility with agro-chemicals and their application.Integration of herbicides with non chemical methods of weed management.Herbicide Resistance and *its* management.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds.Study of herbicide formulations and mixture of herbicide. Herbicide and agro-chemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

SCW/ EXT -312 10. System Simulation and Agroaclvisory 3(2+1)

Theory

System Approach for repreenting soil-plnnt-atmosphcri continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements. relational diagrams.

Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for their estimation. Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types, methods, tools & techniques, forecast verification: Value added weather forecast, ITK for weather forecast and its validity; Crop-Weather Calendars; Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical

Preparation of crop weather calendars. Preparation of ago-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production: yield forecasting, insect & disease forecasti.llg models. Siiiiulation with.Iiillitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast. Feedback from farmers about the agroadvisory.

EXT-322 IL Agricultural Journalism 3(2+1)

Theory

Agricultural Joll!Dalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agriqultural journalism is similar to and different from other types of journalism. Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers d magazines: Syle and 1 age of newspapers and magazines. parts of newspapers and agazines. The agricltural st?ry: Types of agricultural stories, subject matter of the aicultural story. ctw.e of the gricu lturl st,ory. SJatheiing agricultural information: Sources of agricuitural or tion,' intenriews, c.Jerag of e\;ents, abstracting from research and scientific materials, re services o r gricultural news sorces. Writin the story: Organizing the material, treatment tthe story. writing th ws lead and e bdy, readabillty meas es. Illu trating agriculturkl stori'es: Use of photographs,,use <?f rtwork (gra s'. harts, J?aP,s, e'c. , iting the captions. Editorial mechanics: Copy re_ading, headline and title writing, proofreadil_lg, lay outing.

Practical

Pratjce in interviewing. Covering agricul tural events.Abstracting stories from research and sdentific materials and from wire services.Wri ting different types of agricu l tural stories.Selecting pictures 'and artwork for the agricultural story. Practice in edHing, copy reading. headline and title writing, proofreading, layouting. Testing copy with a readabil ity formula. Visit to a publishing office.

AHD-322

12. FISHERY AND POULTRY MANAGEMENT 3(2+1)

Fishery:

Definition, common characteristics and position of fish in Animal Kingdom, fishery statistics preparation and managem ent of fish pond, physical and chemical condition of water for fishery, feeds and feeding of fishes, breeding of fish, diseases and enemies of fishes, use of Duck/quality beats on fish feeds. Historical development in pou ltry birds potential. Male and female reproductive system of chickens, Breeds and strains of broiler and layers of chickens.General aspects of breeding for better egg production and body weight gain, Selection of culling. Artificial insemination.Establishment of poultry farm, housing and equipment, incubation an batching of eggs, broiler and layer management, lighting schedule for poultry. Digestion, digestive system of chicken, feed ingredients, availability of CP and ME in ingredients, feed processing, formulation of feed viz. Starter, Grower, Layer, Finisher and Breeder ration, FCR, CP ratio, Nutritional C:Ieficiency condition.Vaccinationschedu le for. poultry, common poultry diseases. Preservation and storage of eggs, Grading of eggs, AGMARK standard of egg, Egg powder, slaughtering and processing of chicken, Marketing of poultry products.

Practical

1. Fishery units, visit, Demonstration and report formulation.
2. Different type of fishes, deep water, middle water, and surface water.
3. Preparation of fish feed.
4. Preparation of feed of poultry.
5. Preparation of different products from eggs.