NEW AND RESTRUCTURED
UNDER GRADUATE CURRICULA & SYLLABUS

B.Sc. (Agriculture)
w.e.f. 2019-20

Semester System as per ICAR
V\textsuperscript{th} Deans Committee Report

Submitted by:

\textit{Board of Studies in Agriculture}
C.S.J.M. University, Kanpur
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>Credits</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Fundamentals of Agronomy</td>
<td>3</td>
<td>AG-101</td>
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<td></td>
<td>Fundamentals of Genetics</td>
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<td></td>
<td>Fundamentals of Soil Science</td>
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<td>Fundamentals of Horticulture</td>
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<td>Rural Sociology &amp; Educational Psychology</td>
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<td>Fundamentals of Plant Biochemistry</td>
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<td>Fundamentals of Entomology-I</td>
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<td>Fundamentals of Agricultural Economics</td>
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<td>Principles of Organic Farming</td>
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<td>Fundamentals of Plant Pathology</td>
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<td>Production Technology for Vegetables and Spices</td>
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<td>Fundamentals of Agricultural Extension Education</td>
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<td>Food Processing and Safety Issues</td>
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<td>Human Values &amp; Ethics</td>
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<td>Soil and Water Conservation Engineering</td>
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<td>IIIrd Semester</td>
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<td>Fundamentals of Plant Breeding</td>
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<td>Farm Machinery and Power</td>
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<td>Principles of Integrated Disease Management</td>
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<td>Environmental Studies &amp; Disaster Management</td>
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<td>Statistical Methods</td>
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<td>Principles of Seed Technology</td>
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<td>Problematic soils and their Management</td>
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<td>Renewable Energy and Green Technology</td>
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<tr>
<td>Production Technology for Ornamental Crops, MAP and Landscaping</td>
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<td>Entrepreneurship Development and Business Communication</td>
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<td>Introductory Agro-meteorology &amp; Climate Change</td>
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<td>Agri- Informatics</td>
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<td>Poultry Production &amp; Management</td>
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<tr>
<td><strong>Vth Semester</strong></td>
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<td>Rainfed and dryland Agriculture</td>
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<td>Crop Improvement-1 (<em>Kharif</em> crops)</td>
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<td>Pests of Crops and Stored Grain and their Management</td>
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<td>Agricultural Marketing Trade &amp; Prices</td>
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<td>Diseases of Field and Horticultural Crops and their Management-I</td>
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<td>Production Technology for Fruit and Plantation Crops</td>
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<td>Communication Skills and Personality Development</td>
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<td>Intellectual Property Rights</td>
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<td>Principles of Food Science &amp; Nutrition</td>
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<tr>
<td>Geo-informatics and Nanotechnology</td>
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<tr>
<th><strong>VIth Semester</strong></th>
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<tr>
<td>Farming System, Precision Farming &amp; Sustainable Agriculture</td>
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<td>Crop Improvement-II (<em>Rabi</em> crops)</td>
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<td>Manures, Fertilizers and Soil Fertility Management</td>
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<tr>
<td>Farm Management, Production &amp; Resource Economics</td>
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<td>Diseases of Field and Horticultural Crops and their Management-II</td>
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<td>Post-harvest Management and Value Addition of Fruits and Vegetables</td>
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<td>Watershed and Wasteland Management</td>
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<td>Beneficial insects and Pest of Horticultural Crops and their Management</td>
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<td>Educational Tour</td>
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**VIIth Semester**

<table>
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<tr>
<th>SN.</th>
<th>Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE&amp;AIA)</th>
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<tbody>
<tr>
<td></td>
<td><strong>Activities</strong></td>
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<tr>
<td>1</td>
<td>General orientation &amp; On campus training by different faculties</td>
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<td>2</td>
<td>Village attachment</td>
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<td></td>
<td>Unit attachment in Univ./ College. KVK/ Research Station Attachment</td>
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<tr>
<td>3</td>
<td>Plant clinic</td>
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<td></td>
<td>Agro-Industrial Attachment</td>
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<td>4</td>
<td>Project Report Preparation, Presentation and Evaluation</td>
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<td><strong>Total weeks for RAWE &amp; AIA</strong></td>
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**RAWE Component -II**

**Agro Industrial Attachment**

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 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 industry
- Documentation of the activities and task performed by the students
- Performance evaluation, appraisal and ranking of students
**VIIIth semester**

**Modules for Skill Development and Entrepreneurship:** A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the viii sem.

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<tr>
<th>Sr.</th>
<th>Title of the module</th>
<th>Credits</th>
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<tr>
<td>1.</td>
<td>Production Technology for Bioagents and Biofertilizer</td>
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<td>2.</td>
<td>Seed Production and Technology</td>
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<tr>
<td>3.</td>
<td>Mushroom Cultivation Technology</td>
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<td>4.</td>
<td>Soil, Plant, Water and Seed Testing</td>
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<td>5.</td>
<td>Commercial Beekeeping</td>
<td>0+10</td>
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<td>6.</td>
<td>Poultry Production Technology</td>
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<td>7.</td>
<td>Commercial Horticulture</td>
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<td>8.</td>
<td>Floriculture and Landscaping</td>
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<tr>
<td>9.</td>
<td>Food Processing</td>
<td>0+10</td>
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<td>10.</td>
<td>Agriculture Waste Management</td>
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<td>11.</td>
<td>Organic Production Technology</td>
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<td>12.</td>
<td>Commercial Sericulture</td>
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<td>Sl.No.</td>
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<tr>
<td>1.</td>
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<td>2.</td>
<td>Presentation</td>
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<td>Regularity</td>
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<td>Business networking skills</td>
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<td>Report Writing Skills</td>
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<td>Final Presentation</td>
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**Elective Courses** : A student can select two elective courses out of the following and offer during 5th and 6th semesters.

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<td>Agribusiness Management</td>
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<td>2.</td>
<td>Agrochemicals</td>
<td>3(2+1)</td>
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<td>3.</td>
<td>Commercial Plant Breeding</td>
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<td>4.</td>
<td>Landscaping</td>
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<td>5.</td>
<td>Food Safety and Standards</td>
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<td>6.</td>
<td>Biopesticides &amp; Biofertilizers</td>
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<td>Protected Cultivation</td>
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<td>Hi-tech. Horticulture</td>
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<td>Weed Management (Deptt. of Agronomy)</td>
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<td>System Simulation and Agro-advisory (Soil Conservation)</td>
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<td>Agricultural Journalism</td>
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<td>12.</td>
<td>Composition cum Duck/ (and) Quail/ (and) Rabbit culture.</td>
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</tbody>
</table>
AGRONOMY

1. Fundamentals of Agronomy 3(2+1) AG-101

Theory
Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water.

Practical

2. Crop Production Technology-I (Kharif Crops) 2(l+l) AG-301

Theory
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops. Cereals - rice, maize, sorghum, pearl millet and finger millet, pulses-pigeonpea, mungbean and urdbean; oilseeds- til, groundnut, and soybean; fibre crops- cotton & jute; forage crops-sorghum, cowpea, cluster bean and napier.

Practical
Rice nursery preparation, transplanting of rice, sowing of soybean, pigeonpea and mungbean. 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. Visit to research centres related to crops.

3. Crop Production Technology-II (Rabi crops) 2(l+l) AG-401

Theory
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; cereals -wheat, barley and oat, pulses-chickpea, lentil, peas, oilseeds-rapeseed, mustard, linseed and sunflower; sugar crops-sugarcane; other crop-Potato. Forage crops-berseem, lucerne and oat.

Practical
Sowing methods of wheat and sugarcane, 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, visit to research stations of related crops.
4. Farming System, Precision Fanning and Sustainable Agriculture  

**Theory**
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 determining productions & efficiencies in cropping and farming systems.
- Indicators of sustainability of cropping & Fanning systems
- Site specific development of IFS models for different agro-climatic zones.
- Visit of IFS models in different agro climatic zones of nearby state Universities/Institutes and farmer fields.

5. Practical Crop Production-I (Kharif Crops)

**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.

6. Practical Crop Production-II (Rabi Crops)

**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.

7. Principles of Organic Farming

**Theory**
Organic farming, principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture. Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production; Certification process and standards Of organic farming.

**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.
8. Elective Course

Students will select two Elective courses one is in semester V and second is in semester VI out of the list of the Elective Course. Weed Management for the Deptt. of Agronomy.
<table>
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<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>AG-102</td>
<td>Fundamentals of Genetics</td>
<td>3(2+1)</td>
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<td>AG-303</td>
<td>Fundamentals of Plant Breeding</td>
<td>3(2+1)</td>
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<tr>
<td>AG-502</td>
<td>Crop Improvement - I (Kharif Crops)</td>
<td>2(1+1)</td>
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<td>AG-509</td>
<td>Intellectual Property Right</td>
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<td>AG-602</td>
<td>Crop Improvement - II (Rabi Crops)</td>
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<td>AG-403</td>
<td>Principles of Seed Technology</td>
<td>3(2+1)</td>
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<tr>
<td>AG-201</td>
<td>Fundamentals of Crop Physiology</td>
<td>3(2+1)</td>
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<td>AG-308</td>
<td>Environmental Studies and Disaster Management</td>
<td>3(2+1)</td>
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Course wise Syllabus

Fundamentals of Genetics  
3(2+1) AG-102

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. 

Practical
Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross 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.

Fundamentals of Plant Breeding  
3(2+1) AG-303

Theory
Historical development, concept, nature and 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; Centres 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 pollinated crops, modes of selection; Population improvement Schemes-Ear to row method, Modified Ear to Row, recurrent selection. Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties; Breeding 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; Biotechnological tools-DNA markers and marker assisted selection.

Practical
Crop Improvement - I (Kharif) 2(1+1) AG-502

Theory
Centers of origin, distribution of species, wild relatives in different cereals (Rice, Maize, Sorghum and Pearl millet); pulses (Pigeonpea, Urdbean and Mungbean); oilseeds (Groundnut); fibre (Cotton). Important concepts of breeding self-pollinated and cross pollinated. Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress and quality (physical, chemical, nutritional); Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea.

Practical
Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Maize, Sorghum, Pearl millet, Pigeonpea, Urd bean, Mungbean, Groundnut, Cotton crops. Maintenance breeding of different 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 production and hybrid 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 AICRP plots of different field crops.

Crop Improvement - II (Rabi) 2(1+1) AG-602

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 modern 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.

Practical
Floral 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.

Principles of Seed Technology 3(1+2) AG-403

Theory
Seed and seed production technology: introduction, 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 important 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, 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: Wheat, Rice, Maize, Sorghum and Bajra. Seed production in major pulses: Urd, Mung, Pigeonpea, 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.
Fundamentals of Crop Physiology

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 growth parameters in crop productivity.

Practical
Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO2 assimilation by Infra Red Gas Analyser (IRGA).

Environmental Studies and Disaster Management

Theory

Disaster Management
Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community - based organizations and media. Central, state, district and local administration.
Practical
Pollution case studies. Case Studies - Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site-Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

Intellectual Property Rights

Theory
1. Fundamentals of Soil Science 3(2+1) AG-103

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. Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

2. Agricultural Microbiology 2(1+1) AG-304

Theory

Practical
3. Fundamentals of Plant Biochemistry

**Theory**


**Practical**


4. Manures, Fertilizers and Soil Fertility Management

**Theory**


**Practical**


5. Problematic Soils and their Management (New)

**Theory**

bio remediation through MPTs of soils, land capability and classification, land suitability classification.
Problematic soils under different Agro-ecosystems.

Practical
Determination of pH & Ec in soil and water. Line and gypsum requirement in soil, ESP and SAR in Soils.
Application of remote sensing and GIS in delineating problematic soil in UP. Visit problematic soil in U.P.

6. Geo-informatics, Nano-technology
2(1+1) AG-511

Theory
Geo-informatics- 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 nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical
1. FUNDAMENTALS OF ENTOMOLOGY-I

(INSECT MORPHOLOGY & TAXONOMY)

Theory

Practical
Methods of collection and preservation of insects including immature stages; External 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 female reproductive systems in insects (Grasshopper);

**Theory**

**Insect Ecology:**

**IPM:**

**Practical**

**3. PESTS OF FIELD CROPS, STORED GRAINS AND THEIR MANAGEMENT  3(2+1) AG-503**

**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 important 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. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

**Paddy:** Leptocorisa varicronis, Hieroglyphus Spp., Nilaparvata lugens, Nephrotetix, spp., Mythimna separata.

**Jowar Maize:** Chilo partellus, Atherigona variasoccata, Scirpophaga exerptalis, Chilo infuscatesles

**Sugarcane:** Top borer, Pyrilla, Early Shoot borer and white fly.

**Cotton:** Pectinophora gossypiella, Earias Spp., Sylepta derogata, Dysdercus Spp., Bemisia tabaci, Amrasca bigutulla.

**Oilseeds:** Lipaphis erysimi, Athalia proxima Bagrada Cruciferarun, Dasyneura lini.

**Pulses:** Helicoverpa armiger Agrotis Spp., Etiella zinckenella

**Pests of Stored Grains:** Sitophilus oryzae, Trogoderma granarium, Sitotroga cerealella, Callosobruchus chinensis.

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

**Practical**
4. BENEFICIAL INSECTS and PESTS OF HORTICULTURAL CROPS AND THEIR MANAGEMENT

**Theory**

General account on nature and type of damage by different arthropod pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific names, order, family, host range, distribution, nature of damage and control practices for other important arthropod pests of various vegetable crops, fruit crops, plantation crops, ornamental crops and major pests of narcotics, spices and condiments. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, 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 of lac - seed lac, button lac, shellac and lac products.

Identification of major parasitoids and predators commonly used in biological control.

**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, plantation gardens, narcotics, spices & condiments. Visit to orchards and gardens.

AGRICULTURAL ECONOMICS

1. Fundamentals of Agricultural Economics 2 (2+0) AG-204

Theory


2. Agricultural Marketing, Trade and Prices 3(2+1) AG-504

Theory

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus - meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri- commodities; cost based and competition based pricing; market promotion - advertising, personal selling, sales promotion and publicity - their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions - buying and selling; physical functions - storage, transport and processing; facilitating functions - packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt, in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI - their objectives and functions; cooperative...
marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR GST.

**Practical**

Plotting and study of demand and supply curves and calculation of elasticities; Study of relationship between market arrivals and prices of some selected commodities; Computation of 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 different 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 to market institutions - NAFED, SWC, - CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

**3. Farm Management, Production and Resource Economics**

**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-linear programming, 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, Crop/livestock/machinery insurance - weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

**Practical**

Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. 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 resources in India.

4. Agricultural Finance and Co-Operation 3(2+1) AG-305

Theory
Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, 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 K.CC. 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; role of ICA, NCUI, NCDC, NAFED.

Practical
1. Soil and Water Conservation Engineering

Theory

Practical

2. Farm Machinery and Power

Theory
Status of Farm Power in India, Sources of Farm Power, I.C. engines, working principles of I.C engines, comparison of two stroke and four stroke cycle engines, Study of different components of I.C. engine, I.C. engine terminology and solved problems, Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor, Familiarization with Power transmission system: clutch, gear box, differential 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, Familiarization with harvesting and threshing equipment.

Practicals
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, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, 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 primary and secondary tillage implements: mould plough, disc plough and disc harrow. Familiarization with seed-cum-fertilizer drills their seed metering mechanism 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.
3. Renewable Energy and Green Technology

Theory
Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource, introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, introduction of wind energy and their application.

Practical
Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-fuels. Familiarization with different solar energy 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.

4. Protected Cultivation and Secondary Agriculture

Theory
Green house technology: Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of green 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, recirculatory dryer and solar dryer). Material handling equipment; conveyor 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.
1. Fundamentals of Plant Pathology

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, diseases triangle and tetrahedron and classification of plant diseases, Important Plant pathogenic organism fungi, bacteria, fastidious vesicular bacteria, Phytoplasmas, Spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasite 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 properties, structure and transmission.
Study of phanerogamic plant parasites.
Epidemiology: Factors affecting disease development.

Practical

2. Diseases of Field and Horticultural Crops & their Management–I

Theory
Symptoms, etiology, disease cycle and management of major diseases of following crops:
Field Crops: Rice: Blast, Brown spot, Bacterial Blight, Sheath blight, false smut, Khaira and tungro; Maize: stalk rots, downy mildew; Sorghum: smuts; Bajra: downy mildew and ergot; Groundnut: early and leaf spots; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Green gram: Cercospora leaf spot, web blight and yellow mosaic; Tobacco: Mosaic.
Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, sigatoka and bunchy top; Papaya: foot rot and leaf curl.
Cruciferous vegetable: Alternaria leaf spot and black rot; Brinjal: phomopsis blight, sclerotinia and little leaf; Tomato: early and late blight, leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: Anthracnose and bacterial blight; ginger: soft rot; Colocasia: Phytophthora blight.

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.
3. Diseases of Field and Horticultural Crops & their Management –II

Theory
Symptoms, etiology, disease cycle and management of major diseases of following crops:

Field Crops:
Wheat: Rusts, loose smut, karnal bunt, powdery mildew, Alternaria blight and ear cockle;
Sugarcane: red rot, smut, wilt and grassy shoot
Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew; Gram: wilt and Ascochyta blight; Lentil: Rust and wilt; Cotton: Vascular wilt and black arm; Pea: Downy mildew, powdery mildew and rust.

Horticultural Crops:
Mango: Anthracnose, 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 and wilt; Onion and garlic: purple blotch and stemphylium blight; Chilli: anthracnose and leaf curl; Turmeric: leaf spot; Coriander: stem gall; Marigold: Botrytis blight; Rose: dieback, powdery mildew; Potato: Early and late blight, Common scab, powdery scab, black scurf and 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.

4. Principles of Integrated Disease Management

Theory
Categories of diseases, IDM: Introduction, history, importance, concepts, principles and tools of IDM. Economic importance of, diseases and Methods of detection and diagnosis of and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Survey surveillance and forecasting of diseases. Safety issues in fungicide uses. Political, social and legal implication 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 of IDM, Identification of biocontrol 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.
HORTICULTURE

1. Fundamentals of Horticulture (NEW) 2(1+1) AG-104

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, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; use of plant bioregulators in horticulture, irrigation and fertilizers applications - method and quality.

Practical

2. Production Technology for Fruit and Plantation Crops 2(1+1) AG-507

Theory
Importance and scope of fruit and plantation crop industry in India; High density planting; Use of rootstocks; Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, Litchi, papaya, apple, pear, peach and; minor fruits-pineapple, pomegranate, jackfruit, strawberry, nut crops; plantation crops-coconut, arecanut, cashew, tea, coffee & rubber.

Practical

3. Production Technology for Vegetable and Spices 2(1+1) AG-207

Theory
Importance of vegetables & spices in human nutrition and national 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 storage, physiological disorders, disease and seed production of important vegetable (potato, tomato, cauliflower, onion, okra, bottle guard and bitter guard) and spices i.e. condiments, Ginger, turmeric, coriander, cumin, funnel, black peper, ilaichi.

Practical
4. Production Technology for Ornamental Crops, MAPs and Landscaping 2(1+1) AG-407

Theory
Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs and climbers. Style of gardening and lawn making and maintenance. Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, geranium, vetiver.

Practical

5. Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1) AG-606

Theory
Importance of fruits and vegetables, extent and possible causes of post harvest losses; Pre- harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate; role of ethylene; post harvest disease and disorders; heat, chilling and freezing injury; 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
AGRICULTURAL EXTENSION

1. Rural Sociology & Educational Psychology

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 in rural context.

Educational psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Practical

Socio-economic survey of village communities. Developing schedules and questionnaires. Visit and gaining of Practical knowledge about the working of basic rural institutions. Identification of important value systems in the rural setting as a means of social control. Identification of rural personality traits that affect the development of personality in rural situation.

2. Fundamentals of Agricultural Extension Education

Theory

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT.

Practical

To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA 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 and television studio for
understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.

3. Entrepreneurship Development and Business Communication 2(1+1) AG-408

Theory
Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agrienterprises, Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agrientrepreneurship and rural enterprise.

Practical
Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

4. Communication Skills and Personality Development 2(1+1) AG-508

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 and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

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.
1. Introduction to Forestry (New)  

**Theory**

Introduction - definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, root suckers; Artificial regeneration - objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification. Tending operations - weeding, cleaning, thinning - mechanical, ordinary, crown and advance thinning. Forest mensuration - objectives, diameter measurement, instruments used in diameter measurement; measurement of volume of felled and 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 growing tree species of the region.

**Practical**


2. Introductory Agro-meteorology & Climate Change

**Theory**

Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon-mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave. Agriculture and weather relations; Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting - types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

**Practical**

Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording. Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis. Measurement of soil

3. Watershed and wasteland Management 2(1+1) AG-607

Theory

Wasteland management - Definition, concept & types of degraded & wasteland. Distribution & 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. Practical:

Practical
Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.

4. Rain fed and Dryland Agriculture: 2(1+1) AG-501

Theory
Rainfed and dryland agriculture - Introduction, types and history. Problems & prospects of rainfed agriculture in India. Soil and climatic conditions prevalent in rainfed areas. Drought: types, effect of water deficit on physio-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 aberrant weather conditions. Precision agriculture; concepts and techniques; their issues and concerns for Indian agriculture.

Practical
Studies on climatic classifications, studies on rainfall pattern is rainfed areas of the country. Studies on cropping pattern of different dryland areas in the country and demarcation of dryland 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. Visit to rainfed research stations/watersheds.

5. Elective Course 3(2+1) AGEL-1/AGEL-2

Students will select two Elective courses one is in semester V and second is in semester VI out of the list of the Elective Course.
1. Introductory Animal husbandry

UNIT 1.
GENERAL : Importance of livestock in Agriculture and Economy. Dairying under specialized and mixed farming. Livestock and milk production statistics.

UNIT 2.
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, Maintenance of livestock records, Milking methods and principles, Clean milk production, Feeds and feeding, Conservation of fodder, Housing for dairy animals.

UNIT 3.
PIG MANAGEMENT : Importance, Important breeds, Raising of piglets up to age of slaughter, General aspects of breeding, Care of sow and boar.

UNIT 4.
SHEEP AND GOAT MANAGEMENT : Importance, Important breeds, Raising of kids and lambs, Breeding, Feeding of goats and sheep.

UNIT 5.
HEALTH MANAGEMENT : Common animal diseases of cattle, buffalo, goat, sheep and swine viz. Anthrax, BQ, HS, Brucellosis, Mastitis, Milk fever, Bloat, Swine fever and Enterotoximea, Vaccination schedule.

Practical
Study of external body parts, Study of phenotypic and physiological difference between cow and buffaloes, Estimation of body weight by measurements, Identification of animals, Castration, Dehorning, 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.

2. Poultry production and management

UNIT 1.
GENERAL : Importance of poultry industry in India, Poultry production and marketing statistics of eggs and chicken. Historical development in poultry birds potential.

UNIT 2.
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.

UNIT 3.
GENERAL MANAGEMENT : Establishment of poultry farm, Housing and equipment, incubation and hatching of eggs, Broiler and layer management, Lighting schedule for poultry.

UNIT 4.
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, Nutritional deficiency conditions.

UNIT 5.
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.
UNIT 6.
Poultry Products: Preservation and storage of eggs, Grading of eggs, AGMARK standard of egg, Egg powder, Slaughtering and processing of chicken, Marketing of poultry products.

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 schedule for broiler and layers, Debeaking, Candling of eggs, Dissection of bird for showing internal body parts.

3. Dairy Science

UNIT 1.
General: Concept of Dairying, Dairying in India, Dairy development in different five year plans.

UNIT 2.
Dairy production statistics, Cleaning and sanitization of dairy equipment.

UNIT 3.
Dairy cooperatives, Functioning of dairy cooperatives societies, Functioning of Anand Pattern, White revolution, Objectives and achievements of operation flood.

UNIT 4.
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.

UNIT 5.
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.O.B. Test
3. M.B.R. 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.
10. Alcohol test.
11. Acidity of milk.

4. Food Processing and Safety Issues

UNIT 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.

UNIT 2.
Food Processing: Pasteurization, Sterilization, Bactofugation, Uperization, Stassanization, U.H.T. pasteurization and Homogenization of milk, Neutralization of milk, Cream, Cooling and chilling of milk.
UNIT 3.
Manufacturing of common dairy product viz. Cream, Butter, Ghee, Dahi, Yoghart, Shrikhand & Ice-cream.

UNIT 4.
Manufacturing of Khoa, Evaporated milk, condensed milk, WMP, SMP, Paneer, Cheese, Chhena, Cheddar cheese and Mozzarella cheese (Pizza cheese).

UNIT 5.
FOOD SAFETY: Definition, Importance, Scope, Hazards and risks. Food safety management, HACCP, ISO Series, TQM-Concept and need for quality component of TQM. Basic water tests.

Practical
1. Demostration of Cream separation.
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.

5. PRINCIPLES OF FOOD SCIENCE AND NUTRITION 3(2+1) AG-510

UNIT 1.
GENERAL: Definition of food and food science, Composition of food, Foods of animal origin, Digestive system of Ruminants.

UNIT 2.
Definition, Chemistry and Function of Carbohydrate, Fat, Proteins and Water.

UNIT 3.
Requirement, Availability, Functions and Nutritional deficiency disease of minerals and vitamins. Flavours and colours used in food.

UNIT 4.
Food microbiology with special reference to milk, Physico Chemical properties of milk.

UNIT 5.
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.
4. Study of Nutritional deficientic conditions.
5. Study of Nutritional disorders.
6. Quality parameters for egg, meat and chicken.
7. Fat test by Gerbers method.
8. T.S. & S.N.F. percentage by Richmond's scale and formula.
1. Statistical Methods

Theory

Practical

2. Agri-Informatics

Theory
Introduction to Computers, Operating Systems, definition and types, Applications of MS-Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, 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 systems, 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 & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document MS-EXCEL - Creating a spreadsheet,
Comprehension and Communication Skills in English

**Theory**

**Practical**
REMEDIAL COURSES

1. Agricultural Heritage  
**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 modern 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.

2. General Agriculture-I  
2(1+1) AG-110A
Agriculture of Intermediate standard including Agronomy, Soil Science, Horticulture, Plant Pathology

3. General Agriculture-II  
2(1+1) AG-111A
Agriculture of Intermediate standard including Ag Engg, Animal Husbandry and economics

4. Introductory Biology  
2(1+1) AG-110B
**Theory**

5. Elementary Mathematics  
2(2+0) AG-111B
**Theory**
Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines. Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (xj, yj) & (X2,y2)> Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line y = mx + c to the given circle x² + y² = a .**Differential Calculus** : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of xⁿ, eˣ, sin x & cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by
substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form \( y = f(x) \) (Simple problems based on it).

Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order. Properties of determinants up to 3rd order and their evaluation.
NON-GRADIAL COURSES

29. NSS/NCC/Physical Education & Yoga Practices 2(0+2) AG-112A/B/C

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 mobilisation
- Social harmony and national integration
- Volunteerism and shramdan
- Citizenship, constitution and human rights
- 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
- Formulation of production oriented project
- Documentation and data reporting
- Resource mobilization
- Additional life skills
- Activities directed by the Central and State Government

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 III and National Service Scheme IV each having one credit load. The entire four courses should be offered continuously 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 five 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 State Government have to be performed by all the volunteers of NSS as per direction.

SYLLABUS

Semester I

National Service Scheme I Introduction and basic components of NSS: AG-112A

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 GOI, coordination 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

Indian 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

Concept of family, community (PRIs and other community based organisations) and society

Semester I:

National Cadet Corps AG-112B

1. Aims, objectives, organization of NCC and NCC song. DG’s cardinals of 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, formation of squad and squad drill.
9. Command and control, organization, badges of rank, honours and awards
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 essential 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 towards social welfare and family planning.
17. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.
18. Adventure activities
20. Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self defense.

Semester I:

Physical Education and Yoga Practices  
2(0+2) AG-112C

1. Teaching 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 - demonstration, 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 in game 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 of skills of Ball Biadminton - demonstration, practice of the skills, 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 situation
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 importance 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 Tennikoit 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 skills and correction. And 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 correction. 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. Teaching of different field events - demonstration practice of the skills and correction.
   13. Teaching of different field events - demonstration practice of the skills and correction with competition 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 - demonstration practice and correction.
20. Teaching of calisthenics - demonstration practice and correction.
Note: 1) Compulsory Uniform: Half pants, Tee Shirts, Shoes and socks all white (Girls will have white Tee Shirt and Track pants) 2) The games mentioned in the practical may be inter changed depending on the season and facilities.

Human Value and Ethics 1(1+0) AG-210

Theory

ELECTIVE COURSES

1. Agri-business Management 3(2+1) AGE-51

Theory

Practical

2. Agrochemicals 3(2+1) AGE-52

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 maneb. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, 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.

Plant.bio-pesticides for ecological agriculture, Bio-insect repellent.

**Practical**


**3. Commercial Plant Breeding**

**Theory**

Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line 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 breeding: 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/B/R and two line system. Learning 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.
4. Landscaping

Theory

Practical
Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal 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.

5. Food Safety and Standards

Theory

Practical
6. Course title: Biopesticides & Biofertilizers 3(2+1) AGE-56

Theory

Practical

7. Protected Cultivation 3(2+1) AGE-61

Theory

Practical
Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, Inter cultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.
8. Hi-tech. Horticulture

Theory
Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods, Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation 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 2application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

9. Weed Management

Theory

Practical

10. System Simulation and Agroadvisory

Theory
System Approach for representing soil-plant-atmospheric 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

11. Agricultural Journalism

Theory
Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural 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 and magazines: Style and language of newspapers and magazines, parts of newspapers and magazines. The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources. Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures. Illustrating agricultural stories: Use of photographs, use of artwork (graphs, charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.

Practical
Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, layouting. Testing copy with a readability formula. Visit to a publishing office.

12. Composition cum Duck/ (and) Quail/ (and) Rabbit culture.

Fishery: Definition, common characteristics and position of fish in Animal Kingdom, fishery statistics preparation and management 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. Duckry: Definition, common features and advantages, breeds, incubation and hatching feeding of ducks, care and managements of ducking, grower, layer/broiler ducks. Characteristics of duck eggs, common diseases and vaccination schedule, duckry statistics.
Quail: Definition, common features of quail farming, advantages, breeds, incubation and hatching, feeding of quails, care and managements of quail chick, grower/layer/broilers. Quail product technology, common diseases and vaccination schedule.
Rabbitry: Introduction, scope and advantages of rabbit farming, breeds, breeding, housing, care and management of young and adult rabbit, feeds and feeding for rabbits, common problems of rabbitry including vaccination schedule, fur and meat production technology.
1. Fishery units, visit, Demonstration and report formulation.
2. Different type of fishes, deep water, middle water, and surface water.
3. Evaluation of Duck Egg (candling) and Grading.
4. Vaccination schedule for duck and Quail.
5. Preparation Ration for Duck, Quail, Rabbit and Fish.
6. Preparation of different products from eggs.