

Distribution of Courses, Syllabii and Credits for B.Sc. (Hons.) Agriculture

3rd Semester

Sl. No.	Course No.	Title of Course	Credit(s)
1	AGR 201	Crop Production Technology II (<i>Kharif</i> crops)	2(1+1)
2	GPB 202	Fundamentals of Plant Breeding	3(2+1)
3	ACGP 203	Agricultural Microbiology	2(1+1)
4	AEN 204	Pests of Crops and Storage and their Management	3(2+1)
5	PPA 205	Diseases of Field and Horticultural Crops and their Management I	2(1+1)
6	AEC 206	Agricultural Finance and Co-operation	3(2+1)
7	AEX 207	Communication Skills and Personality Development	2(1+1)
8	ACH 208	Chemistry and Application of Crop Protection Chemicals	2(1+1)
9	HORT 209	Production Technology for Vegetables and Spices	2(1+1)
10	AEG 210	Farm Machinery and Power	2(1+1)
11	HVE 211	Human Values and Ethics	1(1+0)**
		Total	23+1**

**NC (Non-Gradual Course)

AGR 201 Crop production Technology II (*Kharif* Crops)

2(1+1)

Theory

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of *kharif* crops:

Cereals: Rice, Maize, Sorghum, Pearl millet and Minor millets

Pulses: Pigeonpea, Mungbean and Urdbean

Practical

Nursery preparation, sowing and transplanting of rice; Field preparation and sowing of *kharif* cereals and pulse crops including inter / mixed cropping; Calculations on seed rate, effect of seed size and sowing depth on germination, seedling vigour of *kharif* field crops; Calculations on fertilizers, top dressing, and foliar feeding of nutrients; Identification of weeds and their control measures; Important intercultural operations and water management in *kharif* crops; Morphological and yield attributing characteristics, estimation of yield, harvesting, threshing, winnowing and storage of *kharif* field crops; Cost of cultivation; Crop distribution in West Bengal and its ecological regions; Study of crop varieties and important agronomic experiments at experimental farms; Visit to research stations for related *kharif* crops and multiple cropping.

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, cultivar options. 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 schemes; 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. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross pollinated crops. Emasculation and hybridization techniques in self & cross pollinated crops. Consequences of inbreeding on genetic structure of resulting populations. Study of male sterility system. Handling of segregation populations. Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiments, analysis of Randomized Block Design. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids.

Theory

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposon. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and sulphur cycles. Biological nitrogen fixation- symbiotic, associative and aysmbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation.

Practical

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

Theory

Stored grain pests, biology, NSD and their management. Insect pests of rice, biology, NSD and their management. Insect pests of wheat, maize, sorghum, ragi, sugarcane, jute, cotton, mesta, sunwomp. Pests of oilseed crops (Ground nut, mustard, castor, gingeshy, sunflower and safflower) NSD and their management. Pests of pulses, biology, NSD and their management. Pests solonaceous, cruciferous, cucurbitaceous, nhindi, colasazia, moringa and amaranths, NSD and their management. Pests of Mango and Banana, their biology, NSD and their management. Pests of citrus, cashew, coconut, coffee, tea, their biology and management. Pests of Grapevine, pomegranate, guava, sapota, ber, apple, tobacco, their biology, NSD and management. Pests of chilli, betelvine, onion, turmeric, coriander, garlic, curry, leaf, pepper, ginger, their biology, NSD and management. Pests of ornamental plants and their management.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.

PPA 205

Diseases of Field & Horticultural Crops & their Management-I

2(1+1)

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 and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, Bajra : ergot; Groundnut: early and late leaf spots, rust, Sclerotium stem rot Soybean: Rhizoctonia blight, bacterial spot, and mosaic; Pigeonpea: Wilt and sterility mosaic; Black & green gram: Cercospora leaf spot and anthracnose, and yellow mosaic; Castor: Phytophthora blight; Tobacco: Leaf curl, damping off and mosaic. Horticultural Crops: Guava: wilt and anthracnose, Pestalotia blight ; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight, Bacterial Wilt ; Tomato: damping off, wilt, early and late blight, leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust.

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 50 pressed and well-mounted specimens.

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 KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practicals

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

AEX 207 Communication Skills and Personality Development

2(1+1)

Theory

Communication Skills: Meaning, Definition and process of communication. Verbal and non-verbal communication, models and barriers to communication. Extension teaching 'Methods': Meaning, classification, individual and group and mass contact method, media mix strategies. Writing Skills, oral presentation skills, individual and group presentations, impromptu presentation, public speaking, group discussion. Organizing seminars and conferences, leader, leadership styles, characteristics of leader and Manager. Stress, Adaptation, Distress and Eustress, Sources of job stress and consequences, Group dynamics and team building, group, group formation, group dynamics. Inter-group relation in organization, team building, nature of team, effectiveness of team. Conflict, levels of conflict, intra and inter personal conflict, organizational conflict, conflict resolution. Motivation, sources of motivation and theories of motivation. Personality: Definition, types, analysis and profiling and development.

Practical

Interactive lecture with AV aids for improving listening skills and note taking of students. Impact analysis of oral presentation skills by using standard format. Writing skills: Directed writing precise, Summary, field report etc., Indexing, footnote and bibliographic procedures etc. Reading and comprehension skills: Testing of pitch, intonation, pause, fidelity and impact analysis. Group discussion, presentations and skill analysis.

ACH 208 Chemistry and Application of Crop Protection Chemicals

2 (1+1)

Theory

Introduction to crop protecting chemicals: definition, history, classification, toxicity and use pattern of Pesticides in Plant Protection; other uses of pesticides. Nomenclature, chemical structure, formulation type and mode of action of some popular pesticides viz. Insecticides [Organo-Chlorines (Endosulfan, HCH), Organo-Phosphates (Chlorpyrifos, Malathion), Carbamates (Carbaryl, Carbofuran), Synthetic Pyrethroids (Allethrin, Cypermethrin)], Fungicides (Carbendazim, Mancozeb) and Herbicides (2,4-D, Glyphosate). Introduction to the chemistry and use of some common Acaricides, Nematicides, Rodenticides, Molluscides, Plant Growth Regulators and Post Harvest Chemicals. Important Name Reactions used in Pesticide Chemistry: Diel's Alder Reaction, Aldol Condensation, Perkin Reaction, Friedel Crafts' Reaction, Grignard Reaction, Michaelis-Arbuzov and Perkow Reaction.

Practical

Identification and familiarizations with the basic apparatus and equipments used in pesticide laboratory; Detection of functional group present in Pesticide Molecule: Phenolic OH, Aldehyde, Ketone, Carboxylic Acid, Primary Aromatic Amine, Ester; Identification of different formulation with toxicological pattern; Estimation of insecticides (Endosulfan, HCH) by hydrolysable chlorine; Estimation of Cu & S present in inorganic fungicides.

HORT(A) 209

Production Technology for Vegetables and Spices

2(1+1)

Theory

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean, Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic; Root crops such as Carrot, Raddish, Beetroot; Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak. Perennial vegetables).

Practical

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Economics of vegetables and spices cultivation.

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.

HVE 211 Human Value and Ethics

(Non-Gradial Course)

1(1+0)

Theory

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination.