

Semester-III

B.Sc.(Honours) Agriculture Semester –III Fifth Dean Committee Syllabus NEP

SEMESTER-WISE DISTRIBUTION OF COURSES

SEMESTER: III

Sl. No. of Paper	Course Code	Course title	Credit hours	Mark Distribution			
				T	I	P	Total
1.	AG-301	Crop Production Technology-1(Kharif crops)	2(1+1)	50	20	30	100
2.	AG-302	Practical Crop Production -1(Kharif crops)	2(0+2)	-	100	-	100
3.	AG-303	Fundamentals of Plant Breeding	3(2+1)	50	20	30	100
4.	AG-304	Agricultural Microbiology	2(1+1)	50	20	30	100
5.	AG-305	Agricultural Finance and Co-Operation	3(2+1)	50	20	30	100
6.	AG-306	Farm Machinery and Power	3(2+1)	50	20	30	100
7.	AG-307	Principles of Integrated Disease Management	3(2+1)	50	20	30	100
8.	AG-308	Environmental Studies & Disaster Management	2(1+1)	50	20	30	100
9.	AG-309	Statistical Methods	2(1+1)	50	20	30	100
10	AG-310	Fundamental of Soil and Water Conservation	2(1+1)	50	20	30	100
11	AG-311	Dairy Science	3(2+1)	50	20	30	100
12	AG-312	Fundamentals of Entomology- II	2(1+1)	50	20	30	100
	Total Credit		29				
T= Theory, I= Internal, P= Practical, Paper =12, Maximum Mark= 1200							

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

Crop Production Technology-1 (Kharif Crops)

2(1+1) 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-pigeon pea, mung bean and urd bean; oilseeds- til, groundnut. and soybean; fibre crops- cotton & jute; forage crops-sorghum. Cow pea, cluster bean and napier.

Practical

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

Mark Distribution		
Theory	Internal	Practical
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Practical Crop Production-I (Kharif Crops)**2(0+2) AG-302****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.

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

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

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross-pollinated crops. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids. Emasculation and hybridization techniques in self & cross-pollinated crops. Consequences of 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 and their analysis in plant breeding experiments.

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

Agricultural Microbiology

2(1+1) AG-304

Theory

Introduction of Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemo autotrophy, photo auto trophy, growth. Bacterial genetics: Genetic recombination-transformation, conjugation and transduction. plasmids, transpose on. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation-symbiotic, associative and a symbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: bio fertilizers, bio pesticides, bio fuel production and biodegradation. Microbial degradation of organic matter in soil. Cellulose decomposing micros for composed preparation & vermin composed. Soil organisms: macro and micro organisms, their beneficial and harmful effects.

Practical

Introduction to microbiology laboratory and its equipments; principles of microscopy. Methods of sterilization. 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. Isolation of BGA. Stain in gand microscopic examination of microbes.

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

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; 4R'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.

Practical

Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire first hand 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.

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

Farm Machinery and Power

3(2+1) AG-306

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.

Practical

Study of different components of I.C. engine. To study air cleaning and cooling system of engine. Familiarization with clutch, transmission, differential and final drive of a tractor, 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.

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

Principles of Integrated Disease Management

3(2+1) AG-307

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 bio control agents, different predators and natural enemies. Identification and nature of damage of important diseases and their management. Plan & assess preventive strategies (IDM module) and decision making, crop monitoring attacked by diseases Farmers fields visit.

Mark Distribution		
Theory 50 Marks	Internal 20 Marks	Practical 30 Marks

Environmental Studies and Disaster Management

2(1+1) AG-308

Theory

Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources. Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation. case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water. floods. drought. conflicts over water, dams- benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture. fertilizer- pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem. Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains. food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries), Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global. National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution 1. Thermal pollution g. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, dies, Wasteland reclamation, Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

Disaster Management

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and

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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 N(it)s, 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.

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Mark Distribution		
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Statistical Methods

2(1+1) AG-309

Theory

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data., Measures of Central Tendency & Dispersion. Definition of Probability. Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions, Definition of Correlation. Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations. Introduction to Test of Significance, One sample & two sample test t for Means. Chi-Square Test of Independence of Attributes in 2 x2 Contingency Table. Introduction to Analysis of Variance. Analysis of One Way Classification. Introduction to Sampling Methods. Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement. Use of Random Number Tables for selection of Simple Random Sample.

Practical

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

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Mark Distribution		
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Fundamental of Soil and Water Conservation **2(1+1) AG-310**

Theory

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

Practical

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

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DAIRY SCIENCE

3(2+1)AG-311

GENERAL : Concept of Dairying, Dairying in India, Dairy development in different five year plans. Dairy production statistics. Cleaning and sanitization of dairy equipment.

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

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

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

Practical

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

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B.Sc. (Honours) Agriculture N E P Semester III Syllabus

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FUNDAMENTALS OF ENTOMOLOGY-II

2(1+1)AG-312

(INSECT ECOLOGY & CONCEPTS OF IPM)

Theory

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

IPM:

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

Practical

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