Course I

Semester II **1+1 =2**

IRRIGATION AND WATER MANAGEMENT

Unit I

Importance of water in crop production. Soil Moisture constants.Water requirement of crops and factors affecting it.

Unit II

Approaches of irrigation scheduling. Systems arid methods of irrigation

Unit III

Quantity and quality of irrigation. Measurement of Irrigation water.

Unit IV

Elementary idea of drainage on farms.

Practical

1. Measurement of irrigation water.
2. Determination of soil moisture content and quality of water.
3. Calculation on consumptive use of water.
4. Numerical exercises on drainage and irrigation requirement.
5. Calculation of irrigation water use efficiency
6. Visit to irrigation and drainage projects.

Course II

Semester II **2+1 =3**

FUNDAMENTALS OF EXTENSION EDUCATION AND RURAL DEVELOPMENT

Unit I

Extension Education:

Meaning, definition, objectives, Principles, Scope, Philosophy and Its distinguishing features. Extension Teaching and Learning, Teaching Elements, Steps In Teaching. Learning, Learning Situation, Basic Principles of Teaching and Learning. Early Extension Efforts in India. Comparative study of Extension Service in India and USA.

Unit II

Community Development:

Meaning, Definition and objectives of Community Development. Organisatlonal setup and Activities of Community development at State, District, Block and Village level. Extension and Rural Development Programmes: Including T & V System, National Demonstration, IRDP, Jawahar Rojgar Yozana.

Unit III

Extension Programme Planning:

Meaning, Principles and Procedure of Programme Planning.

Unit IV

Monitoring and Evaluation:

Definition: purpose, types, criteria and steps involved in monitoring and evaluation.

Practical

1. Practice in Conducting Survey
2. Practice in Preparing schedule and Questionnaire for studying the organisatlonal set up of community development.
3. Contact with the farmers and educating them in new technology of Agrlcultur#
4. Developing programme for a village & a Block
5. Preparation of an outline and practice on evaluation of a programme.
6. Classification, Tabulation and diagrammatic representation of dat&
7. Writing study Reports.

Course III

Semester II **2+1 =3**

ELEMENTARY CROP-PHYSIOLOGY

Unit I

Role of plant physiology in agriculture. Cell structure and function.

Unit II

Physicochemical phenomenon ï diffusion, osmosis and imbibitions. Essential nutrient elements, their role, deficiency symptoms, mineral absorption.

Unit III

Photosynthesis - light and dark reactions. Mechanism of respiration, transpiration

Unit IV

Fat metabolism, synthesis of fatty acids, glycerol and their condensation. Assimilation of nitrogen in plants. Plant growth substances, photoperiodism and verbalization.

Practical

1. Experiments on diffusion, osmosis and imbibitions.
2. Determination of transpiration rate by potometers.
3. Extraction of photosynthetic pigments, separation of chlorophyll ñaò and ñbò and carotenoides.
4. Experiments on factors affecting rate of photosynthesis (Co. light and temperature)
5. Determination of photosynthetic and respiration rates through portable CO_2 gas analyser.

Course IV

Semester II **1+1 =2**

INTRODUCTORY ENTOMOLOGY

Unit I

General Introduction to Phylum-Arthropoda, its various classes and their distinguishing characters with particular reference to class Insecta.

Taxonomy: Insect Classification up to the level of families of agricultural importance of following orders:

Orthoptora	-	Acrididae
Isoptera	-	Termitidae
Hemiptera	-	Coreidae, Pyrrhocoreidae. Lophopidae, Aleurodidae, Jassidse, Aphidae, Coccidae, Lacciferidae,
Coleoptera	-	Dermestidae, Coccinellidae, Bruchidae, Chrisomelidae, Curculiondae, Tenebrionidee, Scarabaeidae;
Lepidoptera	-	Gelechiidae, Pyralididae, Noctuidae, Cymbidae, Papilionidae, Arctiidae and Bombycidae;
Hymenoptera	-	Tenthredinidae and Apidee
Diptera	-	Trypetidae.

Unit II

Insect Morphology: Body wall-structure, composition and functions; Body divisions-Head (Structure and its appendages; structure, functions and modifications of antennae; Mouthparts- Biting and chewing, Piercing and Sucking, Sponging, Siphoning, chewing, and lapping); Thorax - its structure and appendages, modifications and functions of legs and wings, wing coupling apparatus and wing venation; Abdomen - its segments and appendages. Sense organs: Structure and functions of ocelli, compound eye and Johnstonôs organ.

Unit III

Anatomy: Digestive, Excretory, Reproductive, Circulatory, Respiratory and Nervous systems of grass hopper.

Unit IV

Post-embryonic development including ecdycis, instars, types of Larvae and pupae. Different types of metamorphosis.

Practical

1. Dissection of Grasshopper for the study of digestive, reproductive and nervous system.
2. Study and Temporary mounting of external parts of grasshopper.
3. Identification and comments upon the various Arthropods with special reference to class Insecta.
4. Collection and preservation of Insects.
5. Viva-voce and practical records.

Course V

Semester II **1+1 =2**

INTRODUCTORY PLANT PATHOL.OGY

Unit I

Definition and importance of Plant Pathology. Causes of plant diseases. Classification of plant diseases according to cause and occurrence.

Unit II

Fungi: Economic importance and general characteristics. Morphology of different vegetative structures (thallus, mycelium, haustoria, etc.),and Reproduction. Different types of spores. Levels of parasitism, Nomenclature, Classification of fungi with special reference to genera. Life history of Pythium, Albugo, Erysiphe, Ustilago and Puccinia. Diagnostic characters of the following genera: Phytophthora, Peronospora, Sclerospora, Ustilago, Sphacelothica,Tolyposporium, Melampsora, Alternaria, Cercospora, Fusarium Helminthosporium, Pyricularia, Rhizoctonia and Colletotricum.

Unit III

Bacteria: Brief history of bacteria, Morphology and Cell structure.Vegetative reproduction. Brief out line of classification of plant pathogenic bacteria. A brief account of Mycoplasma.

Unit IV

Viruses: Nature and properties.Transmission of plant virus. Phanerogamic plant parasites: Cucuta, Loranthus Orobanche and Striga.

Practical

1. Temporary slide preparation of representative genera of disease causing fungi for morphological studies.
2. Simple staining of bacteria from milk and curd.
3. Preparation of PDA
4. Practical record
5. Viva voce

Course VI

Semester II **3+1 =4**

ELEMENTARY PLANT BIOCHEMISTRY AND CHEMISTRY OF PLANT PRODUCTS AND PLANT ANALYSIS

Unit I

Scope of biochemistry. Carbohydrates - Definition, Classification, Chemistry and Structural formula of the following -a. Monosaccharide's - b. Glucose, c. Fructose, d. Galactose. e. Oligosaccharides - Sucrose, Maltose, Lactose: f. Polysaccharides - Starch, Cellulose, Inulin.

Unit II

Proteins - definition, classification, composition, important functions, Primary and Secondary Structure of protein. Biological significance of proteins. Amino acids - Classification, properties of amino acids, Structure of the following amino acids - Glycine, Tryptophan, Aspartic acid, serine. Histidine, Methionine, proline, Essential and non-essential amino acid, Nutritional significance of amino acids.

Unit III

Lipids - Definition, classification, properties and structural formula of the following saturated fatty acids (Butyric acid, caproic acid, palmitic acid, stearic acid) and unsaturated fatty acid (oleic acid, Linolenic acid, Euric acid). Enzyme - Occurrence, nomenclature, classification, mechanism of action, general properties and factors affecting the rate of enzyme action, co-enzyme-A. Vitamins - Classification, biochemical functions and structural formula of Vitamin A, Thiamine(B_1) , Raboflavin (B_2), Vitamin B_{12},(Cyanocobalamine) Ascorbic acid, Vit. D.

Unit IV

Phytohormones - Occurrence, structure and functions of important plant growth substances viz. Auxins, Gibberellins, cytokinins and Abscisic acid. Alkaloids- Occurrence, classification, uses, general properties and Biological significance of alkaloids. Structural formula of Conine, Nicotine and Papaverine. Nucleic acid - structural formula of Pyrimidines and Purines, Nucleoside and Nucleotides, Watson and Crick model of DNA.

Practical -

1. Qualitative test of important sugars, proteins and alkaloids.
2. Estimation of starch in plants.
3. Estimation of reducing and non reducing sugars in cane juice and jiggery.
4. Separation and identification of amino acid by paper chromatography.
5. Iodometric titration.
6. Estimation of Diastase enzyme in plants.
7. Estimation of Ca by EDTA method.

Course VII

Semester II **3+1 =4**

INTRODUCTION TO AGRICULTURAL AND NATURAL RESOURCE ECONOMICS AND FARM MANAGEMENT ECONOMICS

Unit I

Natural Resource Economic

1. Definition, subject matter and scope of Economics.
2. Micro Economics and Macro Economics within both static and dynamic framework.
3. Definition, subject matter and significance of agricultural economics.
4. Primitive and Scientific Agriculture. Characteristics of Indian agriculture true; major problems including causes of low productivity.
5. Economic Development, role of agriculture. Technological change in agriculture and various inter-relationships.
6. Task of an economic system, role of economic theory in agriculture:

Unit II

Production and Consumption Economic

Basic production problems, production function, productivity curves, relationships thereof, intensity of resource use, law of diminishing returns output-elasticity, homogeneity in production functions.

Theory of demand, demand curves, consumption function, Elasticity, Utility Analysis, Indifference Curve, Consumerôs surplus.

Unit III

Natural Resources

Meaning, Geographical situations, Topography and crops (agro-ecological zones), Temperature and plant growth, Land and land use, culturable waste land, crop rotations, cropping scheme and cropping intensity. Forest - Classification, causes of deforestation. Functions of forests. Forestry programs of the Indian Government. Water - Irrigation sources, progress, Misuse of irrigation water. Application of economic laws to irrigation. Growth and utilization of irrigation potential. Command Area - meaning and Functions of water Managements. Management of irrigation water. Ongoing projects including watershed management program. Utilized groundwater resources.

Unit IV

Farm Management Economics

1. Definition and scope of farm Economics and management.
2. Farm Management and production economics. Agricultural Economics and Industrial Economics - Similarities and differences.
3. Management decisions and cultivators holdings. Economic Principles - their role in farm management. Application of Economic Principles/Laws.
4. Law of Diminishing, Returns/Principle of variable Proportions, Laws return, Scale properties, Law of Equi-mangirial, Returns, Law of substitution, opportunity cost/opportunity Returns, Law of comparative advantage.
5. Production Function, productivity curves, Least Cost combination inputs, Principle of combining Enterprises. Determination of Optimum output.
6. Cost concepts and Principles, Cost Relationships and curves.

7. Time Comparison (Compounding and discounting of costs) Allocation of Over-head and common costs.
8. Profit Maximization.
9. Measures of form profit.
10. Farm Records and Accounts.
11. Methods of valuation and depreciation of assets.
12. Types of farming Diversified, General farm, subsistence or Marginal farming, specialized farms, Mixed farming, Ranching and Dry farming.
13. Systems of Farmin9 Cooperative farming, Peasant farming. State farming, Collective farming, and capitalistic farming.
14. Tools of Farm Management: Farm Budgeting (Complete and partial budgeting) and farm planning, Linear Programming (Graphical method).
15. Definition of Institute and University Types of uncertainty In agriculture (Price uncertainty, yield uncertainty, Innovation uncertainty Social and legal frame as a source of uncertainty). Diversification (complementary and supplementary relationships) as a mechanism to minimize uncertainty), crop and cattle insurance, pump set insurance Arguments for and against.

Practical

1. Socio-economic survey and collection of data, classification and tabulation with special reference to natural resources of a village.
2. Study of a farm holding (resources, enterprises, costs, profit and complete farm economy) of the allotted farmer by cost-Accounting method.
3. Preparation of an alternative farm plan for the farmer.
4. Submission of Report.