Annexure-2
Syllabus / Key topics

1. AGRICULTURE

1.	Fundamentals of Agronomy, Soil Science, Horticulture, Plant Biochemistry and Biotechnology, Genetics, Entomology, Microbiology, Fundamentals of Agricultural Economics, Soil and Water Conservation Engineering, Plant Pathology, Agricultural Extension Education and Crop Physiology Crop Production Technology – for Rabi and Kharif Crops, Farming System & Sustainable Agriculture Fundamentals of Plant Breeding, Agricultural Finance and Cooperation, Agri- Informatics, Farm Machinery and Power, Production Technology for Vegetables and Spices. Environmental Studies and Disaster Management, Livestock and Poultry Management, Principles of Integrated Pest and Disease Management, Manures, Fertilizers and Soil Fertility Management, Pests of Crops and Stored Grain and their Management, Diseases of Field and Horticultural Crops. Crop Improvement- for Rabi and Kharif Crops, Entrepreneurship Development and Business Communication, Geo-informatics and Nano-technology and Precision Farming, Practical Intellectual Property Rights, Introductory Biology*/Elementary Mathematics*, Rural Sociology & Educational Psychology, Agricultural Heritage, Statistical Methods Production Technology for Ornamental Crops, MAP and Landscaping Renewable Energy and Green Technology Problematic Soils and their Management Production Technology for Fruit and Plantation CropsPrinciples of Seed Technology

	Agricultural Marketing Trade & Prices Introductory Agro-meteorology & Climate Change Rainfed Agriculture & Watershed Management Protected Cultivation and Secondary Agriculture Diseases of Field and Horticultural Crops and their Management-II Post-harvest Management and Value Addition of Fruits and Vegetables Management of Beneficial Insects Crop Improvement- for Kharif and Rabi crops Principles of Organic Farming Farm Management, Production & Resource Economics Principles of Food Science and Nutrition Protected Cultivation Hi-tech. Horticulture Landscaping System Simulation and Agro-advisory Agricultural Journalism Orientation and Survey of Village Agronomical Interventions Plant Protection Interventions Soil Improvement Interventions (Soil sampling and testing) Fruit and Vegetable production interventions Food Processing and Storage interventions Animal Production Interventions Extension and Transfer of Technology activities Production Technology for Bioagents and Biofertilizer Seed Production and Technology Mushroom Cultivation Technology Soil, Plant, Water and Seed Testing Commercial Beekeeping Poultry Production Technology Commercial Horticulture Floriculture and Landscaping Food Processing Agriculture Waste Management Organic Production Technology

	Agrochemicals Commercial Plant Breeding Landscaping Food Safety and Standards Bio-pesticides & Bio-fertilizers Micro propagation Technologies Weed Management

2. B.Sc. Agricultural Engineering (Key Topics)

- **Fundamentals of Soil, Water & Conservation Engineering Surveying:**

Survey equipment, calculations of area of regular and irregular fields. Levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring. Hydrologic cycle. Concept of watershed, Runoff estimation and measurement, Water measurement - weirs, flumes and orifices and methods of water measurement and instruments. Concept of soil erosion. Universal soil loss equation. Erosion control structures for agricultural Lands i.e contour bunding, graded bunding, broad base terraces, bench terraces, diversion drains and grassed waterways. Erosion control structures for non agricultural lands and temporary gully control structures. Design of rain water harvesting systems in hills including earthen embankments and small tanks.

- **Farm Power and Machinery**

Status and need of hill mechanization, different sources of farm power in India, I.C engines, working principles, two stroke and four stroke engines, I.C. engine terminology, different systems of I.C. engine. Tractors and power tillers, Types, Selection of tractor and cost of tractor power and power tiller power. Tillage implements: Primary and Secondary tillage implements, Implements for intercultural operations, seed drills, paddy transplanters, plant

- **Protected Cultivation and Post Harvest Technology**

Green house technology, Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of greenhouse for cooling and heating purposes. Green house equipment, 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. Cost estimation and economic analysis. Choice of crops for cultivation under greenhouses, problems / constraints of greenhouse cultivation and future strategies. Threshing, threshers for different crops, parts, terminology, care and maintenance. Maize shellers. Drying, grain drying, types of drying, types of dryers. Storage, grain storage, types of storage structures. Fruits and vegetables cleaning, machinery for cleaning of fruits and vegetables, care and maintenance. Grading, methods of grading, equipment for grading of fruits and vegetables, care and maintenance. Size reduction. equipment for size reduction care and maintenance.

- **Renewable Energy Sources**

Energy sources, Introduction, classification, energy from biomass, types of biogas plants, constructional details, biogas production and its utilization, agricultural wastes, Principles of combustion, pyrolysis and gasification, types of gasifiers, producer gas and its utilization. Briquettes and uses of Briquettes, solar energy, solar flat plate and focussing plate collectors, solar air heaters, solar

solar lantern, solar street lights, solar fencing, solar pumping systems. Wind energy: types of wind mills, constructional details & application of wind mills. Hydraulic ram. Liquid Bio fuels, bio diesel and Ethanol from agricultural produce, its production & uses.

3. BOTANY (Key Topics)

Development of Microbiology, Eubacteria and Archaebacteria, Plant Viruses and Viroids, Animal Viruses, Bacteriophages and Prions, Microbial applications and interactions
Classification, Distinguish features, Diversity, marphogenesis of Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
Chromatin organization, Numerical alterations in the genome, Genetic recombination and gene mapping, Gene structure, expression and sudden changes, Cytogenetics of higher plants
Plant growth, development and cellular organization, Fundamental tissues, types and constituent cells, Meristems and vascular tissues-components and composition, Physiological and genetic control of leaf and root formation, Histology of the stem and roots
Plant cell; its envelope and unique features, Cytoskeleton and Cell organelles, Nucleus and its contents including structure and function of DNA, RNA and Proteins-structure, synthesis and function, Cell cycle and cell death, Chromatin organization, Numerical alterations in the genome, Genetic recombination and gene mapping, Gene structure, expression and sudden changes, Cytogenetics of higher plants
Plant Breeding: Introduction, genetic background and selection methods, Breeding methods and crop improvement, Data collection, presentation and descriptive statistics, Probability distributions and various tests of significance, Experimental designs, analysis of data and their significance
Plant Resource Utilization, Plant Resource Utilization, Extinction and Conservation, In-site/ off site conservation practices and conservation enactments
Food and fodder, Horticulture and floriculture, Medicinal and aromatic plants (MAPs), Vegetable oil and sugar industry, Plant fibres, natural dyes and paper industry
Ecosystem ecology, Population ecology, Community ecology, Ecologicalconcerns and solutions, Adv...

Reproductive modes in flowering plants; Genetics of sexuality, Male and female gametophytes; Pollen biology, Pollination and Breeding systems, Pollen pistil interaction and fertilization, Fruit and seed
Enzymology and its role in life processes, Photobiology and signal transduction, Plant hormone signaling and perception, Photochemistry and photosynthesis, Respiration, nitrogen and Sulphur metabolism
Characteristic features of fungi, Classification, diversity and significance of fungi, Disease inoculum and pathogenesis, Host defense mechanisms and chemical weapons of the pathogens, Management of plant diseases
Recombinant DNA technology, Genetic engineering of plants and microbes, Genomics and proteomics, Plant tissue culture and organogenesis, Somatic hybridization, micropropagation, variant selection and secondary metabolite production
Seed production in plants, Modes of vegetative propagation, Breeding systems and methods, *in vitro* multiplication, Micropropagation and its utility