

Part B - Syllabus

AGRICULTURE (AGR)

Crop Production, Physiology and Horticulture: Principles of agronomy: tillage, crop geometry, nutrient and irrigation management, weed management, cropping systems and climate-resilient farming; production of major cereals, pulses and oilseeds. Plant–water relations, mineral nutrition, photosynthesis, respiration, plant growth regulators and responses to abiotic stress. Principles of horticulture: propagation, protected cultivation, and production and post-harvest management of fruit, vegetable, ornamental and medicinal crops.

Genetics, Breeding, Biochemistry and Biotechnology: Mendelian inheritance, linkage, mutation and basic quantitative genetics; principles of selection, hybridisation, heterosis, marker-assisted and genomic breeding, genome editing (CRISPR) and seed quality. Structure and function of biomolecules and enzymes; nitrogen metabolism, plant hormones and secondary metabolites. Plant tissue culture: callus culture, organogenesis, somatic embryogenesis and micropropagation; plant genetic transformation, transgenic and genome-edited crops, germplasm conservation and applications in crop improvement.

Soil, Microbiology and Plant Protection: Soil properties (water, organic matter, pH, EC, ion exchange); essential nutrients, deficiency symptoms, manures, fertilisers, soil testing and integrated nutrient management; problem soils; organic and sustainable farming. Soil and rhizosphere microbiology, nutrient cycling, nitrogen fixation, plant–microbe interactions, bio-fertilizers and biopesticides. Plant pathogens, disease cycle, epidemiology, diagnosis and integrated disease management; crop and stored-grain pests, integrated pest management and beneficial insects (pollinators, parasitoids, predators, honeybee, silkworm and lac insect)

Agricultural Informatics and Emerging Technologies: Computer fundamentals, spreadsheets, databases and agricultural data handling. Applications of bioinformatics, remote sensing, GIS, GPS, sensors, drones, artificial intelligence and precision farming in soil and crop mapping, crop monitoring and decision support. Applications of nanotechnology in agriculture including nanofertilisers, nanopesticides and nanosensors.

Food Science, Nutrition and Value Addition: Food composition and nutritive value; balanced diet and nutritional quality. Food microbiology, spoilage, preservation, processing, packaging, safety and quality; post-harvest losses and value addition of agricultural and horticultural produce; functional foods and nutraceuticals.