

Syllabus for entrance test of Ph. D. in Soil Science & Agricultural Chemistry

Syllabus:

Soil definition and types; Soil texture, textural classes, mechanical analysis; Soil structure - genesis, types, characterization and management soil structure; soil aggregation, aggregate stability; soil crusting - mechanism, factors affecting and evaluation; soil conditioners; puddling, its effect on soil physical properties.

Soil water: content and potential, soil water retention, soil-water constants, measurement of soil water content, energy state of soil water, soil water potential, soil-moisture potential. Water flow in saturated and unsaturated soils and laws influencing the water flow in soils; Infiltration; field water balance; soil-plant-atmosphere continuum.

Soil fertility and soil productivity; essential plant nutrients - functions and deficiency symptoms. Nitrogen, phosphorus and potassium dynamics in both soil and plants; Nutrient sources - Fertilizers and manures; Micronutrients -critical limits in soils and plants; factors affecting their availability and correction of their deficiencies in plants; role of chelates in nutrient availability.

Soil fertility evaluation –Laws and methods; soil quality in relation to sustainable agriculture. Common soil test methods for fertilizer recommendations; quantity- intensity relationships; soil test crop response correlations and response functions. Fertilizer use efficiency; integrated nutrient management.

Soil colloids: inorganic and organic colloids - origin of charge, concept of point of zero-charge (PZC) surface charge characteristics of soils; soil organic matter - fractionation of soil organic matter and different fractions, clay-organic interactions; ionic equilibria; chemical kinetics; Ion exchange processes in soil; adsorption isotherms, ligand exchange, AEC, CEC and chemistry of sub-merged soil.

Soil biota, soil microbial ecology, types of organisms in different soils; soil microbial biomass; microbial interactions; soil characteristics influencing growth and activity of microflora; Microbial transformations of nutrients in soil; biochemical composition and biodegradation of soil organic matter and crop residues, humus formation.

Weathering of rocks and mineral; soil formation, soil forming processes and its factors and soil classification.

Erosion and Environmental pollution-types, factors influencing and their management.

Introduction and history of remote sensing; Application of remote sensing techniques classical and geo-statistical techniques of evolution of soil variability.

