

AGRICULTURAL ENGINEERING - SOIL AND WATER ENGINEERING

Hydrologic processes and systems; hydrologic problems of small Watersheds; hydrologic characteristics of watersheds. Measurement and analysis of hydrologic parameters, rainfall- runoff Models, stream flow measurement and analysis of data. Hydrograph analysis; unit hydrograph theory; synthetic and dimensionless hydrograph, convolution of unit hydrograph. Concept of hydraulic flood routing, flood routing (reservoir and channel Routing). Definition and concept of different types of hydrologic models for Simulation of hydrologic problems.

Concepts of irrigation; irrigation principles, losses, conveyance, distribution; Application, scheduling parameters, water budgeting. Surface irrigation, hydraulics of water advance and recession, hydraulic resistance to flow, gravity irrigation. Design of border irrigation, furrow irrigation, check basin irrigation; Sub-irrigation methods and concepts. Preliminary design criteria of sprinkler and micro irrigation systems, hydraulics of sprinkler and micro irrigation systems. Design of lateral, submain and main Line of sprinkler and micro irrigation. Fertigation aspects. Underground Water Conveyance System; Evaluation of irrigation systems and practices.

Theories and applications of surface and sub-surface drainage, steady state, Unsteady state drainage equations for layered and non-layered soils, Horizontal sub-surface drainage. Principle and applications of Earnst, Glover Dumm, Kraijenhoff-Van-De-Leur equations. Salt balance, leaching requirement and management practices under Drained conditions. Design of different components of sub-surface drainage systems, theories of vertical drainage and multiple well point system. Disposal of drainage effluents, management of drainage projects of waterlogged and saline soils, case studies.

Properties affecting groundwater storage and movement, groundwater balance studies. Well hydraulics, two dimensional flow, steady and unsteady state flow in Confined, unconfined and semi-confined aquifers, steady flow in sloping aquifers, partial penetrating wells. Analysis of multi-aquifers. Flow analysis in interfering wells. Pumping tests and determination of aquifer parameters. Groundwater modeling for water resources planning. Techniques for groundwater recharge.