

COMPUTATIONAL METHODS IN HYDRAULICS AND HYDROLOGY

2-0-3-0-9

Basic: Introduction to computer programming and computation with Matlab. (02 lectures) Open channel flow: Estimation of normal and critical depth; uniform flow computations; computation of water surface profile (WSP) gradually varied flow estimation using standard step and direct step methods, WSP in presence of hydraulic structures; unsteady flow Saint Venant equation, kinematic wave routing, diffusion routing, overland flow; steady and unsteady modelling using HECRAS. (07 lectures) Closed conduit flow: Steady and unsteady state modelling; pipe network analysis; introduction to EPANET/WaterCAD. (05 lectures) Surface water hydrology: Estimation of Unit hydrographs; lumped and distributed flow routing; hydrologic statistics parameter estimation, time series analysis, frequency analysis, geostatistics; hydrologic modelling using HECHMS. (05 lectures) Groundwater hydrology: Solving groundwater flow equation saturated and unsaturated flow, Richard's equation, Green-Ampt infiltration model; introduction to MODFLOW. (05 lectures) Application of soft computing methods and GIS in Hydraulic and Hydrologic modelling. (03 lectures) Laboratory: Programming exercises for the related topics. (10 lab classes)