

TRAINING COURSE
ON
**SOFTWARE FOR GROUND
WATER DATA MANAGEMENT**

UNDER
WORLD BANK FUNDED HYDROLOGY PROJECT

LECTURE NOTES
VOLUME - 2

ORGANISED BY



आये हि एव मयेभुवः

NATIONAL INSTITUTE OF HYDROLOGY
ROORKEE - 247 667, INDIA

CONTENTS

Module	Page
9 PROCESSING OF GROUNDWATER DATA	1-20
● Introduction	
● Estimation of the Missing Data	
● Data Interpolation	
● Correlation and Regression	
● Probabilistic Distributions	
10 PUMP-TEST DATA AND DETERMINATION OF AQUIFER PARAMETERS	1-25
● Introduction	
● Aquifer parameters	
● Pump-Tests	
● Performance of a Pumping Test	
● Methods of Analysing Pumping Test Data	
● Aquifer Parameters Using Marquardt Algorithm	
11 GROUNDWATER BALANCE	
UNIT-1	1-12
● Recharge From Rainfall & Irrigation Return Flow	
UNIT-2	1-10
● Seepage from a Canal	
● Steady Seepage from a Canal	
● Unsteady Seepage from a Canal	
UNIT-3	1-12
● Stream Aquifer Interaction	
● Introduction	
● Steady Flow between a Stream and an Aquifer	
● Unsteady Flow between a Stream and an aquifer	
12 TIME SERIES ANALYSIS	1-21
● Introduction	
● Classification of Time Series	
● Components of a Time Series	
● Characteristics of Time Series	
● Trend Analysis	
● Time Series Modelling	

13 NETWORK DESIGN 1-16

- Introduction
- Groundwater Regime Monitoring
- Groundwater Regime Monitoring in India
- Groundwater Monitoring Network design

14 GROUNDWATER DATA HANDLING SOFTWARE 1-18

- Introduction
- United Nations Groundwater Software
- Hardware Requirements
- Software Requirements
- Installation
- Permeability Calculations and Conversions
- Ground Water Chemistry
- Pumping Tests
- Well Hydraulics and Well Construction
- Water Level Data Base and Hydrographs
- Well Logs and Lithological Cross-sections
- Graphics
- Units

15 GROUNDWATER MODELLING SOFTWARES

UNIT-1 1-22

- Overview of Groundwater Modelling Softwares
 - Introduction
 - Modelling Equations
 - Modelling Approach
 - Survey of Groundwater Models
 - Adopting a model

UNIT-2 1-13

- Application of MODFLOW
 - Introduction
 - Model Formulation
 - Description of Various Packages
 - Application

UNIT-3 1-20

- Application of MODINV
 - Introduction
 - MODINV Software
 - MODINV Processing Steps

	UNIT-4	1-14
	<ul style="list-style-type: none"> ● Block Level Water Balance <ul style="list-style-type: none"> ● Introduction ● Methodology ● Software for Block Groundwater Balance 	
	UNIT-5	1-10
	<ul style="list-style-type: none"> ● Software for Groundwater Flow in Hardrock Region <ul style="list-style-type: none"> ● Introduction ● Sandia Waste-Isolation Flow and Transport Model for Fractured Media (SWIFT III) ● Numerical Simulation of fluid Flow in a Two-Dimensional Discrete Fracture Network: Program NETFLOW 	
	UNIT-6	1-12
	<ul style="list-style-type: none"> ● Groundwater Quality Modelling <ul style="list-style-type: none"> ● Introduction ● Synthesis ● Simulation Techniques ● SUTRA 	
16	SYSTEM FOR STORAGE, PROCESSING AND RETRIEVAL OF HYDROLOGICAL DATA (HYMOS)	1-53
	<ul style="list-style-type: none"> ● General Overview ● Data Storage, Retrieval and Processing ● Time Series, Time Intervals and Time Labels ● Menus and Function Keys ● Databases ● Catchment Data ● Processing of Rainfall Data ● Climatological Data ● Water Level Data ● Stage Discharge Data ● Discharges 	
