Ground Water Hydrology - Web course

COURSE OUTLINE

This course has been designed to introduce groundwater hydrology to the graduate and undergraduate students of engineering colleges and universities.

The course has altogether 45 lectures which will cover all the aspects of groundwater hydrology, such as assessment, development and management.

Example problems including its solution will be incorporated for easy understanding of the physical and mathematical concepts of groundwater hydrology.
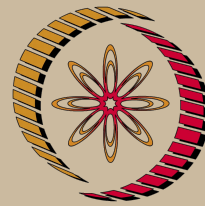
Some real world example problems are also been incorporated to give an idea about the complexities and challenges encountered during the modeling and management of groundwater processes.

Contents:

Introduction to groundwater hydrology and role of groundwater in water resources system and management, movement of groundwater through saturated and unsaturated porous media, well hydraulics, groundwater management and groundwater transport process.

COURSE DETAIL

Sl. No.	Topic	No. of Hours
1	**INTRODUCTION** Characteristic of ground water, Global distribution of water, Role of groundwater in water resources system and their management, groundwater column, aquifers, classification of aquifers. Hydrogeological cycle, water level fluctuations, Groundwater balance.	05
2	**MOVEMENT OF GROUNDWATER** Darcy's Law, Hydraulic conductivity, Aquifer transmissivity and storativity, Dupuit assumptions Storage coefficient - Specific yield Heterogeneity and Anisotropy, Direct and indirect methods for estimation of aquifer parameters. Governing equation for flow through porous medium - Steady and unsteady state flow - Initial and boundary conditions, solution of flow equations.	12
3	**WELL HYDRAULICS** Steady and unsteady flow to a well in a confined and unconfined aquifer - Partially penetrating wells - Wells in a leaky confined aquifer - Multiple well systems - Wells	10

	near aquifer boundaries - Hydraulics of recharge wells.	
4	**GROUNDWATER MANAGEMENT** Dynamic equilibrium in natural aquifers, groundwater budgets, management potential of aquifers, safe yield, seepage from surface water, stream-aquifer interaction, artificial recharge.	09
5	**GROUNDWATER TRANSPORT PROCESS** Hydrodynamic dispersion - occurrence of dispersion phenomena, coefficient of dispersion - Aquifer advection dispersion equation and parameters - initial and boundary conditions - method of solutions, solution of advection dispersion equation.	09

References:

1. Bear J., Hydraulics of Groundwater, McGrow-Hill International, 1979.

2. Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000.

3. Driscoll, F., Groundwater and Wells, St. Paul, Minnesota, II Ed., 1986.

4. Raghunath H.M., Ground Water Hydrology, Wiley Eastern Ltd., Second reprint, 2000.

5. Willis, R. and W.W.G. Yeh, Groundwater Systems Planning and Management, Prentice-Hall, 1987.

6. Bear J., Dynamics of fluids in porous media, American Elsevier publishing co., inc, 1972.

7. C. Walton, Groundwater Resources Evaluation, McGraw Hill, 1970.

8. O.D.L. Strack, Groundwater Mechanics, Prentice Hall, 1989.

9. S.P. Garg, Groundwater and Tube Wells, Oxford & IBH Publishing Co., 1993.