

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NMCD533	Solute Transport Modelling	3	0	0	3
Course Objective						
<ul style="list-style-type: none"> The objective of the course is to make an exposure of Solute Transport Mechanism and its impact to address groundwater contamination problems 						
Learning Outcomes						
Upon successful completion of this course, students will:						
<ul style="list-style-type: none"> able to handle the groundwater contamination problems through various mathematical techniques 						

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Groundwater contamination: Occurrence of Groundwater, Sources of Groundwater Contamination and its types. Geological formations and its Types, Properties of Geological formations.	10	Knowledge about groundwater sources of contamination and geological properties.
2	Solute Transport: Transport Mechanism, Advection, Diffusion, Dispersion, Ficks Law of Diffusion, Hydrodynamic Dispersion and its equation, Dispersion Theory.	10	Knowledge about transport mechanism and associated laws govern to deal with advection-dispersion equation.
3	Mathematical Approaches: Analytical, Semi-analytical and Numerical approaches, Transform Techniques, Homotopy Analysis Methods, Finite Difference Methods, Finite Element Methods.	10	Knowledge about various mathematical approaches to deal with solute transport problems.
4	Hydrodynamics dispersion problems with concentration type, Flux type and Mixed type boundary conditions, Analytical, Semi-analytical and Numerical solutions.	10	Knowledge about transformation of the physical model into mathematical model and their solutions.
5	Error Analysis	02	Knowledge about error analysis in the outcome of the model and their solutions
Total		42	

Text Books:

1. Batu, V., Applied flow and solute transport modeling in aquifers: Fundamental principles and analytical and numerical methods, CRC, Boca Raton, FL, 2006

Reference Books:

1. J. Bear, *Dynamics of fluids in porous media*, American Elsevier, New York., 1972
2. D. K. Todd, and L. W. Mays, *Groundwater Hydrology*. 3rd Edition, John Wiley & Sons, 2005