8CE171 Groundwater Engineering

L-T-P-Cr: 3-0-0-3 Objective: Students will be imparted upon knowledge of the formation of the aquifer and its properties, flow through porous media and its applications in Civil Engineering.

Theory: 1. Introduction: Ground water development in India, Soil moisture, Classification of subsurface water. 4 Lectures

2. Characteristics of fluid and the Medium, Specific yield, Porosity, Storage co-efficient, Permeability, Compressibility, Aquifers, Classification of aquifer. 5 Lectures

3. Darcy’s law, Range of validity of Darcy’s law, Co-efficient of permeability, Determination of permeability. 4 Lectures

4. General Hydrodynamics: Equations for the flow of Fluids through Porous media. The Equation of continuity, Equations of motion, Dupuit’s equations for unconfined seepage flow, Plane free surface flow with horizontal impervious base without infiltration, Plane free surface flow with horizontal impervious boundary with infiltration and evaporation, Confined and semi-confined flow.

10 Lectures

5. Unconfined flow towards well with uniform infiltration from the ground surface, Confined radial flow towards the well, Discharge as a function of drawdown, well efficiency, Radius of influence, Lowering of ground water table, Unsteady confined flow, well losses. 8 Lectures

6. Design and construction of different types of wells. 4 Lectures

7. Geophysical Investigations: Surface geophysical techniques, Electrical resistivity, Seismic refraction and reflection, other methods. 4 Lectures

8. Ground Water Quality: Ground Water sampling, potable water standards of WHO& BIS. 3 Lectures

Text Books: 1. M.H. Raghunath, Groundwater Hydrology, New Age Publication, New Delhi. 2. Charles Fitts, Groundwater Science, Academic Press. 3. V.C. Agarwal, Groundwater Hydrology, PHI. Reference Books: 1. Todd, David Keith (2007), Ground Water Hydrology, Wiley India Edition, New Delhi-110002. 2. Charles Fitts, Groundwater Science, Academic Press. 3. Bear, J., Hydraulics of Groundwater, McGraw Hill, New York. 4. Freeze and Cherry, Groundwater Hydrology.

Expected Outcome: Students will be able to understand and use basic equations of flow through porous media and its applications.