BACHELORS WITH WATER MANAGEMENT AS MAJOR (CT – I)
2nd SEMESTER

WMG224J WATER MANAGEMENT _ HYDROLOGY AND HYDRAULICS

CREDITS: THEORY: 4, PRACTICAL:2

COURSE OUTCOME:

The purpose of this course is to provide an introduction to the basic physical concepts behind hydrology & fluid mechanics and techniques used in analysis of fluid flow and fluidic systems.

UNIT I: HYDROLOGY

Concept and scope of hydrology, Hydrological cycle: Evaporation: Process, Factors effecting evaporation, Measurement of evaporation, Transpiration: process, Factors affecting transpiration, Condensation: Process and measurement, Precipitation: Process, Types and forms, Measurement and distribution.

UNIT II: SURFACE WATER HYDROLOGY

Runoff cycle and its components, Factors effecting runoff, Measurement of Runoff, Water balance equation, Stream flow measurement, Base flow, Hydrograph: Types, component and its applications

UNIT III: GROUNDWATER HYDROLOGY

Aquifer and types of aquifers, Vertical distribution and movement of groundwater (Darcy's Law), Groundwater and well hydraulics: Steady and unsteady unidirectional and radial flow in different aquifers, Water wells: construction of shallow (Dug and Bored) and deep well (Cable tool and Rotatory).

UNIT IV: FLUID KINETICS AND DYNAMICS

Basis of Hydraulics, Fluid and its Properties: Mass Density, viscosity, Vapour Pressure, Specific gravity, Surface tension & Capillarity, Fluid Types: steady and unsteady flow, laminar, turbulent flow, uniform and non-uniform flow, Bernoulli's Equation and its application

PRACTICAL:

1. Verification of Bernoulli's Theorem, Calibration of Venturimeter,
2. Measurement of precipitation and evaporation
3. Measurement of flow and discharge of stream/spring
4. Estimation of flood using unit hydrograph
5. Computation of rate of infiltration using infiltrometer
6. Determination of capacity of well.
7. Calculation of capacity of power of a hydro-power plant
8. Estimation of recharge through water balance equation

SUGGESTED READINGS:

1. Bansil, P.C. 2004. *Water Management in India*. Concept Publishing Company, India. Brebbia, C.A. 2013. *Water Resources Management VII*. WIT Press.
2. Fluid Mechanics, 7th Edition, Frank M. White, McGraw Hill
3. CEA. 2011. *Water Resources and Power Maps of India*. Central Board of Irrigation & Power.Grumbine, R.E. and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science* 339:36-37.
4. Loucks, D.P., Stedinger, J.R. & Haith, D. A. 1981. *Water Resource Systems Planningand Analysis*. Englewood Cliffs, NJ, Prentice Hall.
5. Mays, L.W. 2006. *Water Resources Sustainability*. The McGraw-Hill Publications.
6. Schward and Zhang, 2003. *Fundamentals of Groundwater*. John Willey and Sons.
7. Souvorov, A. V. 1999. *Marine Ecologonomics: The Ecology and Economics ofMarine Natural Resource Management*. Elsevier Publications.
8. Vickers, A. 2001. *Handbook of Water Use and Conservation*. Water Plow Press.
9. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev.,Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

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