

ENVIRONMENT AND WATER MANAGEMENT**Semester III (2018-19)**

Course Code UGEWM17DC301

Course Title: Hydrology

Total Credits: 06

Max. Marks: 90 (theory=60, Lab. Course=30)

Credit-I: Hydrology & Hydrological Cycle**15 hours**

- 1.1 Concept and scope of hydrology
- 1.2 Evaporation: process, factors affecting evaporation, measurement of evaporation
- 1.3 Transpiration: process, factors affecting transpiration
- 1.4 Condensation: process and measurement
- 1.5 Precipitation: process, types and forms, measurement and distribution

Credit-II: Runoff and Ground water**15 hours**

- 2.1 Runoff cycle and its components
- 2.2 Factors affecting runoff
- 2.3 Measurement of runoff, stream gauging, stream hydrograph
- 2.4 Vertical distribution of ground water.
- 2.5 Aquifers and aquifuge, Geology of aquifers, types of aquifers (confined and unconfined aquifers). aquifer parameters (porosity, specific yield, storage coefficient, permeability, transmissivity)

Credit-III: Global water resources**15 hours**

- 3.1 Water as a resource material: consumptive, partial consumptive and non-Consumptive uses of water
- 3.2 Global water budget
- 3.3 Global per capita water demands
- 3.4 Geographical limitations to water availability
- 3.5 Potable water scarcity based on economic viability

Credit-IV: Fluid Mechanics**15 hours**

- 4.1 Properties of fluids: viscosity and surface tension
- 4.2 Kinematics and Dynamics of Fluid flow :
 - 4.2.1 Types of flow lines, Types of Fluid flow, Rate of flow (discharge), Continuity equation for one and three-dimensional flow.
 - 4.2.2 Energy equation (Bernoulli's theorem). Venturi-meter.
- 4.3 Laminar and Turbulent Flow:
 - 4.3.1 Reynolds Experiment, Hagen Poiseuille's formula for laminar flow in pipes
 - 4.3.2 Darcy Weisbach equation for loss of head due to friction in pipes.
- 4.4 Flow through pipes and open channels
 - 4.4.1 Loss of energy in pipes, calculation of flow velocity (Chezy's formula) and head losses.
 - 4.4.2 Types of channels: Classification of flow in channels, open channels (uniform flow) flow velocity, and Chezy's constant discharge theory.

Laboratory Course**Credit V and VI**

- 1. Flow visualization
- 2. Determination of flow velocity.
- 3. Determination of Permeability and porosity.
- 4. Measurement of discharge in an open laboratory channel
- 5. Measurement of discharge in a pipe-using orifice meter / Venturi meter.
- 6. Determination of resistance co-efficient in a uniform channel flow and in a pipe flow.
- 7. Measurement of discharge, and calculation of seepage loss in a canal reach.
- 8. Lysimeter experiment on the site.
- 9. Measurement of pan evaporation and its comparison with Penman equation.
- 10. Spring and stream order classification