

### 3/4 B.Tech. FIFTH SEMESTER

**CE5T3**

**WATER RESOURCES ENGINEERING-I**

**Credits: 4**

**Lecture: 4 periods/week**

**Internal assessment: 30 marks**

**Tutorial: 1 period /week**

**Semester end examination: 70 marks**

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#### **Objectives:**

- To become conversant with principles and practice of Irrigation engineering.
- To be aware of the occurrence, movement and augmentation of surface water and ground water.

#### **Learning outcomes:**

At the end of the course the student will have:

- An understanding of the need and importance of irrigation and also knows the irrigation management practices.
- Knowledge on the various components of hydrologic cycle and the availability of water resource for planning its development.

#### **UNIT I**

##### **INTRODUCTION:**

Engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, and computation of average rainfall over a basin, processing of rainfall data.

#### **UNIT-II**

##### **RAINFALL:**

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapotranspiration-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices. Runoff-components of runoff, factors affecting runoff, stream gauging, effective rainfall, separation of base flow.

#### **UNIT-III**

##### **HYDROGRAPH:**

Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph.

#### **UNIT-IV**

##### **FLOOD ROUTING:**

Design Discharge, Computation of design discharge-rational formula, SCS method, flood frequency analysis-Gumbel's method, log Pearson III method, basic concepts of flood routing-hydraulic and hydrologic routing, channel and reservoir routing.

#### **UNIT-V**

##### **GROUND WATER:**

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers.

#### **UNIT-VI**

##### **IRRIGATION:**

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation, standards of quality for Irrigation water.

#### **UNIT-VII**

##### **SOIL-WATER-PLANT RELATIONSHIP:**

Vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies

#### **UNIT-VIII**

##### **CANALS:**

Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining.

### **Learning resources**

#### **Text books:**

1. A text book of Engineering Hydrology, (3<sup>rd</sup> edition) by Jayarami Reddy, Bangalore University Science Press, 2011.
2. Irrigation and water power engineering, (16<sup>th</sup> edition) by Punmia, B.C. Laxmi Publications pvt. Ltd., New Delhi, 2010.

#### **Reference books:**

1. Elementary hydrology by Singh V.P., PHI Publications, 2012.
2. Irrigation and Water Resources & Water Power, (7<sup>th</sup> edition) by Modi, P.N., Standard Book House, 2008.
3. Irrigation Water Management by Majundar, D.K., Prentice Hall of India, 2009.

#### **Web references : NPTEL**