

WATER RESOURCES ENGINEERING- I

Course Code: 15CE1121

L	T	P	C
3	0	0	3

Pre-requisites:

Fluid Mechanics

Course Outcomes:

At the end of the Course, the Student will be able to:

CO 1 Describe the various hydrological parameters

CO 2 Apply the technique for developing hydrographs for estimating the peak runoff from different catchments

CO 3 Estimate the peak floods and solve hydrologic flood routing models

CO 4 Assess the aquifer properties and yield from a well

CO 5 Estimate the quantity of water required for different crops

UNIT-I

(10 Lectures)

HYDROLOGY:

Introduction to Engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data and estimation of missing precipitation data. Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation – evapotranspiration - Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT-II

(10 Lectures)

DESCRIPTIVE HYDROLOGY AND HYDROGRAPH ANALYSIS:

Runoff-components of runoff, factors affecting runoff, Stream gauging: Necessity, selection of gauging sites, methods of measurement of

discharge, Hydrograph analysis - base flow separation, effective rain fall, Unit Hydrograph- definition, limitations and applications, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph (concept only).

UNIT-III

(10 Lectures)

ESTIMATION OF FLOOD DISCHARGE:

Estimation of peak discharge, rational method, SCS method, Design flood, return period, flood frequency analysis, Gumbel's and log Pearson Type III methods (concepts only).

FLOOD ROUTING:

Basic concepts of flood routing, hydraulic and hydrologic routing, channel and reservoir routing, Muskingum method of channel routing.

UNIT-IV

(10 Lectures)

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, Determination of hydraulic properties of aquifers, Yield of an open well- constant level pumping test, recuperation test.

UNIT-V

(10 Lectures)

IRRIGATION AND WATER REQUIREMENT OF CROPS:

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.

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Crop seasons in India, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies, determination of irrigation requirements of crops.

TEXT BOOKS:

1. Jayaram Reddy, "Engineering Hydrology", 2nd Edition, Laxmi Publications Pvt. Ltd., New Delhi reprint 2008.
2. B.C.Punmia, B.B.L. Pande, Ashok K.R. Jain, Arun K.R. Jain, "Irrigation & Water Power Engineering", 16th Edition, Laxmi Publications (P) Ltd., New Delhi, 2009.
3. R.K.Sharma & T.K. Sharma, "Hydrology and Water Resources Engineering", 5th Edition, Dhanapati Rai Publications, 2000.
4. S.K Garg, "Irrigation Engineering and Hydraulic Structures", 24th Edition, Khanna publishers, 2012.
5. K Subramanya, "Engineering Hydrology", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2008.

REFERENCES:

1. V.P.Singh, "Elementary Hydrology", 2nd Edition, PHI Publications, Prentice Hall of India, 1992.
2. P.N.Modi, "Irrigation, Water Resources & Water Power Engineering", 2nd Edition, Standard Book House, Rajsons Publications Pvt. Ltd., 2008.
3. D.K.Majumdar, "Irrigation Water Management", 3rd Edition, Prentice Hall of India, 2004.
4. K.R.Arora, "Irrigation, Water Power and Water Resources Engineering", 3rd Edition, Standard Publishers Distributors.