

6th Semester	Irrigation & Drainage Engineering	L-T-P 3-0-0	3 CREDITS
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Module I

(7 Hours)

Irrigation and its importance; Irrigation potential and actually used from different sources, means to enhance the potential; Soil moisture content - Determination of soil moisture content by gravimetric method. Neutron probe, Tensiometer and gypsum block method; measurement of discharge/irrigation water by weirs, notches, orifices, mouth pieces, Parshall flume and cutthroat flume

Module II

(8 Hours)

Canals- classifications of canals and terminologies used in canal sections; design of economical channels section, design of unlined channels in non-alluvial soil, Kennedy's and Lacey's theory for design of unlined channel in alluvial soil, comparison between Kennedy's and Lacey's theory, numerical problem on design of unlined channels in alluvial and non-alluvial soil; Underground water conveyance system in pipes- irrigation structures used in fields, Study of canal lining and economic feasibility of lining of channels

Module III

(8 Hours)

Study of soil-water-plant relationship, soil water movement in crop root zone, Water requirement of crops- computation and measurement of crop water requirement by various methods, evapotranspiration of crops and methods employed to measure it; Irrigation scheduling – determination of frequency of irrigation for different crops, determination of quantity of irrigation for each crop in the field; adaptability, characteristics and types of border, check-basin, furrow and micro irrigation; design of border, check-basin, furrow and micro irrigation methods, Land grading and leveling- study of different methods of land grading ,smoothing and leveling.

Module IV

(10 Hours)

Water logging and Drainage:Introduction, forms of excess water, causes and impacts; objectives of drainage, extent of drainage problems in the state; definition, classification of drainage systems, types of surface drainage methods and their application, drainage coefficient and its importance in drainage design; various methods to determine drainage coefficient, design of surface drainage system; purpose and benefits of sub-surface drainage, classification of sub-surface drainage systems; Drainage investigation- Reconnaissance survey, detailed survey of drainage basin, Investigations on hydraulic conductivity, drainable porosity, groundwater hydrology; Design of sub-surface drainage system for (i) Steady state condition (ii) Unsteady state condition- Dupuit-Forchhemeir assumptions and their applicability, derivation of Hooghoudt's equation (Ellipse equation) for spacing between drains, solution of drain spacing using equivalent depth concept; Derivation of Ernst equation for spacing between drains in heterogeneous soil profile; unsteady state drainage equations; Design of tile drainage system, ancillary components of sub-surface drainage system; Layout, construction and installation of drain pipes, drainage outlet

Module V

(7 Hours)

Classification of non-conventional drainage systems, vertical drainage, bio-drainage, pump drainage, mole drainage and their adaptability; Salinity measurement and classification of salt affected soils; Reclamation methods of salt affected soils, Salt balance equation, leaching requirement for saline soils, gypsum requirement for alkali soils; Chemical properties of

irrigation water, assessment of the quality of irrigation water; Sea water intrusion, skimming well concept and conjunctive use of fresh and saline water

Canals drainage problems Drainage investigation Design of sub-surface drainage system non-conventional drainage Land grading Reclamation methods

Text Books

1. Michael A.M. 2012. Irrigation: Theory and Practice. Vikas Publishing House New Delhi
2. Majumdar D. K. 2013. Irrigation Water Management Principles. PHI learning Private Limited New Delhi 2nd Edition
3. Bhattacharya A K and Michael AM. 2013. Land Drainage, Principles, Methods and Applications. Vikas Publication House, Noida (UP).
4. Michael A M and Ojha T P.2014. Principles of Agricultural Engineering Vol II, 5th Edition, Jain Brothers Publication, New Delhi

Reference Books

1. Panigrahi, B. 2013. A Handbook on Irrigation and Drainage. New India Publishing Agency, New Delhi
2. Allen R. G., L. S. Pereira, D. Raes, M. Smith. 1998. Crop Evapotranspiration guidelines for computing crop water requirement. Irrigation and drainage paper 56, FAO of United Nations, Rome
3. Murthy V V N. 2013. Land and water Management Engineering. Kalyani Publishers, New Delhi.
4. Israelsen O W. and Hansen V. E and Stringham G. E. 1980. Irrigation Principles and Practices, John Wiley & Sons, Inc. USA.
5. Ritzema H.P.1994 Drainage Principles and Applications, ILRI Publication 16, Second Edition (Completely Revised)