

22IADE302 DRAINAGE ENGINEERING

Hours Per Week :

L	T	P	C
1	0	2	2

PREREQUISITE KNOWLEDGE: Basics of runoff and fluid flow characteristics and soil characteristics.

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with water logging causes and impact, drainage problems, different type of drainage systems, design and their management. It also helps students to impart knowledge in reclaiming problematic soil through different methods and installing drainage systems.

MODULE-1

UNIT-1

4L+0T+8P=12 Hours

INTRODUCTION TO DRAINAGE:

Water logging- causes and impacts; drainage, objectives of drainage, familiarization with the drainage problems of the state; surface drainage coefficient, types of surface drainage, sub-surface drainage: purpose and benefits.

UNIT-2

4L+0T+8P=12 Hours

SURFACE DRAINAGE SYSTEM:

Design of surface drains; investigations of design parameters-hydraulic conductivity, drainable porosity, water table; derivation of Hooghoudt's and Ernst's drain spacing equations.

PRACTICES:

- In-situ measurement of hydraulic conductivity by single auger hole and inverse auger hole method.
- Estimation of drainage coefficients.
- Installation of piezometer and observation wells.
- Preparation of iso-bath and isobar maps.
- Determination of drainable porosity.
- Design of surface drainage systems.

MODULE-2

UNIT-1

4L+0T+8P=12 Hours

SUBSURFACE DRAINAGE SYSTEM:

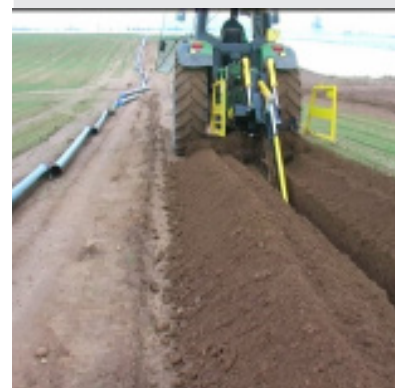
Design of subsurface drainage system; drainage materials, drainage pipes, drain envelope; layout, construction and installation of drains.

UNIT-2

4L+0T+8P=12 Hours

DRAINAGE STRUCTURES & SOIL RECLAMATION:

Drainage structures; vertical drainage; bio - drainage; mole drains; salt balance, reclamation of saline and alkaline soils, leaching requirements, conjunctive use of fresh and saline water.



Source:
http://www.icid.org/images/drainage_pic.jpg

SKILLS:

- ✓ Estimation of drainage coefficients.
- ✓ Installation of piezometer and observation wells.

PRACTICES:

- Design of gravel envelop.
- Design of subsurface drainage systems;
- Determination of chemical properties of soil and water;
- Study of drainage tiles and pipes.
- Installation of sub-surface drainage system.
- Cost analysis of surface and sub-surface drainage system.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Analyze the problems faced by the farmers cultivating various crops in drainage affected fields and the causes for occurring drainage affect in agriculture in view of increasing yields and reducing cost of cultivation.	Analyze	1 & 2	1,2,4,7
2	Examine problematic soil and measure reclamation of soil.	Analyze	2	1,2,4,6,7
3	Create and develop innovative drainage field network systems for overcoming the water logged conditions and salt affected problems in various fields of Indian agriculture.	Create	1 & 2	1,2,4,5,7,11,12
4	Create and take up the various projects on the present research gaps in agricultural drainage systems to promote and address the demands and needs of the farming community.	Create	1 & 2	1,2,3,4,5,6,7,12

TEXT BOOKS:

1. Bhattacharya AK and Michael AM. Land Drainage, Principles, Methods and Applications. Vikas Publication House, 2013 Noida (UP).

REFERENCE BOOKS:

1. Ritzema H.P. "Drainage Principles and Applications" ILRI Publication 16, Second Edition, 1994 (Completely Revised).
2. Michael AM. and Ojha TP. "Principles of Agricultural Engineering" Vol-II 5th Edition. Jain Brothers Publication, 2014 New Delhi.
3. Kadam U.S., Thokal R.T., Gorantiwar S.D. and Powar A.G. 2007. Agricultural Drainage- Principles and Practices, Westville Publishing House, 2008.