AMAG15 IRRIGATION AND DRAINAGE ENGINEERING

UNIT-1 WATER RESOURCES UTILIZATION AND IRRIGATION DEVELOPMENT IN INDIA

1.1 Introduction to Irrigation.

1.2 Water conveyance, underground pipe conveyance system, design, accessories, irrigation structures, land grading, different design methods and estimation of earth work and cost.

1.3 Soil water plant relationship, soil water movement, infiltration, evapotranspiration, depth of irrigation, frequency of irrigation, irrigation scheduling, irrigation efficiencies.

UNIT-2 SURFACE IRRIGATION METHODS OF WATER APPLICATION

2.1 Border, check basin, furrow and contour irrigation; sprinkler and drip irrigation method, merits, demerits, selection and design.

2.2 Command- area concepts and components, irrigation terminologies relevant to command area, on farm development works, farmer participation- in water distribution,

2.3 Water delivery methods, design of unlined alluvial channels silt theories, design of lined channels, and materials for lining.

UNIT-3 DRAINAGE DEFINITION

3.1 Need for land drainage; History of land drainage;

3.2 Design considerations for land drainage;

3.3 Definitions of parameters in drainage equations: hydraulic conductivity,- tansmissivity, drainable porosity, drainage- coefficient;

3.4 Subsurface flow to drains Steady state equations;- The Hooghoudt's equation derivation, importance of equivalent depth;

3.5 The-Ernst equation- derivation, horizontal, vertical and radial flow;

3.6 Unsteady state equations The Glover Dumm equation;

3.7 Comparison between Steady State and Unsteady State.

UNIT-4 SURFACE DRAINAGE SYSTEMS BEDDING

4.1 Field drains, Field laterals; Layout of- field drains and laterals; Diversion or interceptor drains;

4.2 Subsurface drainage systems drain materials, envelopes, filters and surrounds;

4.3 Functions of envelope, envelope materials, envelope requirements in relation to soil characteristics, gravel envelopes, organic envelopes,

4.4 Synthetic envelopes;- Layout, construction and installation of drains;

4.5 Drainage structures; Tube well drainage introduction, physical and economic feasibility;

4.6 Mole drainage.

UNIT-5 HYDRAULICS OF DRAINAGE PIPES MANNING'S EQUATION FOR PIPE FLOW

5.1 Hydraulic gradient and slope; Investigations of drain design parameters through drain testing hydraulic conductivity, transmissivity, drainable porosity;

5.2 Observation wells and their installation;

5.3 Recording water table data and drain discharges;

5.4 Flow equations used in drainage testing steady state and non steady state conditions;

5.5 Drainage design criteria and system economics.

Reference Books:

1. James, J.G. (1988). Principles of Farm Irrigation system Design. John Wiley & Sons, New York.
2. Lal, R. (1983). Irrigation Hydraulics. Saroj Prakashan Publishers, Allahabad.
3. Majumdar,- D. K. (2000). Irrigation Water Management Principles and Practice. Prentice Hall of India, New Delhi.
4. Michael, A. M. and Ojha, T.P. (1985). Principles of Agricultural Engineering. (Vol. II). Jain brothers, New Delhi.