

23CE506: HYDROLOGY AND WATER RESOURCES ENGINEERING

Topic: Canal systems

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UNIT-V: Canal Systems

- Alignment of Canals, Canal Losses, Design Discharge, Canal Outlets, Waterlogging, Canal Lining and Drainage

Learning Outcomes

- Explain canal alignment, losses, design discharge, outlets, lining and drainage.

Introduction to Canal Systems

- Artificial channels constructed to convey water for irrigation.

Classification of Canals

- Perennial canals, inundation canals, ridge canals, contour canals.

Canal Alignment

- Selection based on topography, economy, command area and soil conditions.

Ridge Canal

- Constructed along watershed; irrigates both sides.

Contour Canal

- Runs parallel to contour lines; suitable for hilly terrain.

Side Slope Canal

- Constructed on side slopes of hills and valleys.

Canal Losses

- Seepage, evaporation, transpiration and leakage losses.

Seepage Losses

- Major loss in unlined canals; may cause waterlogging.

Evaporation Losses

- Depend on temperature, humidity and wind velocity.

Reduction of Canal Losses

- Canal lining, maintenance and weed control.

Design Discharge

- Maximum discharge required to meet irrigation demand.

Factors Affecting Design Discharge

- Crop requirement, duty, delta and irrigated area.

Duty and Delta

- Important parameters used in canal design.

Design of Channels

- Hydraulic design for safe and economical flow.

Rigid Boundary Channels

- Concrete or masonry lined channels.

Advantages of Rigid Channels

- High velocity, low seepage and durability.

Alluvial Channels

- Channels flowing through alluvial soils.

Regime Channels

- Neither silting nor scouring under normal conditions.

Kennedy's Theory

- Based on critical velocity concept.

Lacey's Theory

- Based on regime conditions and silt factor.

Canal Outlets

- Structures supplying water from distributary to watercourse.

Non-Modular Outlets

- Discharge depends on upstream and downstream levels.

Semi-Modular Outlets

- Discharge depends mainly on upstream water level.

Modular Outlets

- Discharge independent of water levels within limits.

Waterlogging

- Rise of groundwater table affecting crops.

Causes and Effects of Waterlogging

- Over-irrigation, seepage, salinity and reduced yield.

Canal Lining and Drainage

- Concrete, brick, stone lining; surface and subsurface drainage.

Summary & Important Questions

- Revision of canal systems, outlets, lining and drainage.