Graduate Certificate in Dam Engineering

Hydrology for Dams

Hydrology for Dams

Hydrology for dams is a crucial aspect of dam engineering that involves the study of water movement, distribution, and behavior within a watershed to assess the design, construction, and operation of dams. It is essential for understanding the impact of precipitation, evaporation, infiltration, and runoff on dam safety and performance.

Abutment
An abutment refers to the supporting structure at the sides of a dam that resists the lateral pressure of the impounded water. It helps to transmit the load of the dam to the foundation and provides stability to the structure.

Aquifer
An aquifer is a geological formation that stores and transmits groundwater. It is an underground layer of permeable rock or sediment that holds water, which can be a significant factor in dam design and safety.

Arch Dam
An arch dam is a type of dam that is curved upstream, with the water pressure pressing against the structure transferring the load to the abutments on the sides. Arch dams are known for their strength and suitability for narrow canyons.

Catchment Area
The catchment area, also known as the watershed, is the land area from which water drains into a river, lake, or reservoir. It is essential in hydrology for dams as it determines the amount of water that can potentially be stored or impounded.

Concrete Dam
A concrete dam is a type of dam constructed using concrete as the primary building material. It can be gravity, arch, or buttress type and is known for its durability and strength.

Crest
The crest of a dam is the top or highest point of the dam structure. It is designed to prevent water from overtopping the dam and causing potential damage or failure.

Crest Gate
A crest gate is a type of gate installed on the crest of a dam to control the flow of water over the spillway. It helps regulate the water level in the reservoir and prevent flooding downstream.

Curtain Grouting
Curtain grouting is a technique used in dam construction to fill and seal voids in the foundation rock to

prevent seepage beneath the dam. It involves injecting grout under pressure into the rock formations to improve their strength and impermeability.

Cutoff Wall
A cutoff wall is a barrier constructed within the foundation of a dam to prevent seepage of water through the foundation material. It is typically made of impermeable materials such as concrete or clay.

Diversion Dam
A diversion dam is a type of dam built to redirect the flow of a river or stream for irrigation, flood control, or other purposes. It diverts water into a canal or pipeline while allowing the remaining flow to continue downstream.

Embankment Dam
An embankment dam is a type of dam constructed with compacted earth, rock, or other fill materials. It relies on the weight of the embankment to resist the pressure of the impounded water.

Emergency Spillway
An emergency spillway is a secondary spillway designed to handle excess water flow during extreme flood events when the primary spillway capacity is exceeded. It helps prevent overtopping of the dam and potential failure.

Flood Routing
Flood routing is the process of predicting and managing the flow of water through a dam or reservoir during a flood event. It involves adjusting the release of water to control downstream flooding and protect the dam structure.

Freeboard
Freeboard is the vertical distance between the water level in a reservoir or dam and the crest of the dam. It provides a safety margin to prevent overtopping and allows for fluctuations in water levels due to precipitation or inflow.

Grout Curtain
A grout curtain is a barrier constructed within the foundation of a dam using grouting techniques to seal fractures and prevent seepage of water. It helps improve the stability and safety of the dam structure.

Hydraulic Gradient
The hydraulic gradient is the slope of the water table or groundwater flow within a dam foundation. It is essential for assessing seepage issues and designing drainage systems to control water movement.

Impervious Core
An impervious core is a central layer of impermeable material, such as clay or concrete, within the body of an embankment dam. It prevents seepage and helps maintain the stability of the dam structure.

Inflow Design Flood
The inflow design flood is the maximum flood event expected to occur at a dam site based on historical

data, rainfall patterns, and hydrological analysis. It is used to determine the spillway capacity and design criteria for the dam.

Masonry Dam
A masonry dam is a type of dam constructed using stone, brick, or concrete blocks as building materials. It is known for its aesthetic appeal and historical significance in dam engineering.

Overtopping
Overtopping occurs when the water level in a reservoir exceeds the crest of a dam, leading to the flow of water over the top of the dam structure. It can cause erosion, structural damage, and potential failure of the dam.

Reservoir
A reservoir is a man-made lake or impoundment created by constructing a dam across a river or stream. It stores water for various purposes, including flood control, irrigation, hydroelectric power generation, and water supply.

Rockfill Dam
A rockfill dam is a type of dam constructed using a combination of compacted rock and earth materials. It relies on the weight and stability of the rockfill to resist the pressure of impounded water.

Seepage
Seepage refers to the flow of water through or beneath a dam structure due to permeable materials, cracks, or joints in the foundation. Excessive seepage can lead to erosion, instability, and potential failure of the dam.

Spillway
A spillway is a structure built into or adjacent to a dam to control the release of water from the reservoir. It helps regulate water levels, prevent overtopping, and manage flood flows to protect the dam and downstream areas.

Storage Capacity
Storage capacity is the volume of water that can be stored in a reservoir behind a dam. It is determined by the dam's height, length, and design features and influences the availability of water for various purposes.

Tailwater
Tailwater is the water level downstream of a dam or structure that affects the flow conditions and performance of the dam. It is essential to consider tailwater levels in dam design and operation to avoid adverse impacts.

Upstream Face
The upstream face of a dam is the side that is exposed to the impounded water in the reservoir. It must be designed to withstand the pressure of the water and prevent erosion or failure of the dam structure.

Watershed Management

Watershed management is the process of planning, implementing, and monitoring activities to protect and improve the quality and quantity of water resources within a watershed. It involves land use planning, erosion control, and pollution prevention to sustainably manage water for various uses.

Yield Analysis
Yield analysis is a method used to estimate the amount of water that can be reliably supplied by a reservoir or water source over a specific period. It helps assess the availability of water for irrigation, municipal, industrial, or other uses.