

Exam Type Questions

Hydrologic Budget



Question 1

Determine the change in water storage for a catchment where the annual precipitation is 1500 mm, evapotranspiration is 700 mm, and runoff is 650 mm. Assume no other inflows or outflows.



Question 2

A watershed receives 1100 mm of precipitation in a year. If evapotranspiration accounts for 450 mm, runoff is 500 mm, and 100 mm infiltrates to recharge groundwater, calculate the change in storage. Assume no additional water inputs or losses.



Question 3

In a given basin, the annual precipitation is recorded as 1300 mm. Additionally, the basin receives an inflow of 200 mm from an adjacent watershed. If evapotranspiration is 600 mm, runoff is 550 mm, and 150 mm infiltrates to recharge groundwater, what is the net change in water storage? Assume no other sources of inflow or outflow.



Question 4

A reservoir covers an area of 120 hectares. During June, the inflow was recorded at $2.5 \text{ m}^3/\text{s}$, while the outflow was maintained at $2.0 \text{ m}^3/\text{s}$. The monthly precipitation was 10 cm, and the storage volume increased by $900,000 \text{ m}^3$. Calculate the estimated evaporation in cubic metres and determine the change in water depth due to evaporation. Assume no infiltration or seepage.



Question 5

A lake with a surface area of 85 hectares received an inflow of $1.8 \text{ m}^3/\text{s}$ during July, while the regulated outflow was $1.4 \text{ m}^3/\text{s}$. The estimated evaporation loss for the month was $500,000 \text{ m}^3$, and the storage volume increased by $600,000 \text{ m}^3$. Assuming no infiltration or seepage, calculate the total precipitation (in cubic metres and in centimetres) that fell over the lake during the month.



Question 6

An artificial pond spans 150 hectares. Over the course of August, the recorded inflow was $3.5 \text{ m}^3/\text{s}$, while the controlled outflow was $3.0 \text{ m}^3/\text{s}$. The precipitation for the month measured 10 cm, and the total increase in storage volume was $1,500,000 \text{ m}^3$. The estimated evaporation loss was $900,000 \text{ m}^3$. Assuming no other losses, calculate the groundwater recharge in cubic metres and its equivalent depth over the pond's surface area.

Exam Type Questions

Discharge



Question 1

A sharp-crested rectangular weir with a crest length of 3.5 metres is installed in a drainage canal. The head over the weir is measured at 0.42 meters, and the discharge coefficient C_d is 3.2. Calculate the discharge over the weir.



Question 2

A rectangular sharp-crested weir is used to measure the flow of a river. The weir crest is 5 metres long, and the water level above the crest is 0.38 metres. If the discharge coefficient C_d is 3.1, find the flow rate over the weir.



Question 3

A 60-degree V-notch weir is placed in a small stream to measure discharge. The water head above the notch is recorded as 0.25 metres, and the discharge coefficient C_d is 0.62. Calculate the flow rate over the weir.



Question 4

A V-notch weir with an angle of 75 degrees is used to measure flow in an irrigation channel. The water head above the notch is 0.32 metres, and the discharge coefficient C_d is 0.6. Determine the flow rate over the weir



Question 5

A broad-crested submerged weir is constructed in a canal to control and measure water flow. The crest width of the weir is 5.0 metres, with an upstream head (H_1) of 1.5 metres and a downstream head (H_2) of 1.0 metre. The discharge coefficient (C_d) for this weir is 2.9. Calculate the flow rate over the weir.



Question 6

A broad-crested submerged weir is installed in a river for flow regulation. The crest width of the weir is 3.8 metres, with an upstream head (H_1) of 1.0 metre and a downstream head (H_2) of 0.7 metres. The discharge coefficient (C_d) for this weir is 2.7. Determine the discharge over the weir.