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Section: C

Assignment: Hydrulic structure

Q.No (2) (a) Define reservioun also explain which type of reservioun will be more enchomical and why?

Reservioun:-

A reservioun is a man made lake or large fresh water body of water. Many people think of reservioun as a lake and might even use the words interchangeably. However, the key difference is that reservioun are ~~great because~~ artizical and made by humans, while lakes are naturally occuring bodies of water. Reservioun are great because the provide a supply of water for when naturally occuring bodies of water, like lakes or river, run dry.

Types of Reservioun:

There are three types of reservioun: (a) Valley-dammed reservioun. (b) bank side reservioun, (c) service reservioun.

(a) Valley-Dammed reservioirs:-

Valley-Dammed reservioirs are created in valleys b/w mountains. Usually there is an existing lake or body of water. The mountains side are used as the wall of the reservioirs to hold the water. To create a valleys-dammed reservioirs, the river that will zill the reservioirs must be diverted, so the ground can be cleared to lay a foundation for the dam. Next, a concrete lining is put in place and dam construction can begin. It can take years to build a dam, but once it's done, the wate pools in the valley, and a large source of water becomes available.

(b) **Bank side Reservioirs:**

Bank side reservioirs are reservioirs that are made by diverting water from local ~~reservioirs~~ rivers or streams to an existing reservioirs. Although this can be applied to many different geographical areas. Unlike the valley-dammed reservioir, which requires a valley, - diverting water from a river can create problems.

(c) **Service Reservioirs:**

Service reservioirs are entirely man made. They are usually stored in concrete basins above or below ground - You might be familiar with the large water towers in the country side.

In some areas peoples dig cisterns, or service reservioirs that are Underground. Citizen must be in a place of higher elevation to allow the water to flow where it needs to go, where as water towers are already at a higher location than the surrounding land.

Q No. 1 (b)

There are two many types of embankments dams. Earth fill embankments and Rock fill embankments. Earth fill embankments are the one which consists of 50% or more soil. while rock fill embankments are the one which consist of 50% or more rocks - If we have to baild an embankments in a hilly area, we should baild Rock fill embankments because it consists of Rocks and in hilly area rocks are easily available. however rock fill embankments have more strength othe than earth fill embankments in hilly area it will have more strength with less cost. ~~where the surface of the reservoir may freeze~~

QNo = 02

Different types of spillways

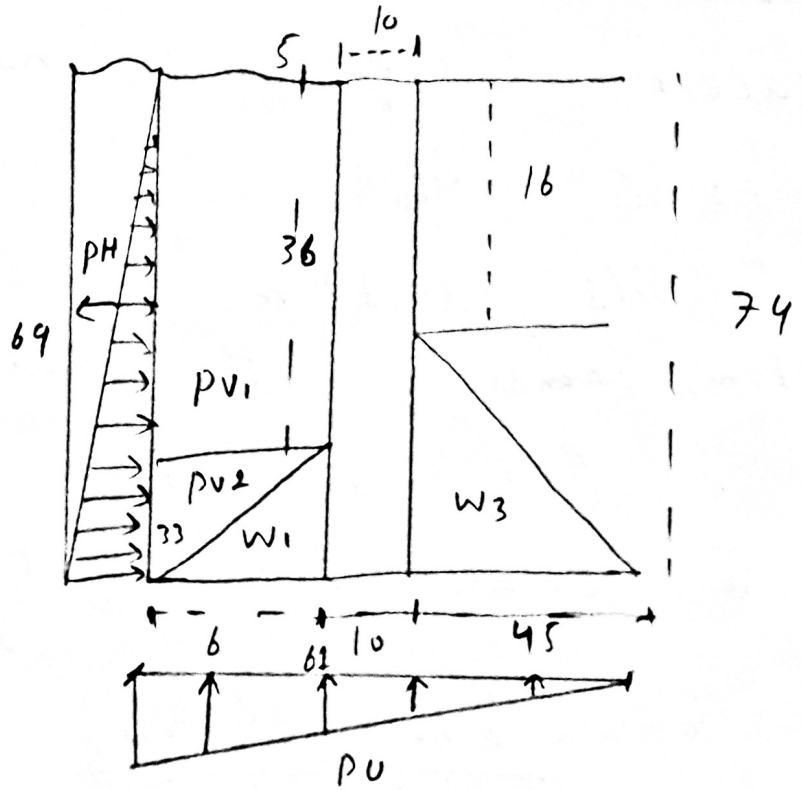
1: Straight Drop spillways
2: Ogee spillways
3: Shaft spillways
4: Chute spillways
5: Side channel
6: Siphon spillways
7: Labyrinth spillways

A shaft spillway or bell mouth spillway should be used in area. having temperature -10c or below - As this spillway is designed like an inverted belt where water can entre around the entire parameter - These Uncontrolled spillway are also morning glory or glory hole spillway

In the area where the surface of the reserviour many freeze - This type of spillway

spillway is normally filled with ice breaking arrangement to prevent the spillway from becoming ice-bond.

Q No (3). Design the gravity dam by assuming the dam dimenssions, find all the stabillity check at least three of them must be in a safe condition and economical. In reserviour full condition considering weight of dam, water pressure and uplift pressure.



⇒ Let Unit weight of Concrete = 24 kN/m³

⇒ Let Unit weight of water = 10 kN/m³

Now force calculation and moment

Forces	Formula	Fy(kg)	Fx(kg)	Lever Arm(m)	Mr	Mo
W_1	$(1/2)\times L\times W\times \gamma_d$	2376	0	57	135432	0
W2	$L\times W\times \gamma_d$	17760	0	50	888000	0
W3	$(1/2)\times L\times W\times \gamma_d$	3132	0	30	93,4600	0
PV1	$(1/2)\times L\times W)\times \gamma_w$	990	0	59	58410	0
PV2	$(L)(W)(\gamma_w)$	2160	0	58	58410	0
PH	$(-(1/2)\times L\times W\times \gamma_w)$	-21045	0	40.67	0	[illegible]
PH	$(-(1/2)\times L\gamma_w\times \gamma_w)$	0	-23805	23.00	0	54715
	Σ	33561	-23905	Σ	2146 6722	140345

=) Now factor of safety Against Tension condition

$$\Rightarrow \bar{x} < B/6$$

$$\Rightarrow B/6 = 10.17\ m$$

Now; eccentricity of the Resultant force

$$e = (B/2) - \bar{x} \rightarrow (1)$$

$\bar{x}$ = Location of Resultant force from toe

$$\Rightarrow \bar{x} = \frac{(\Sigma M_r - \Sigma M_o)}{\Sigma F_v}$$

$$= \left(\frac{2,146,722 - 1,403,345}{33561}\right)$$

$$\bar{x} = 22.15$$

Putting value in (1)

$$e = 10.17 - 22.15$$

So $e = 8.35\,m$

Condition → safe in Tension → ok

⇒ Now factor of safety Against stress

Condition ⇒ $\gamma_{meet} > 0$

$$\Rightarrow \gamma_{toe} = (\Sigma FV/B)\left(1 + \frac{6e}{B}\right)$$

$$= \left(\frac{3356}{61.02}\right)\left(1 + \frac{6 \times 8.35}{61.02}\right)$$

$\gamma_{Toe} = 1001.573$

$$\Rightarrow \gamma_{meet} = (\Sigma FV/B)\left(1 - \frac{6 \times e}{B}\right)$$

$$= \left(\frac{3356}{61.02}\right)\left(1 - \frac{6 \times 8.35}{61.02}\right)$$

$\gamma_{meet} = 98.42\ kN/m^3$

So safe in stress → ok

=> Now factor of safety against overturning

Condition → $(\Sigma M_r / \Sigma M_o) > 2$

$$\frac{2146722}{140345} = 1.53 < 2$$

So Not safe in over turning

Now $\Sigma M_r > \Sigma M_o$

=> $\Sigma M_r = 2146722$

=> $\Sigma M_o = 140345$

So condition is ok

Now factor of safety Against sliding

=> Condition => $\frac{(-u\Sigma Fv + B2)}{\Sigma Fh} > 1$

here $= 2 = 1400$

$u = 0.7$ (0.65 to 0.75)

$$= \frac{(0.7 \times 33561) + (61.02 \times 1400)}{23805}$$

$= 4.57 \longrightarrow$ ok

Condition → safe in sliding.