SYED JAWWAD

7386

HYDRAULIC STRUCTURE

Q#1

a) RESERVOIR:-

Artificial lakes or man made lakes are known as reservoirs. They are mistakes by being called lakes but the only difference between Lakes and reservoir is that lakes are natural whereas, reservoirs are artificially made.

There are 3 types of Reservoirs.

1. Valley dammed Reservoir
2. Bank-Side Reservoir
3. Service Reservoir

Service Reservoir is the most economical and is fully made Artificially or man-made. The Construction Can be done easily and no natural water diversion is needed.

Q#1 Part b

-> There are two types of Embankment, They are as follows.

a) Earth fill Embankments.

b) Rock fill Embankments

-> Earthfill Embankments consist of 50% of Earth where as rock-fill Embankments Consists of 50% of rocks. They are usually Used in the Construction of Embankments in hilly areas as they are more Economical and they Provide more Strength. Other than this, Rocks are easily available in hilly areas and makes it easy for the Construction.

SPILLWAYS:-

Spillway are known as Overflow Channel in United kingdom. Their purpose is to ~~conduct~~ Control the release of water flow from dams or levee into the downstream area, typically the riverbed. They make sure that the water doesn't over-flow Causing no damage or destruction to the dam.

TYPES OF SPILLWAY:-

1. Straight drop
2. Ogee Spillway
3. Shaft
4. Chute.
5. Side Channel
6. Siphon
7. Labyrinth.

OGEE SHAPED SPILLWAY:-

→ An ogee Shaped Spillway is the most Commonly used Spillway.

→ It is widely used in with gravity Dam, Arch dams and buttress dams.

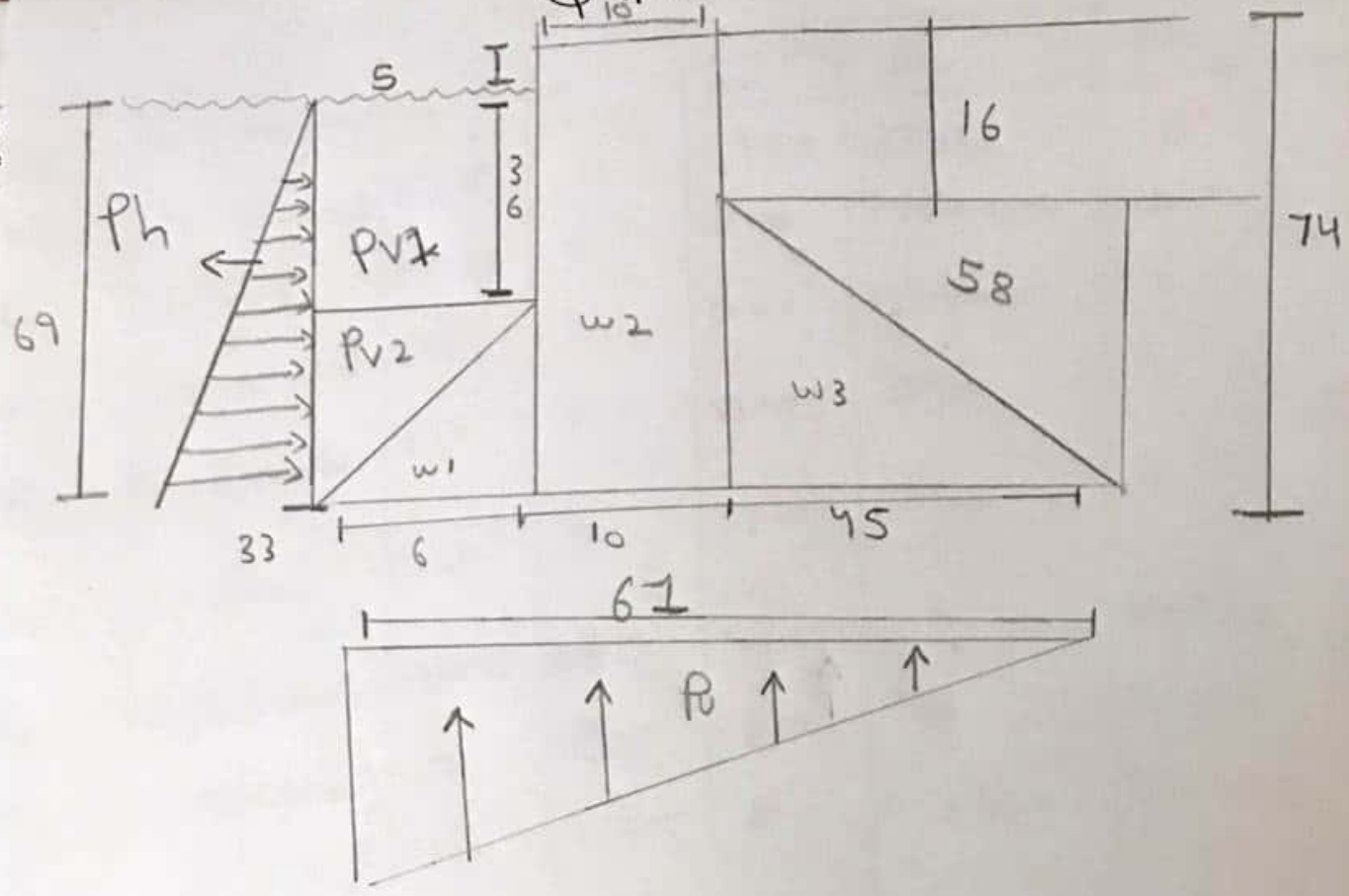
→ Several Rock fill and Earth fill dams are also Provided with this type of Spillway as a Super Structure.

→ An ogee Shape Spillway looks like an English letter "S".

→ The upper part of the Spillway surface matches Closely to the lower nappe of Ventilated Spillway.

→ In -10 degree C area we will ~~to~~ Suggest is ogee Shaped Spillway.

Q#3



Assume Unit Weight for Concrete = 24 kN/m³

Assume Unit Weight for Water = 10 kN/m³

Cont..

Forced And Moment Calculation

Forces	Force Forward	Fy	Fx	Lever (m) Arm	Mv	Mo
W_1	$(1/2)\times L\times w\times rd$	2376	0	57.00	135432	0
W_2	$L\times w\times rd$	17760	0	50.00	888000.0	0
W_3	$(1/2)\times L\times w\times rd$	31320	0	30.00	939600.0	0
P_{v1}	$(1/2)\times L\times w\times rw$	990	0	59.00	58410	0
P_{v2}	$L\times W\times rw$	2160	0	58.00	58416	0
P_u	$(-1/2)\times L\times w\times rw$	-21045	0	40.67	0	855830
P_h	$(-(1/2)\times L\times w\times rw)$	0	-23805	23.00	0	547515
	Σ	33561	-23805	Σ	2146722.0	1403345

→ For Factor of Safety Against Tension

$$e < B/6$$

$$B/6 = 10.17m$$

eccentricity of the Resultant force

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

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

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

$$\bar{x} = 22.15$$

So $e = 8.35m$

Condition ⇒ Safe in Tension (Ok)

→ For factor of Safety Against Stress

Condition → $\gamma_{heel} > 0$

$\gamma_{Toe} = (\Sigma Fv/B)(1 \pm (6e/B))$

$\gamma_{Toe} = 1002.0484\ kN/m^3$

$\gamma_{heel} = (\Sigma Fv/B)(1 - (6e/B))$

$\gamma_{heel} = 98.31\ kN/m^3$

→ Condition → Safe in Stress (ok)

→ For factors of Safety Against Over-turning

Condition → $(\Sigma Mr/\Sigma Mo) > 2$

$= (\Sigma Mr/\Sigma Mo) = 1.53$

Condition ⇒ Not Safe in overturning (Not ok)

$(\Sigma Mr > \Sigma Mo)$

$\Sigma Mr = 214722.0$

$\Sigma Mo = 140345$

Condition ⇒ Safe (ok)

→ For Factor of Safety Against Sliding

Condition ⇒ $((\mu_1 \Sigma Fv + B_q V/\Sigma FH) > 1$

$q_v = 1400$

$\mu_1 = 0.7$ (0.65 to 0.75)

$((\mu_1 \Sigma Fv + B_q V/\Sigma FH) = 4.57$

Condition → Safe in Sliding (ok)