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SECTION "C"

DEPARTMENT BS- CIVIL

SUBJECT HYDRALIC ENGINEERING

SUBMITTED TO: SIR ADEED

QNO - 1 (a)

Reservior:-

→ A Reservior is man-made lake or large freshwater body of water.

→ Most commonly, an enlarged natural or artificial lake, pond or impoundment created using dam or lack store water.

→ A Reservior is primarily for the storage of water to ensure an adequate supply when it is needed.

→ We have three main types of reservior.

- valley Demond Reservior
- Bank-Side Reservior.
- Service Reservior.

The most economical types of Reservior is service Reservior, Because :-

→ It Required less time to construct as compactive to other types of Reservior.

→ It is economical, have less cost as compare to other types of Reservior.

→ I choose service Reservior because that are entirely man made. In some

areas, people dig service Reservior that are underground it must be in higher elevation areas.

→ It can also save us labor cost and other material cost.

Q NO-01(b)

I will suggest rock fill Embankment dam for hilly area because :-

→ Rock fill Embankment dam is constructed from impervious material such as, Mansonary concrete, Asphalt concrete, sheet of steel, pile, timber other materials and transition layes. Because the impervious membrane is employed as the water proof and can be placed eithes with in the embankment or on the upstream slope.

→ In hilly Area, the chances of rain is maximum because of high latitude if we construct earth fill embankment dam capacity or Intensity of rain will damage it down of earth fill dam.

→ Rock fill embankment have more strength then earthfill embankment.

→ Rock fill embankment consist of 50% or more rock that why, ~~the~~ in hilly area rock (material) will be easily Available.

→ So I will suggest Rock Fill embankment dam in hilly area

QNO-02

Different types of spillways are as follows:

1:- Straight Drop spillway.

2:- Ogee spillway.

3:- Shaft spillway.

4:- Chute spillway.

5:- Side channel spillway.

6:- Siphon spillway.

7:- Labyrinth spillway.

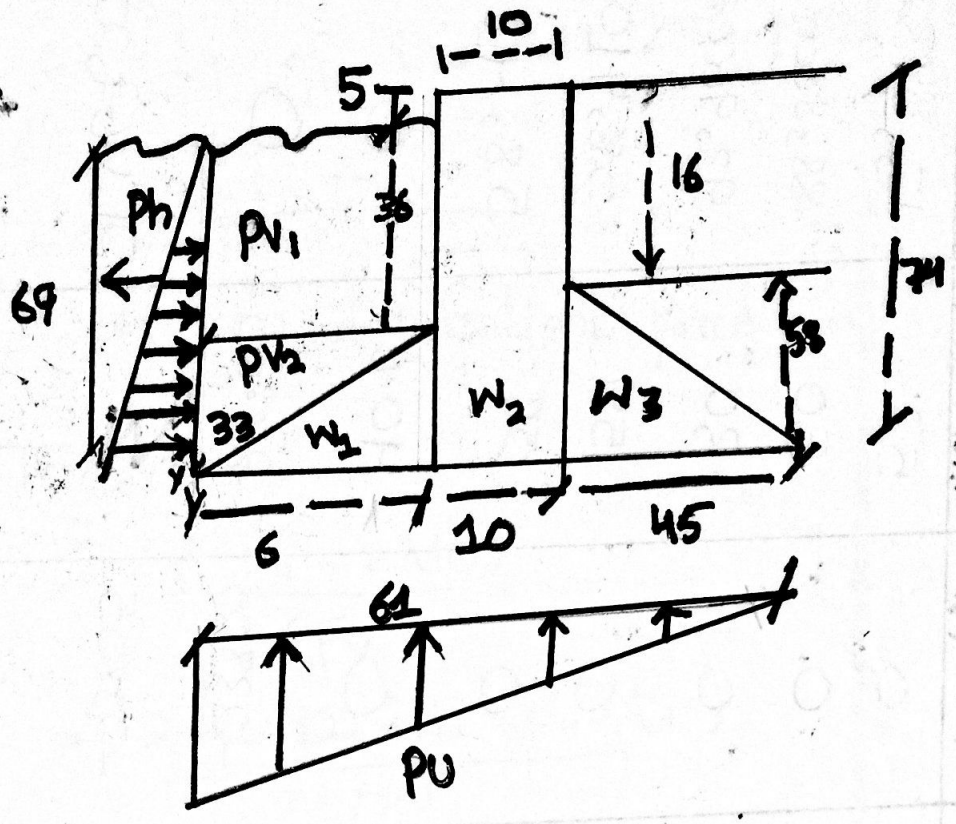
➔ In area's where temperature reaches to freezing point (-10°c) then shift or Bell mouth spillway is provided inthe Dam or Reservior.

Shaft spillway with funnel-shaped inlet is called "morning glory" or "glory hole" spillway. One of its distinguishing characteristics is that near-maximum capacity of the spillway is attained at relatively low heads. Therefore, shaft spillway is ideal when maximum spillway discharge is not likely to be exceeded.

Because of this feature, however the spillway becomes unsuitable when a flow larger than the selected inflow design flow occurs. This disadvantage can be got rid of by providing an auxilliary or emergency spillway and using shaft spillway as service spillway.

⇒ Shaft or Bellmouth spillways are not suitable in climates where substantial ice may form on the reservoir during winter. Also, even for small reservoirs, the size of the bellmouth and its throat must be large enough to allow passage of any debris that might be brought down by river. The bellmouth presents a danger to sailing and fishing boats when the reservoir water level is high. So guards must be fixed around its perimeter; these must also be designed not to hold back floating debris that could restrict the bellmouth discharge capacity.

QNO #03



⇒ Lets unit weight for concrete = 24 KN/m³.

⇒ Lets unity weight for water = 10 KN/m³

Now force calculation & Moment.

Forces	Formulas	Fy (KG)	Fx (KG)	Lever ARM (M)	M_T	M_O
W1	(1/2) x L x W x γd	2376	0	57	13,5432	0
W2	L x W x γd	17760	0	50	88,8000	0
W3	(1/2) x L x W x γd	31320	0	30	93,9600	0
P_{V1}	(1/2) x L x W x γw	990	0	59	58,410	0
P_{V2}	(L) (W) (γw)	2160	0	58	58,410	0
PU	(-(1/2) x L x W x γw)	-21045	0	40.67	0	855830
Ph	(-(1/2) x L x W x γw)	0	-23805	23.00	0	547515
	Σ	33561	-23805	Σ	21,467,22	1403345

⇒ Now factor of saftey Against Tension Condition.

⇒ $e < B/6$

⇒ $B/6 = 10.17\,m$

Now; ecentricity of the Resultant force

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

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

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

$$= \left(\frac{2,146,722 - 1,403,345.}{33,561}\right)$$

$$\bar{x} = 22.15$$

Putting value in (1)

$$e = 10.17 - 22.15$$

So $\boxed{e = 8.35\,m}$

Condition → Safe in Tension → (OK)

→ Now Factor of Saftey Aganist Stress

Condition => $\gamma_{heel} > 0$

$$\Rightarrow \gamma_{Toe} = (\Sigma F_V / B)\left(1 + \frac{60}{B}\right)$$

$$= \left(\frac{33561}{61.02}\right)\left(\frac{1+6\times 8.35}{61.2}\right)$$

$$\boxed{\gamma_{Toe} = 1001.573.}$$

$$\Rightarrow \gamma_{heel} = 98.42 \text{ KN/m}^3$$

So Safe in Stress ⟶ (ok)

⇒ Now factor of Saftey Aganist overturning

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

$$\frac{2146729}{1403345} = 1.53 < 2$$

So Not Safe in overturning

NOW

$$\Sigma M_r > \Sigma M_o$$

$\Rightarrow \Sigma M_r = 2146722$

$\Rightarrow \Sigma M_o = 1403345$

So condition is **OK.**

Now factor of Safety Aganist sliding

$\Rightarrow$ Condition $\longrightarrow \left(\dfrac{\Sigma F_v + B_q}{\Sigma F_H} \right) > 1$

here $q = 1400$

$M = 0.7$ (0.65 to 0.75)

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

$= 4.57 \longrightarrow$ **OK.**

Condition $\longrightarrow$ Safe in Sliding