Paper: Hydraulic Structure

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Q No 1

Ans RESERVIOUR:-

A reservioue is a man made take or large fresh water body of water. Many People think of reservioue as a take & might even use the wood interchangebly. How ever the key diffeence is that reservioue are artificial and made by humans, while take are naturally occuring bodies of water. Reservioue are great because they provide a supply of water for when naturally occuring bodies of water like, lakes or river, sunding

Types of RESERVIOUR:-

1) Mainly three types of Reservioue.
2) Bank-side Reservioue.
3) Service Reservioue

In above three types of reservioue service reservioue is more economical because it is entirly man made. frame construction is easy to construct as well as no need of any natural water bodies

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diversion it also require small space

Q1 B:-

Ans:- An embankment dam is large artificial dam. it is typically created by Placement & compaction of a complex semi-plastic mound of various composition of soil, sand; clay or rocks. It has of semi Previous water proff naturally covering for its surface & a dense, impervious core.

As embackment are categorized as earth fill embackment & Rock fill embackment. Earth fill embackment are the one which consist of 50% or more soil while rocks fill embackment are the one which consist of 50% or more rocks. If we have to build embackment or hilly area we should fill rock fill embackment dam because if has more strenght then soil fill & in hilly area rocks will be easily available which makes over

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Project economical & save.

Q2:

Ans Types of spillways:—

They have the following types.

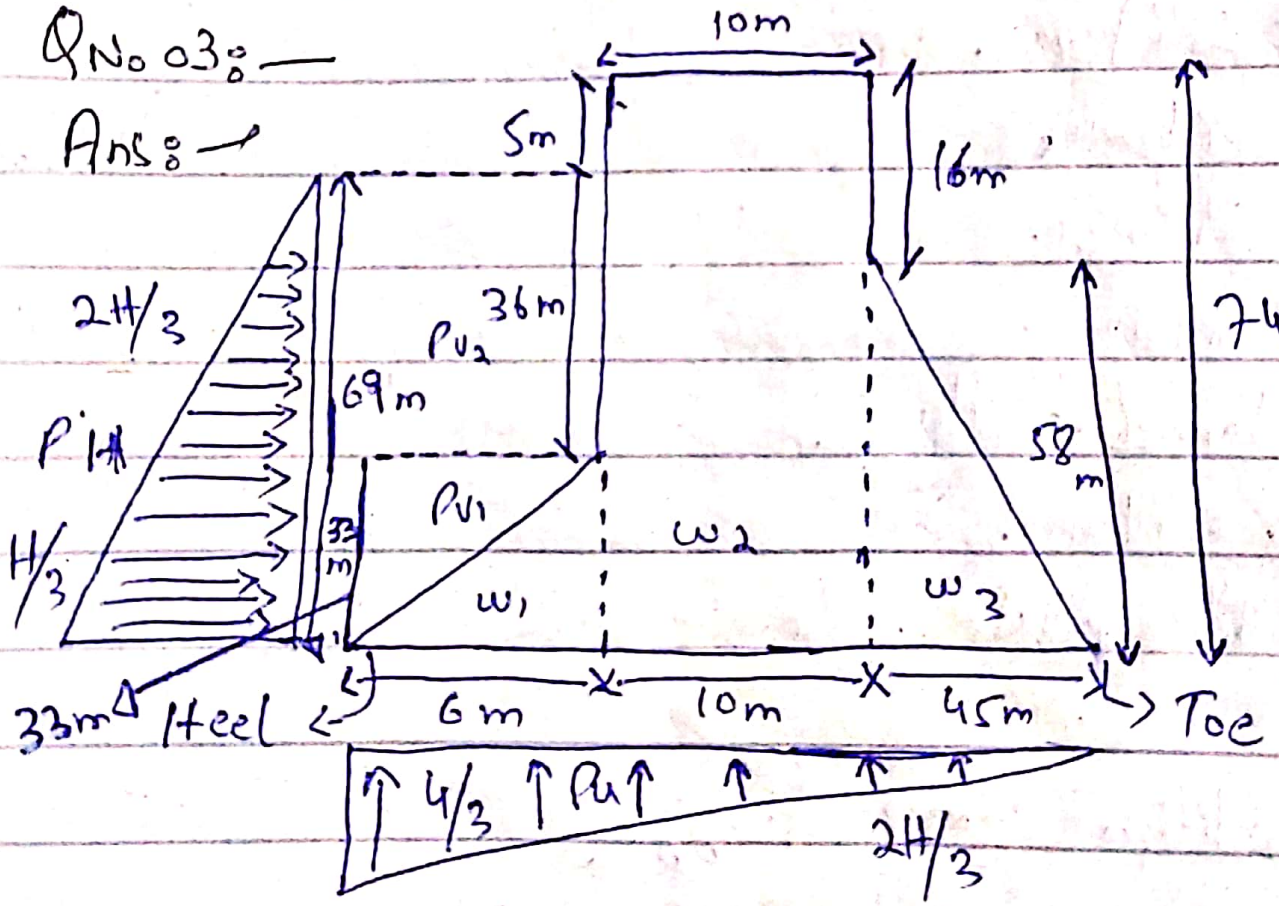
1) Straight spillway.
2) ogee spillway.
3) shaft spillway.
4) Chute spillway.
5) side channel spillway.
6) siphon spillway.
7) Labyrinth spillway.

In condition where freezing point of water is less then to degree centegrade in winter the most efficient spillway is chute spillway. Because chute spillways disposed water from upstream to downstream through steepy sloped open channel so that the flow will be high & will be in supercritical condition that will

dissipates are also provided in this type of spillway. Thus the temp of water go high & it will not allow water to freez & stop so the water will move freely in this cold area.

Q No 03:—

Ans:—



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force	force formulas	Fv (KN)	FH (KN)	lever (Arm) (m)	Mr (Fv x L.A)	Mo
w_1	1/2x33x6x24	2376	0	57.00	135432	
w_2	24x10x74	17760	0	50.00	888000	
w_3	1/2x58x45x24	31320	0	30.00	939600	
P_{v_1}	1/2x6x.33x10	990	0	59.00	58410	
P_{v_2}	6x36x10	2160	0	58.00	125280	
Pu	-1/2x61x10x69	-2145	0	40.67	0	855900.15
Ph	-1/2x69x10x69	0	-23805	23.000	0	547.515
		$\Sigma Fv =$	$\Sigma FH =$		$\Sigma Mr =$	$\Sigma Mo =$
		33561	-23805		2146722	1403415.15

Assume unit weight of concrete = 24kN/m³.
Assume unit weight of water = 10 kN/m³.

Now for factor of safety Against tension

Condition $e < B/6$

$$B/6 = 10.16$$

Now eccentricity e of resultant forces

$$e = \frac{B - \bar{x}}{2}$$ ∴ $\bar{x}$ location of resultant force from toe..

$$\bar{x} = \frac{\Sigma Mr - \Sigma Mo}{\Sigma Fv}$$

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$$= \frac{2146722 - 1403415.15}{33561}$$

$$\boxed{\bar{X} = 22.15}$$

So

$$e = \frac{61}{2} - 22.15$$

$\boxed{e = 8.35 m}$ condition in tension is [ok]

→ for fois Against Stress condition; $\gamma_{heel} > 0$

As

$$\gamma = \frac{\Sigma Fv}{B}\left(1 + 6e/B\right)$$

for

$$\gamma_{toe} = \frac{\Sigma Fv}{B}\left(1 + \frac{6(8.35)}{61}\right)$$

$$\boxed{\gamma_{toe} = 1002.049}$$

Also

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

$$= \frac{33561}{61}\left(1 - \frac{6(8.35)}{61}\right)$$

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

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Condition in safe in stress so [ok]

→ for fos Against over tunning

Condition $\frac{\Sigma M_r}{\Sigma M_o} > 2$

$\Rightarrow \frac{2146722}{1403415.15} = 1.53 < 2$ condition's not [ok]

So condition $[\Sigma M_r > \Sigma M_o)$

$2146722 > 1403415.15$ [ok]

⟹ for fos Against sliding

condition; $\mu \Sigma F_v + B \times q > 1$ ∴ $q = 1400$

$\mu = 0.7 (0.65 - 0.75)$

So $\frac{0.7(33.561) + 61 \times 1400}{23805}$

$= 4.57$

So condition is safe in sliding [ok]