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Subject

Hydraulic structure

Submitted

to

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Q. 1@ Reservoir:

A reservoir is a man-made lake or large freshwater body of water. Many people think of a reservoir as a lake and might even use the words is that reservoir are artificial and lakes are naturally.

Mainly three types of reservoir.

- Valley demand reservoir
- Bank side reservoir
- Service reservoir

In above three types, service reservoirs is most economical because they it is entirely man made. Its frame construction is easily to as well as no need of any natural water body diversion. It also required small space.

Q1 (b) Types of Embankment Dam:-

Types of embankment dam  
Earth fill embankments and Rock fill embankments. Earth fill embankment are those one which consists of 50% or more soil while rock fill embankments are the one which consist of 50% or more rock. If we have to build an embankments in a hilly area, we should built rock fill embankment because rock fill embankment have more strength then earth fill embankments and in hilly area rocks will be easily available. which will make our project economical and save.

Q.2.

### Types of spillways:-

Types of spillways are as follows.

- 1) Straight drop spillway.
- 2) Ogee spillway.
- 3) Chute spillway.
- 4) Shaft spillway.
- 5) Side channel spillway.
- 6) Siphon spillway.
- 7) Labyrinth spillway.

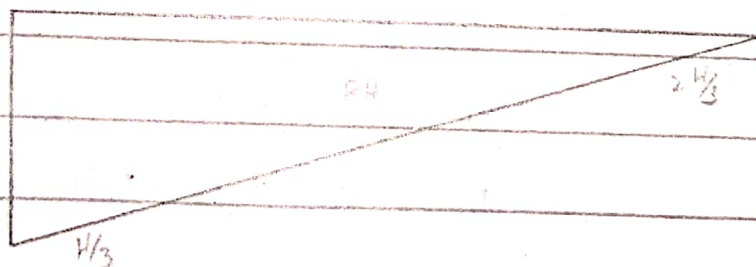
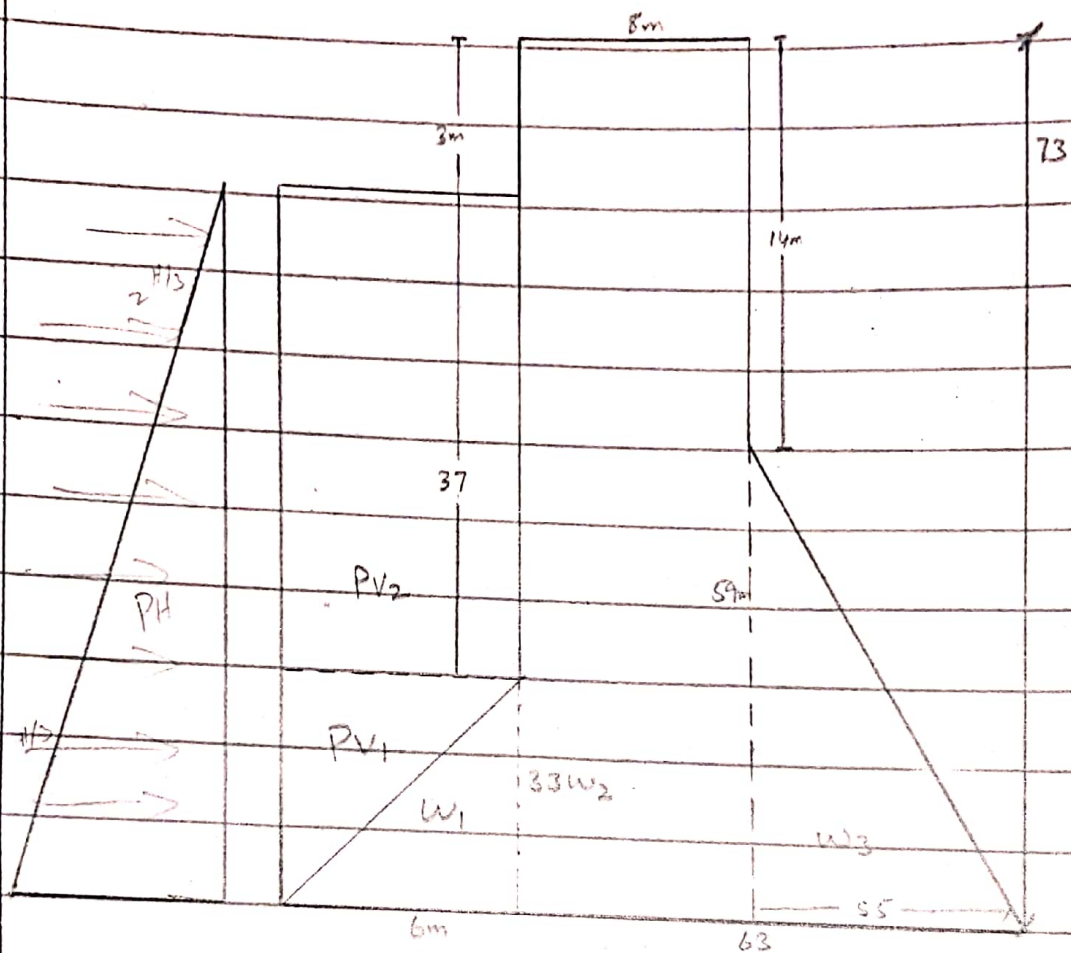
In a condition where freezing point of water is less than  $-10$  degree centigrade in winters the most efficient spillway is chute spillway. Because chute spillway disposed water from upstream to the downstream through a steeply sloped open channel so that the flow will be very fast, the flowing water pressure will be high and will be in supercritical condition. That will dissipate energy

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From the following water, energy dissipator are also provided in this type of spillways. Thus the temperature of water will go high and it will not allow water to freeze and stop. So the water will move freely in this cold area.

Also in this type of spillway as the water flow from steepy channel so that the kinetic energy will take place and increases the temperature of water.

Q3.



Force	Force calculation	F <sub>V</sub>	F <sub>H</sub>	L.A	M <sub>x</sub>	M <sub>0</sub>
W <sub>1</sub>	$\frac{1}{2} \times 6 \times 33 \times 24$	2376		$63 + \frac{1}{3} = 65$	154440	
W <sub>2</sub>	$8 \times 73 \times 24$	14016		$55 + \frac{8}{12} = 59$	826944	
W <sub>3</sub>	$\frac{1}{2} \times 55 \times 59 \times 24$	38940		$55 + \frac{1}{2} = 56.5$	1427929.3	
PV <sub>1</sub>	$\frac{1}{2} \times 6 \times 33 \times 10$	990		$63 + \frac{2 \times 6}{3} = 67$	66330	
PV <sub>2</sub>	$6 \times 37 \times 10$	2220		$63 + \frac{6}{2} = 66$	146520	
P <sub>U</sub>	$-\frac{1}{2} \times 69 \times 70 \times 10$	-24150		$69 \times \frac{2}{3} = 46$		1110900
P <sub>H</sub>	$-\frac{70^2}{2} \times 10$		-24500	$70 \times \frac{1}{3} = 23.3$		570850

$$\sum F_V = 34392 \quad \sum F_H = 24500 \quad \sum M_x = 2622163.8 - 1681750.0$$

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

$$\bar{x} = \frac{2622163.8 - 1681750.0}{34392}$$

$$\bar{x} = 27.34 \text{ m}$$

$$e = 69/2 - 27.34$$

$$e = 7.16 \text{ m}$$

Condition:-

$$e < B/6$$

$$e < 69/6$$

$$7.16 < 11.5 \quad \text{ok safe}$$

$$\gamma_{heel} > 0$$

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

$$\gamma_{toe} = \frac{\sum Fv}{B} \left(1 + \frac{6e}{B}\right) \Rightarrow \frac{34392}{69} \left(1 + \frac{6(7.16)}{69}\right)$$

$$\gamma_{toe} = 808.76 \text{ KN/m}^2$$

$$\gamma_{heel} = \frac{\sum Fv}{B} \left(1 - \frac{6e}{B}\right) \Rightarrow \frac{34392}{69} \left(1 - \frac{6(7.16)}{69}\right)$$

$$\gamma_{heel} = 188.10 \text{ KN/m}^2$$

$$\gamma_{heel} > 0 \quad \text{ok safe.}$$

$$\frac{\sum M_x}{\sum M_o} > 2$$

$$= \frac{2622168.8}{1681750.0}$$

$$= 1.56 < 2 \quad \text{Not safe.}$$



$$\frac{\mu EFU + B \times Q}{EFH} > 1$$

$$\frac{0.75 \times 34392 + 69 \times 1400}{24500}$$

$$4.99 > 1$$

ok safe.