

①

Name: Nadeem Iqbal

ID: 7277

Subject: Hydraulic Structure

Teacher: Engr. Adeed

Q. NO. 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 interchangeably.

However the key difference is that reservoirs are artificial and made by humans.

While lakes are naturally occurring bodies of water, reservoirs are great b/c they provide a supply of water for when naturally occurring bodies of water like lakes or rivers run

## Valley dam reservoir

are created in the valleys b/w mountains. Usually there is an existing lake or body of water. The mountain sides are used as the wall of reservoir to hold the water.

To create a valley dam reservoir the river that will fill the reservoir must be diverted. So the ground can be cleared to lay a foundation for the dam. Next a concrete laying is put in place and dam construction can begin. It can take a year to build a dam. But once it's done, the water pools in the valley and a large source of water becomes available.

①  
b)

## Earthfill Embankments

These may be classified as dam use compacted soil for constructing the bulk of the dam volume.

An earthfill dam is constructed primarily of selected engineering soil compacted uniformly and intensively in the relatively thin layers at a control moisture content.

An embankment may be earthfill dam if compacted soils account for over 50% of the volume of material.

---

Q No: 2

## types of spillway

Ans: Types of spillway

- ① strength drop spillway
- ② ogee spillway
- ③ shaft spillway
- ④ chute spillway
- ⑤ side spillway
- ⑥ siphon spillway
- ⑦ labyrinth spillway

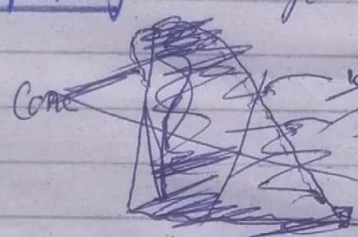
### ① ~~strong~~ ogee-shaped spillway

An ogee-shaped spillway is the most commonly used spillway. It is widely used with gravity dams, arch dams and buttress dams.

Several earth and rock fill dams are also provided with this type of spillway as a super structure. An ogee-shaped spillway has a control weir of ogee-shaped which is like the an elongated english letter. The upper part of the spillway surface matches closely to

to the profile of the lower nappe of a venturated sheet of water falling freely from a sharp outside crested weir. Downstream and upstream profile of ogee spillway

② Chute Spillway

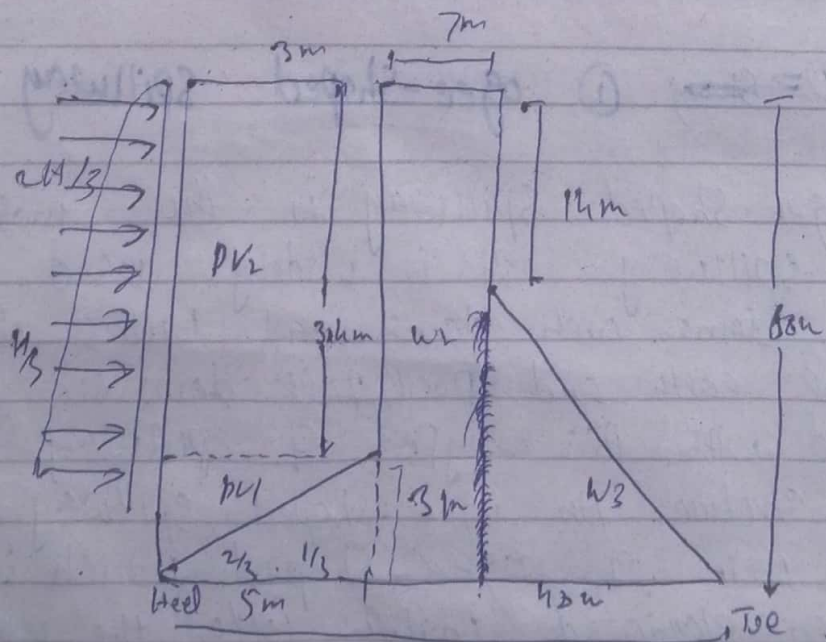


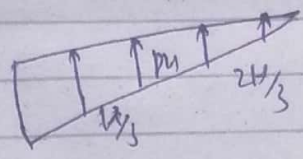
ogee spillway and chute spillway which is more efficient in a condition of while freezing point of water is less than  $-15$  degrees in winter

but these two spillway slope is more than others

Q.No: 3

Gravity dam





Moment Calculation

wt of concrete

Assume =  $\gamma_{\text{concrete}} = 24 \text{ kN/m}^3$

$\gamma_w = 10 \text{ kN/m}^3$

Force	Force Calculn	FV kN	2H	(L-A)	Mv	M <sub>F</sub>
W1	$1/2 \times 5 \times 31 \times 24$	1860		$48.5 \times 1/3$ <del><math>49.67</math></del>	56838	
W2	$7 \times 69 \times 24$	11624		$41 \times 7/2 = 44.5$	276103.4	
W3	$1/2 \times 41 \times 54 \times 24$	26568		$48.5 \times 2/3 = 57.3$	397807	
PV1	$1/2 \times 5 \times 31 \times 10$	775		$48.5/2 = 50.5$	85850	
PV2	$5 \times 34 \times 10$	1700		$53 \times 2/3 = 35.3$		608559.25
Pu	$-1/2 \times 53 \times 65 \times 10$	-17225		$65/3 = 21.67$		457770.75
PH	$-65 \times 10$		-21125		<del><math>\Sigma M_v =</math></del> 14	<del><math>\Sigma M_H =</math></del> 1066338
		$\Sigma F_v =$ 2862	$\Sigma F_H =$ 21125		$\Sigma M_v =$ 1457438.39	$\Sigma M_H =$ 1066338

eccentricity of the resultant force

$$e = \beta/2 + x$$

$\therefore$  location of resultant force from toe

6

$$\bar{x} = \frac{\sum Mr - \sum Mo}{\sum FV}$$

$$\bar{x} = \frac{14524.2839 - 1066338}{25102}$$

$$\bar{x} = 15.3 \text{ m}$$

$$e = B/2 - \bar{x} = 53/2 - 15.38$$

$$e = 11.12 \text{ m}$$

Factor of Safety Against Tension

condition  $e < B/6$

$$e < 53/6$$

$$11.12 < 8.83$$

NOT OK

Stress wheel to

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

$$r_{toe} = \frac{\sum FV}{B} \left( 1 + \frac{6e}{B} \right) = \frac{25102}{53} \left( 1 + \frac{6 \cdot 11.12}{53} \right) = 10$$

$$= 1069.8 \text{ KN/m}^2$$

$$r_{heel} = \frac{\sum FV}{B} \left(1 - \frac{6e}{B}\right) = \frac{15702}{83} \left(1 - \frac{6 \times 11.12}{83}\right)$$

$$= 122.06 \text{ KN/m}^2$$

$\therefore r_{mid} < 0$  Not safe

Factor of safety against overtopping

$$\frac{\sum MV}{\sum MD}$$

$$= \frac{1452488.35}{1066335}$$

$$= 1.36 < 2 \text{ Not safe Fail}$$

$$\sum MV > \sum MD$$

$$1452488.35 > 1066335 \text{ ok Safe}$$