

I-D - 7701

Name

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I-D

7701

Section

B

Instructor

Eng - Adeed

exam

hydraulic Structure

Q1 Reservoir: A natural or artificial place where water is store for use, especially water for supplying a community land etc.

OR

A reservoir is a man made lake or large fresh water body of water. Many people think of a reservoir as a lake and might even use the word interchangeably. Reservoir are great because they provide a supply of water for when naturally occurring bodies water, like lake or river, run dry.

Type of reservoir:

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

Economic Reservoir:

* ~~Service~~ Service reservoir is an economic reservoir because this type of ~~eres~~ reservoir is

entirely man made, & made of concrete structure.

→ The service reservoir also known as distribution reservoir.

→ Service reservoir can be reduce the cost of pumping, by refilling the reservoir at time of day when energy cost is low.

→ This type of reservoir will be constructed on specific area.

for domestic or irrigation purpose it should be close.

Q1 part B

→ ~~A~~ In hilly area we suggest rock fill dam. because rock fill dam

is an economical in hilly area.

→ This type of the dam can be also suitable in area that don't present in best condition for deep foundation.

→ The structure failure of rock fill is 15%.

→ Rock fill have more strength than earth fill.

→ The elevation of rock fill is high than earth fill.

another key - element - benefit is that it can withstand to cold condition hot & humid climates as well.

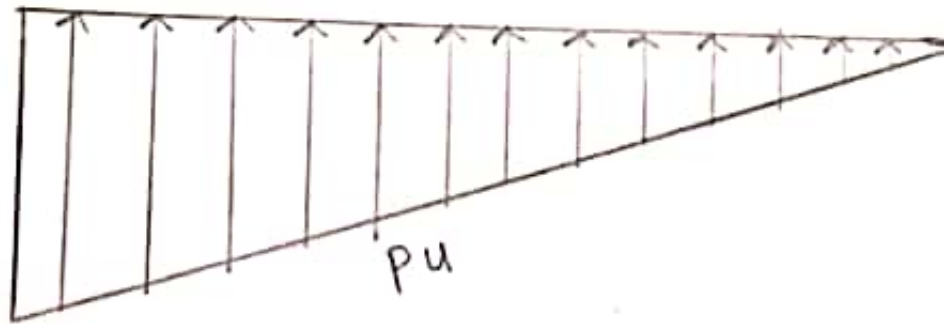
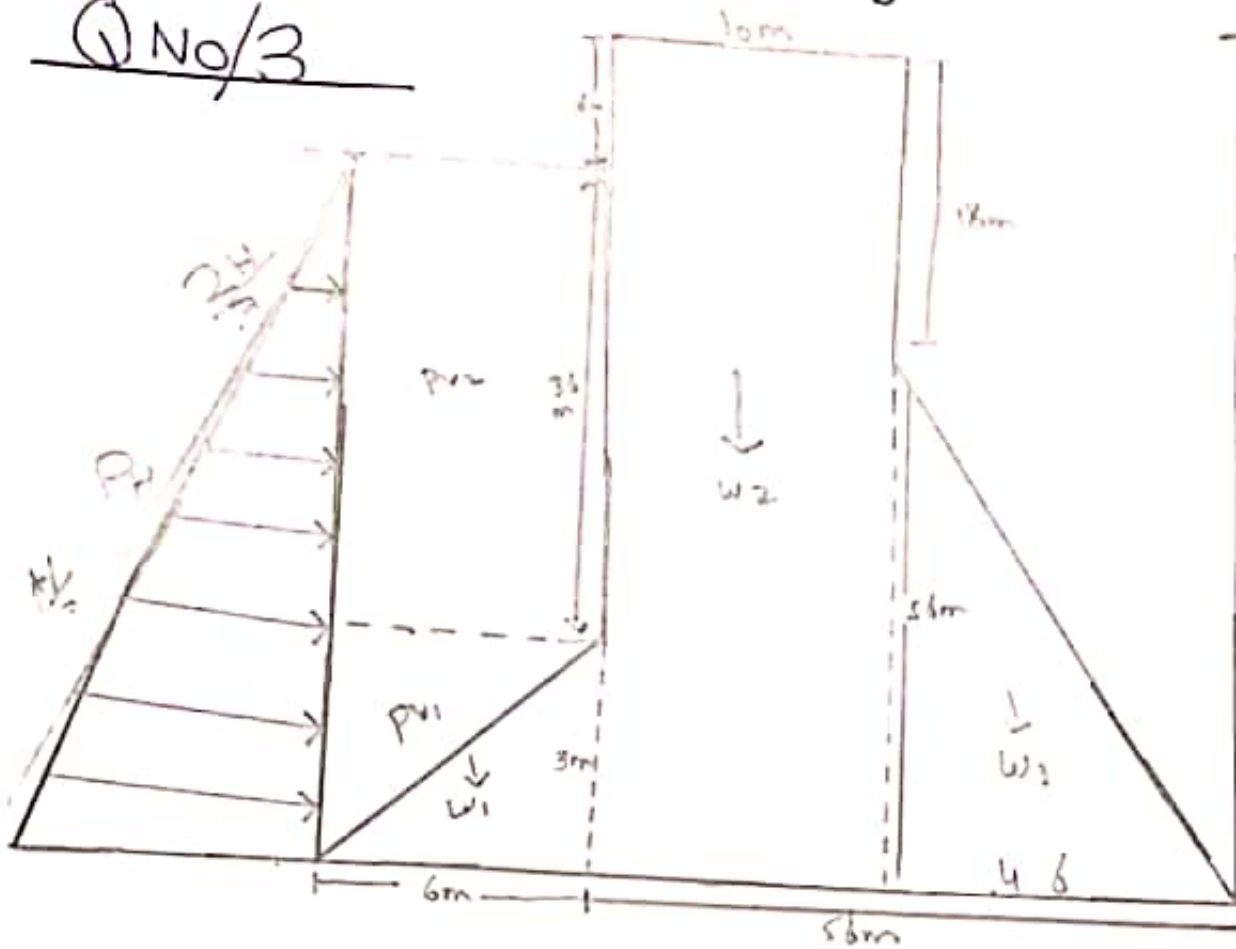
⑤
The flow water pressure will be high and will be in supercritical condition that will dissipate energy from the fully water. Energy dissipate are providing in this type of spill way thus the temperature of water go high and will not allow water to freeze and stop so the water will move freely in the cold area.

So this type of spill ways will be more efficient in a condition where freezing point of water is less than 10 degree centigrade in winter.

4°C the water converted into ice from started, so the chute spill way have steep slope and easily ice come to down stream and dam is safe from failure due to extra load of ice.

Gravity Dam

Q No/3



$$\gamma_d = 24 \text{ kN/m}^3$$

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

Force	force calculation	FV kN	FH (kN)	lever arm	M _R	M ₀
w ₁	$\frac{1}{2} \times 5 \times 32 \times 24$	384		$56 + 6 \times \frac{1}{3} = 58$	2.2272	
w ₂	$10 \times 74 \times 24$	11280		$46 + 10 \times \frac{1}{2} = 51$	654240	
w ₃	$\frac{1}{2} \times 56 \times 46 \times 24$	30192		$\frac{2}{3} \times 4.6 = 30.66$	947769	
p _{v1}	$\frac{1}{2} \times 6 \times 31 \times 10$	930		$56 + 6 \times \frac{3}{2} = 60$	55800	
p _{v2}	$6 \times 36 \times 10$	2160		$48 + 6 \times \frac{1}{2} = 51$	110160	
p _v	$-\frac{1}{2} \times 62 \times 68 \times 10 = 21080$			$68 \times \frac{2}{3} = 45.33$		955556.4
p _H	$-10 \times \frac{(68)^2}{2}$		-23120	$\frac{11}{3} = \frac{68}{3} = 22.66$		523899.2
		$\Sigma FV = 24586$	$\Sigma FH = 23120$		$\Sigma MR = 1790233.9$	$\Sigma Mo = 1479455.6$

Step #1

eccentricity of the resultant

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

$$\bar{x} = \frac{\sum MR - \sum Mo}{\sum F_v} = \frac{1790233.9 - 1479455.6}{24586}$$

$$\bar{x} = 9.55 \text{ m}$$

Fos against Tension

$$e < \frac{B}{6}$$

$$\frac{B}{6} \Rightarrow \frac{62}{6} = 10.33, \text{ so } 9.55 < 10.33 \text{ m}$$

Step #2

$$G_{Toc} = \left(\frac{\sum F_v}{B} \right) \left(\frac{1+6e}{B} \right) \quad G_{net} = \left(\frac{\sum F_v}{B} \right) \left(\frac{1-6e}{B} \right)$$

$$G_{Toc} = 881.6$$

$$= 88.51$$

$$G < 0$$

Not ok

Step #3

FOS against Turning

$$\frac{\sum MR}{\sum M_0} > 2$$

$$\frac{17902339}{14794556} = 2.21$$

$$2.21 > 2 \quad \text{OK}$$

Step #4

FOS against Sliding

$$= \frac{\mu \sum F_v + B \cdot q}{\sum F_H}$$

$$q = 1400$$

$$\mu = 0.7$$

$$= \frac{0.7 \times 24586 + 62 + 1400}{23120}$$

$$23120$$

$$= 4.49 > 1 \quad \text{OK}$$

