IQRA NATIONAL UNIVERSITY

HYDRAULIC STRUCTURES

QUIZ

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ID = 7775

SECTION = (A)

MODULE= 8th SEMESTER

INSTRUCTOR = ENGR.ADEED KHAN

Hydraulic Structures

Q# 01

a) Define reservioue also explain which type of reservioue will be more encnomical and why?

Ans:

Reservoir

A reservoir is a man-made lake or large freshwater body of water. Reservoir mean a "Tank". A reservoir is, most commonly, an elarged natural or artificial lake, Pond and or Impoundment created using a dum or lock to store water. And reservoir axe artificial and lakes are naturally.

Mainly three types of reservioue.

1) Valley damed reservioe

2) Bank - side reseovioe

3) Service reservioe

Service reservoir will be more economical as compared to other type of reservoir. It is also known as "Distribution reservoir". These are the storage reservoir, which stored treated water.

"Reasons"

Service reservoirs store fully treated putable water close to the point of distribution. So need less cost and energy for distribution of water. It perform several functions:

- ensuring sufficient head of water in the water distribution system.
- Providing water capacity to even out peak demand from consumers.

Large service reservoirs are also be managed to reduce the cost of pumping.

Q# 01
Part (b)

Which type of Embankment dam you will suggest in a hilly area and why?

Ans:

There are two types of embankment Earth fill embankment and Rock fill embankment Earth fill embankment are the one which consists of 50% or more soil while rock fill embankment consits 50% or more rocks

"Rockfill Embankment dam"

Rockfill embankment dams are best and economical in hilly areas.

=> One of the most important aspects of a rockfill dam is that it can be very cheap and economical since materials can be sourced from near the dam's location.

=> Rockfill dams are appropriate for construction at location where rock can be quarried at near dam site. This type of dam also be suitable in areas that don't present the best conditions for deep foundations.

=> Can withstand to cold conditions, hot and humid climates, as well.

=> Another that Rockfill dam is that can be very cheap materials can be taken near the dam's location.

Q # 2

a) List down different types of spillways also mention which type of spillway will be more efficient in a condition where freezing point of water is less then -10 degree centigrade in winters and why?

Ans:

Spillways:

Types:

Different types of spillways are as follow;

i) Side channel spillway
ii) Siphon spillway
iii) Labyrinth spillway
iv) Straight drop spillway or Free overfall spillway.
v) Shaft spillway
vi) Ogee spillway
vii) Chute spillway or open channel spillway.

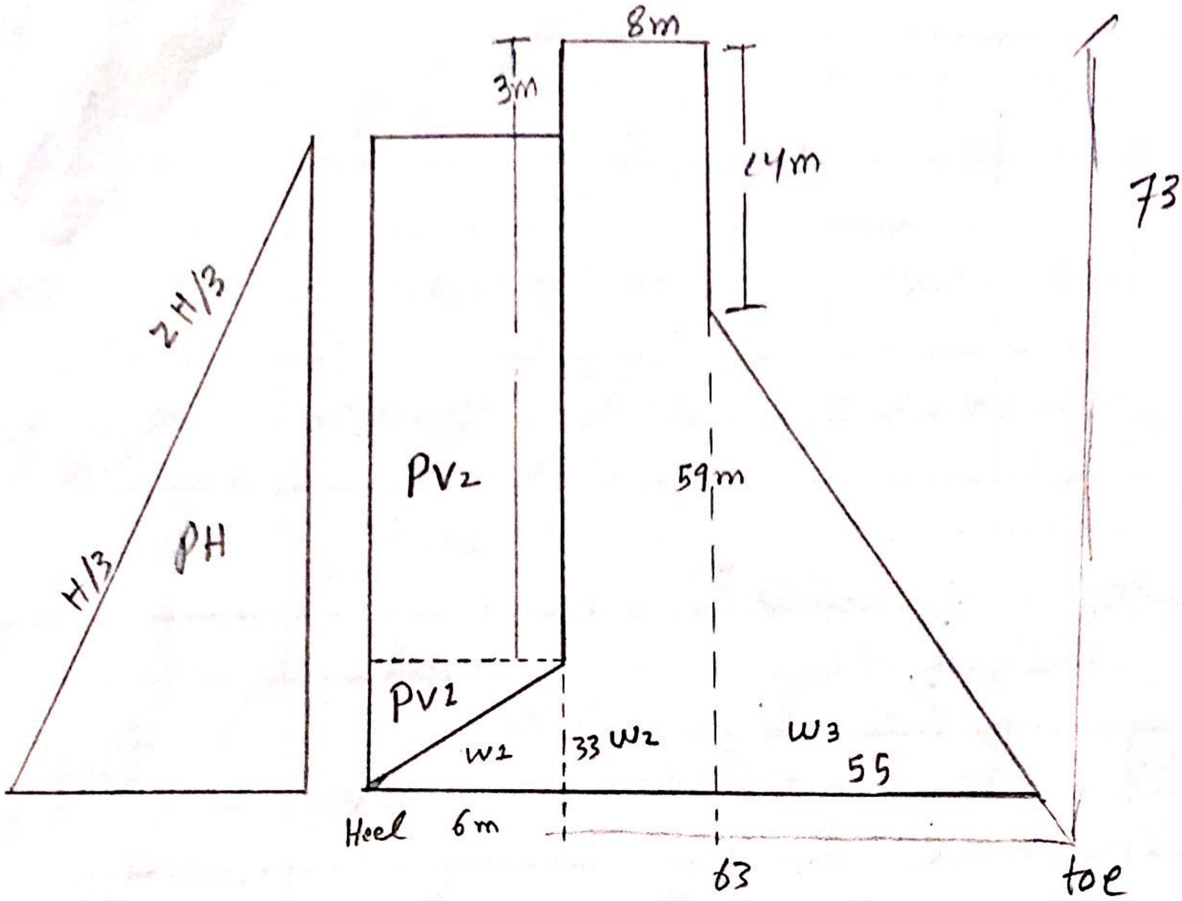
In a condition where freezing point of water is less than -10 degree centigrade in winter the most efficient spillway is chute spillway. Because chute spillway which surplus water from upstream is disposed to the downstream. It is generally constructed at one end of the dam or separately away from the dam in a natural saddle in a bank of the river.

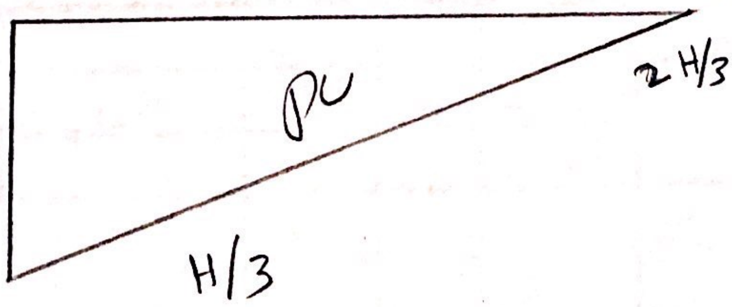
Chute spillways is suitable for gravity dams, earthen dams, rockfill dams, etc. And the flow will be very fast the following water pressure will be high and will be supercritical condition. That will dissipate energy from the falling water, energy dissipators are also provided in this type of spillway thus the temperature of water will go high and it will not allow water to freez and stop. So the water will move freely in this cold area. Chute spillway is also called as trough spillway or open channel spill way. The flow should be always in super critical condition.

Q# 03 (Problem)

a) Design the gravity dam by assuming - - -

- - - - - - - - - - - - - - - - Pressure.





Forces	Force Calculation	FV (KN)	FH	L.A	Mr	Mo
W_1	$\frac{1}{2} \times 6 \times 33 \times 24$	2376		$63+6/3=65$	154440	
W_2	$8 \times 73 \times 24$	14016		$55+8/2=59$	826944	
W_3	$\frac{1}{2} \times 55 \times 59 \times 24$	38940		$55 \times \frac{2}{3}=36.67$	1427978	
P_{V1}	$\frac{1}{2} \times 6 \times 33 \times 10$	990		$63+\frac{2\times6}{3}=67$	66336	
P_{V2}	$6 \times 37 \times 10$	2220		$63+6/2=66$	146520	
P_u	$-\frac{1}{2} \times 69 \times 70 \times 10$	-24150		$69 \times \frac{2}{3}=46$		1110900
P_H	$-\frac{70^2}{9} \times 10$		-24500	$70 \times 1/3 = 23.3$		570850

$\Sigma F_V = 34392$ $\Sigma F_H = 24500$ $\Sigma M_R = 2622163.8$ | 1681750.0

Condition

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

$$e < \frac{69}{6}$$

$7.16 < 11.5$ ok safe

$\gamma heel > 0$

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

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

$\gamma toe = 808.76 \ kN/m^2$

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

$\gamma heel = 188.10 \ kN/m^2$

$\gamma heel > 0$ ok safe

$$\frac{\Sigma Mr}{\Sigma Mo} > 2$$

$$= \frac{2622163.8}{1681750.0}$$

$1.59 \not> 2$ not safe

$\Sigma Mr > \Sigma Mo$

$2622163.8 > 1681750.0$ safe.

$$\frac{\mu \Sigma FV + B \times 2}{\Sigma FH} > 1$$

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

$4.99 > 1$ ok safe.