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Sec :- "C"

Subject :- hydraulic structure

Submitted to :- Sir Adeed

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Q1)(a):- Reservior

A reservior is a man made fresh body of water. Many people think of a reservior as a lake and might even use the words interchangably. However the key difference is that reservior are artificial and lakes are naturally.

Three types of Reservior:-

=> Valley dammed reservior.

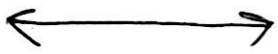
=> Bank-side reservior.

=> Service reservior.

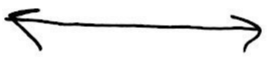
More economical Reservior:

In all above reservior Bank side reservior is most economical.

Bank side reservior is that which is made by diverting water from local reservior or streams to an existing reservior. It is economical because in this only water is diverted from a local river, there is no need of large construction of reservior only construction is done for diversion of water.



Q(1)(b):- I suggest the rock fill embankment in hilly areas because the rocks are used in embankment are easily available in hilly areas as compared to clay and sand, which is not available in hilly areas. There are more rains in hilly areas and rock fill dam does not allow water to pass through embankment as compared to earthfill embankment. which is easy to build and rigid structures are self supported by their weights.



Ans 2):- A spillway is a hydraulic structure built at a dame site for diverting the spurplus water from a reservior after it has been filled to its maximum capacity. spillways are classified into different types on the basis of the arrangement of control structure. Following are the most commonly used spillway.

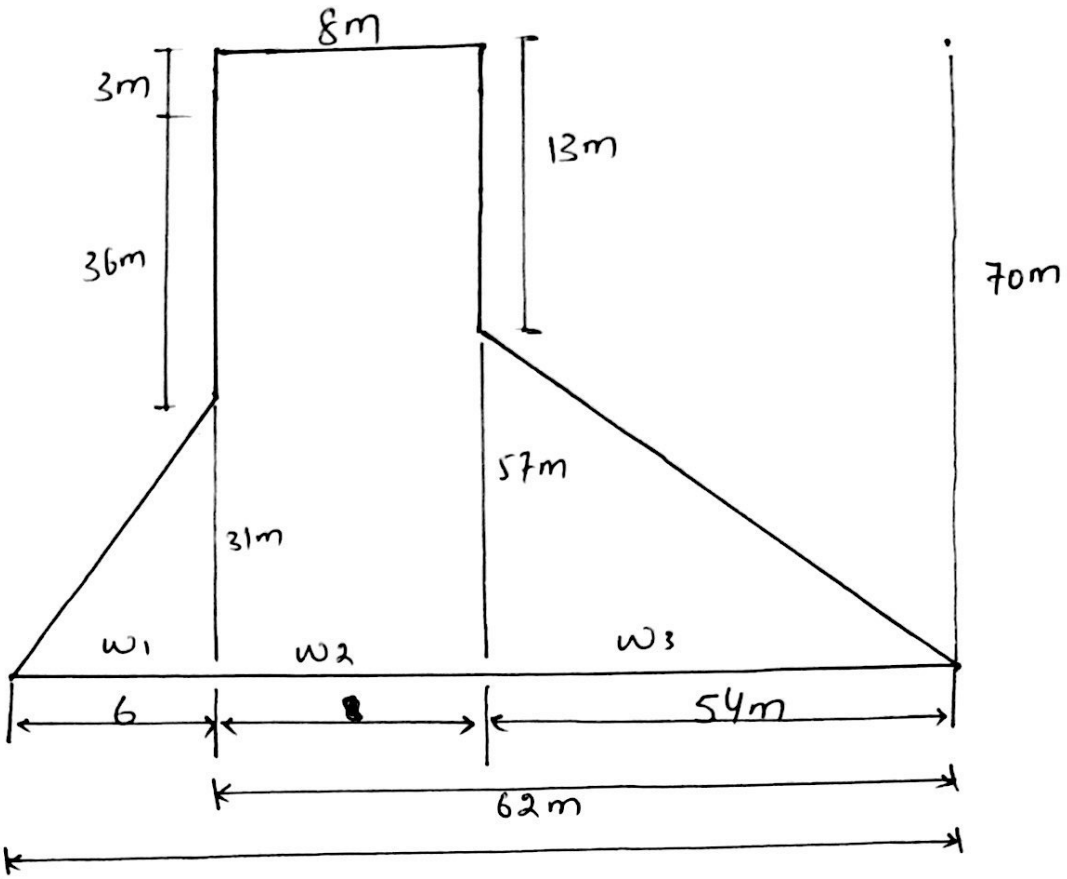
=> side channel spillway.
=> Labyrinth spillway.
=> chute spillway.
=> Shaft spillway.
=> Ogee spillway. (More efficient).
=> straight Drop spillway.
=> siphon Spillway.

Spillway More efficient in condition where Freezing Point of water is Less than -10C in winter:

Ogee spillway:- Saline water have freezing point less than -10C in winter so the dam constructed on river with high salinity is mostly concrete gravity Dam For concrete gravity dam ogee spillway are often most commonly used, and is located within the dam body hence whenever there is surplus water it will be freely disposed of through ogee spillway along its ogee shaped crest.

Why:- As the spillway is an improved from of drop spillway and also it is most commonly used in concrete gravity dam Following are the key feature.

(Q3):-



Force	Force cal	FV	FH	L.A	MY	Mo
w_1	$\frac{1}{2}\times 6\times 31\times 24$	2232		$62+\frac{6}{3}=64$	142848	
w_2	$8\times 70\times 24$	13440		$54+\frac{8}{2}=58$	779520	
w_3	$\frac{1}{2}\times 54\times 57\times 24$	36936		$54+\frac{2}{3}=36$	1329696	
PV_1	$\frac{1}{2}\times 6\times 31\times 10$	930		$62+\frac{2\times 6}{3}=66$	61380	
PV_2	$6\times 37\times 10$	2220		$62+\frac{6}{2}=65$	144300	
PV	$-\frac{1}{2}\times 68\times 67\times 10$	-22780		$68\times\frac{2}{3}=45.33$		1032617.4
PH	$-\frac{67^2}{2}\times 10$		-22445	$67\times\frac{1}{3}=22.3$		500523.5

$\Sigma F_V = 32978$

$\Sigma F_H = 22445$

$\Sigma M_R = 2457744$

$\Sigma M_O = 1533140.9$

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

$$\bar{x} = \frac{2457744 - 1533140.9}{32978}$$

$$\bar{x} = 28.036 m$$

$$e = \frac{68}{2} - 28.036$$

$$e = 5.96 m$$

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

$$e < \frac{68}{6}$$

$5.96 < 11.33$ ok safe.

theel > 0

$$f = \frac{\Sigma F_V}{B}\left[1 + \frac{6e}{B}\right]$$

$$f = \frac{32978}{68}\left[1 + \frac{6(5.96)}{68}\right]$$

$\gamma toe = 484.97(1.525)$

$\gamma toe = 740.007$

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

$= \frac{32978}{68}\left[1 - \frac{6(5.96)}{68}\right]$

$= 229.93$

$\gamma heal > 0$ ok safe

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

$= \frac{2457744}{1533140.9}$

$1.60 < 2$ not safe

$\Sigma M_r > \Sigma M_o$

$2457740 > 1533140.9$ ok safe.

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

$= \frac{0.75 \times 32978 + 68 \times 1400}{22445} > 1$

$= 5.343 > 1$ ok safe.