

RESERVOIR:-

It is a french word,
Reservoir means a "tank."

It is most commonly an
elevated natural or artificial
lake, ponds or impoundment
created using a dam or
lock to store water

OR

A natural or artificial
place where water is collected
for use, especially water
for supplying community,
irrigation lands, power etc

(ii) Service Reservoirs:-

It will be more economical
as compared to other types
of reservoirs. It is also
known as distribution reservoir.
These are storage reservoirs
which store treated water.

Reasons:

(i) Service reservoirs store fully treated portable water close to the point of distribution so need less cost and energy for distribution of water.

(ii) Service reservoir perform several functions.

- Ensuring sufficient need of water in the water distribution system.

- providing water capacity to even out peak demand from consumers.

(iii) Large service reservoirs can also be managed to service the cost of planning by refilling the reservoir at time of day when energy cost are low.

(b) Rockfill Embankment dam:-

Rockfill embankment dams are best and economical in valley areas. Because Rockfill dams are appropriate for construction at locations where suitable rock can be ~~found~~ ^{qualified} at or needed to build the dam site. and where the foundations will not be subjected to loading or to erosion from any leakage through or under the dam.

- 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 dam location.

- This type of dam can also be suitable in areas that don't present the best conditions for deep foundation.

(4)

7 The section of compacted granular soil type helps to slow the flow of water while the impervious zone provide strength and stability during heavy rainfall and flood.

- Another key benefit is that it can withstand to cold conditions, hot and humid climates as well.

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Ans 21- Spillways:-
Types:-

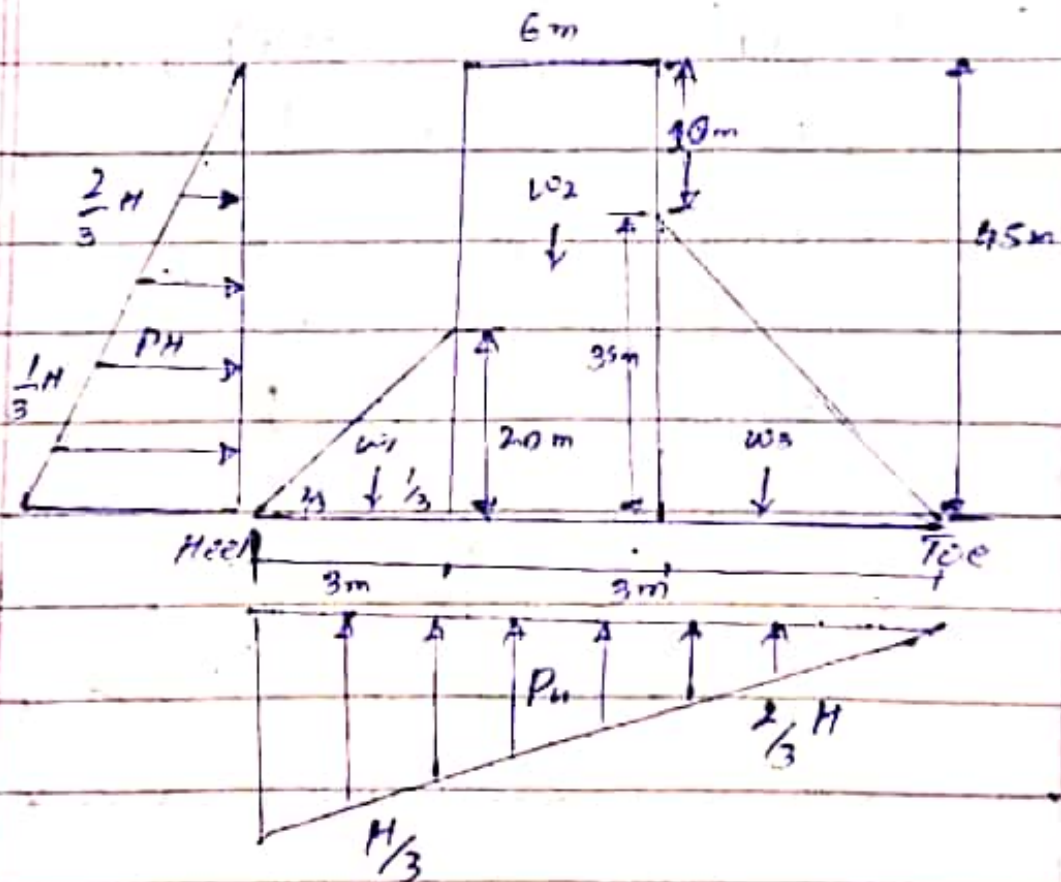
* Different types of spillway are-

- (1) Straight drop spillway.
- (2) Ogee spillway.
- (3) Shaft spillway.
- (4) chute spillway.
- (5) side channel spillway.
- (6) Siphon spillway.
- (7) Labyrinth spillway.

★ Graph dams:

Ans:-

For the graph dam as shown in the figure we will check the stability. In reservoir full condition considering weight of dam, water pressure, and weight pressure.



Moment Calculation:-

Forces	Force Calculation	F_v (kN)	F_H (kN)	L.A (cm)	M_H	M_o
W_1	$\frac{1}{2} \times 3 \times 20 \times 24$	720		$31 + 3 \times \frac{1}{3}$ = 32	23040	
W_2	$6 \times 15 \times 24$	6480		$25 + 6 \times \frac{1}{2}$ = 28	181440	
W_3	$\frac{1}{2} \times 25 \times 35 \times 24$	10500		$31 + \frac{2}{3}$ = 21	220500	
P_{v1}	$\frac{1}{2} \times 3 \times 20 \times 10$	300		$31 + 3 \times \frac{2}{3}$ = 33	9900	
P_{v2}	$3 \times 23 \times 10$	690		$31 + 3 \times \frac{2}{3}$ = 32.5	22475	
P_{u1}	$-\frac{1}{2} \times 34 \times 42 \times 10 = -7140$			$33 \times \frac{2}{3}$ = 22		159080
P_H	$-\frac{413^2}{2} \times 10$		-9285	$43 \times \frac{1}{3}$ = 14.33		132480.85
		ΣF_y	ΣF_H		ΣM_H	ΣM_o
		= 11550	= -9285		= 457305	= 2289560.85

(8)

Essentricity:-

Given as

$$e = \frac{B_1}{2} - \bar{x} \rightarrow (A)$$

$$\bar{x} = \frac{\sum Mx - \sum Mo}{\sum Fv} = \frac{4157305 - 2847560.85}{11550}$$

$$\bar{x} = 14.52$$

By putting values of "A"

$$e = \frac{34}{2} - 14.52 = 17 - 14.52$$

$$e = 2.48$$

"1" Factor of Safety for
tension

$$e < \frac{B_1}{6}$$

$$2.48 < \frac{34}{6}$$

$$2.48 < 5.67 \text{ (OK)}$$

* ————— *

(91)

(2) Stresses :- $\gamma_{heel} > 0$

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

$$\gamma_{Toe} = \frac{\Sigma Fv}{B} \left(1 + \frac{6e}{B} \right)$$

$$= \frac{11550}{34} \left(1 + \frac{6(2.48)}{34} \right)$$

$$= (339.71)(1 + 0.44)$$

$$= (339.71)(1.44)$$

$$\gamma_{Toe} = 502.778$$

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

$$= \frac{11550}{34} \left(1 - \frac{6(2.48)}{34} \right)$$

$$= 11550(1 - 0.44)$$

$$\gamma_{heel} = 190.2470 \text{ (OK)}$$

(3) Factor of Safety Against overturning:-

Given as,

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

$$\frac{457305}{289560.85} > 2$$

$$(1.58 > 2)$$

not safe

$$\sum M_r > \sum M_o$$

$$(457305 > 289560.85)$$

(safe)

(4) FOS against sliding:-

$$\frac{\mu \sum F_v + Bq}{\sum F_H} > 1$$

$$\frac{(0.7)(11550) + (34)(1400)}{9245} > 1$$

$$\frac{8085 + 47600}{9245} > 1$$

$$(6.02 > 1) \text{ (OK)}$$

Thus our design is safe.

Given

$$\mu = 0.7$$

$$q = 1400$$

$$0.65 - 0.75$$