⇒ Name: Manzoor Khan

⇒ Subject: Hydraullic Structure

⇒ Semester: 8th

⇒ Teacher: Engr. Adeed Khan

⇒ Exam: Mid Term

⇒ ID: 7678

⇒ Section: C

QNo 1:

Ans (a)

Reservior:

A reservior is a man-made lake or large freshwater body of water.

Explaination:

There are three main type of Reservior; valley-dammed reservior, hand side Reservior and Service Reservior.

Service Reservior is more economical because Service Reservior store fully potable water close to the point of distribution.

Also Service Reservior are man-made, it perform several functions, including ensuring sufficient head of water in the water distribution system and providing water capacity to even out peak demand from consumers, enabling the treatment plant to run at optimum efficiency.

Large Service Reservoirs can also be managed to reduce the Cost of pumping, by ~~refil~~ refilling The reservior at times of day when energy costs are low.

☆ ☆

Q No 1

Ans: (b) There are two type of embankments dams.

(1) Earth fill Embankments.

(2) Rock fill Embankments.

So in hilly Area Rockfill Embankment dams are built, because rock fill Embankment Consist of 50-/. of rocks material and rocks are easily Available. Also; It is made from dumped and Compacted rock fill. While Earthfill dam are made up mostly of Compacted Earth.

Rockfill dam are permeable. They have an impermeable Core on the upstream ~~Side~~ face of the dam to prevent Seepage Through the porous Core. So Rock fill dam are economical and Safe.

Q=NO:02 (4)

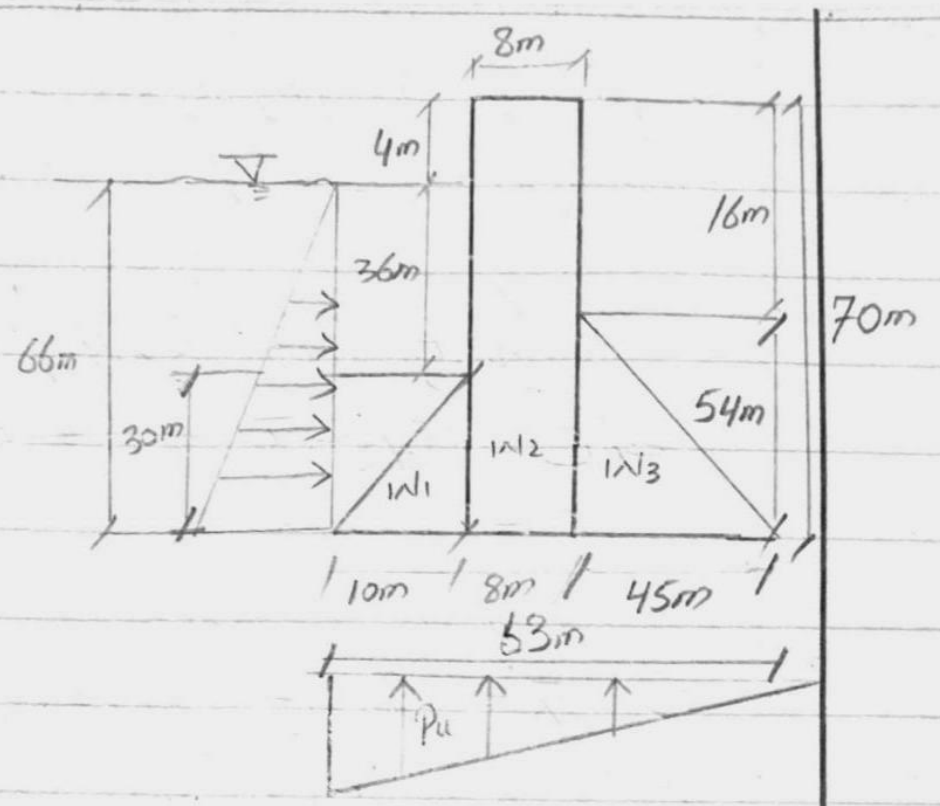
Answer: There are Several different types of Spillway Which are given below

1. Straight drop Spillway
2. Ogee Spill-Way
3. Shaft Spillway
4. Chute Spillway
5. Side channel spillway
6. Siphon Spillway
7. Labyrinth Spillway

Explaination: Chute Spillway is one of the most efficient Spillway. It is used in the area where temperature is less than -10degree. Because Cute Spillway disposed water from upstream to down stream through steepy sloped open Channel. So that the flow will be very fast. The flowing water pressure will be high and will be in Supercritical Condition that will dissipate energy are also provide in this type of Spillway. Thus the temp of water go high and will not allow water to freez and stop So the water will moves freely in this Cold Area.

Q No3

Ans:



=> Assume unit wt for Concrete = 24 kN/m³

=> Assume unit wt for water = 10 kN/m³

Now force & Moment Calculation.

Forces	Forced Formula	Fv(kN)	FH(kN)	Lever Arm (m)	MR	Mo
W1	$\frac{1}{2} \times L \times W \times \gamma_d$	3600	0	56.33	202800	0
W2	$L \times W \times \gamma_d$	13440	0	49.00	658560	0
W3	$\frac{1}{2} \times L \times W \times \gamma_d$	29160	0	30.00	874800	0
Pv1	$\frac{1}{2} \times L \times W \times \gamma_w$	1500	0	59.67	89500	0
Pv2	$L \times W \times \gamma_w$	3600	0	58.00	208800	0
Pu	$(-(1/2) \times L \times W \times \gamma_w)$	-20790	0	42.00	0	873180
Ph	$(-(1/2) \times L \times W \times \gamma_w)$	0	-21780	22.00	0	479160
	Σ	30510	-21780	Σ	2034460	1352340

⇒ For factor of Safety Against Tension;

Condition → $e < B/6$ → $B/6 = 10.50m$

eccentricity of the Resultant force

$\Rightarrow e = B/2 - \bar{x}$ ——→ (i)

$\bar{x}$ = location of Resultant force from toe.

$\Rightarrow \bar{x} = \frac{\Sigma M_r - \Sigma M_o}{\Sigma F_v} = \frac{2034460 - 1352340}{30510}$

$\Rightarrow \bar{x} = 22.36$

Putting value we get

So $e = \frac{63}{2} - 22.36$

$$\boxed{e = 9.14\ m}$$

Condition → Safe in tension → ok.

⇒ For factor of Safety Against Stress.

→ Condition → $\gamma_{Heel} > 0$

Now,

$\gamma = (\Sigma F_v / B)(1 \pm 6e/B)$ ——→ (A)

Now from Eq (A) we get

$\gamma_{Toe} = (\Sigma F_v/B)(1 + 6e/B)$

$\gamma_{Toe} = 905.97128 \ kN/m^3$

and

$\gamma_{Heel} = (\Sigma F_v/B)(1 - \frac{6e}{B})$

$= \left(\frac{30510}{63}\right)\left(1 - \frac{6 \times 9.14}{63}\right)$

$\boxed{\gamma_{Heel} = 62.72 \ kN/m^3}$

Condition → Safe in Stress → ok.

⇒ For Factor of Safety Against overturning.

Condition → $(\Sigma M_r/\Sigma M_o) > 2$

⇒ $\frac{2034460}{1352340} = 1.50 \not> 2$

Condition → Not Safe in overturning → Not ok

⇒ Condition $\Sigma M_r > \Sigma M_o$

$\Sigma M_r = 2034460$

$\Sigma M_o = 1352340$

Condition → Safe → ok

⇒ For Factor of Safety Against Sliding.

Condition → $\dfrac{(\mu \Sigma F_V + B q)}{\Sigma F_H} > 1$

$\therefore q = 1400$

$\mu = 0.7$

putting value we get.

$$= \frac{0.7 \times 30510 + 63 \times 1400}{21780}$$

$$= 5.03 > 1$$

Condition Safe in Sliding

End.