Name	Aamar Ghafoor
ID	7728
Section	A
Submitted To	Engr. Adeed Khan
Subject	Hydralic Structure

Q 1) Part (a)

Ans

A reservoir is an artificial take or large fresh water body. Reservoir is generally used to store a large supply of water for use in several purposes.

Mainly there are three type of reservoir.

A) Valley - dammed reservoir
B) Bank side reservoir
C) Service reservoir

In above three the most economical reservoir is service reservoir because there is no need of diversion of any natural body.

Its frame construction is also easy as compared to valley dammed reservoir and Bank side reservoir.

Service reservoir also gives suitable pressure for the distribution system and also reduce the pressure fluctuations.

It also gives a steady or different phased out.

Q No 1 (b)

Ans.

Rockfill embankment dam is Suitible in hilly areas because:

It consist over 50% rock fill material which are more Streogthen than earthfill embankment dam.

The Structure are more effective because the force of the water from hilly area's sloping hits the impervious zone and is transfered to the paved transition zone where water can slowley begin to filter through the dam.

It is easly to construct in hilly areas because the material (Rocks) is easily avalibe in hilly Areas.

Rockfill embankment dam its can bear the pressure of Water coming from the hill Areas.

Q No 2

Different type of Spillways.

A) Strength drop Spill way
B) Ogee Spill way
C) Shaft spill way
D) Siphon Spill way
E) Labyrinth spill way
F) Chute Spill way
G) Side Channel spill way

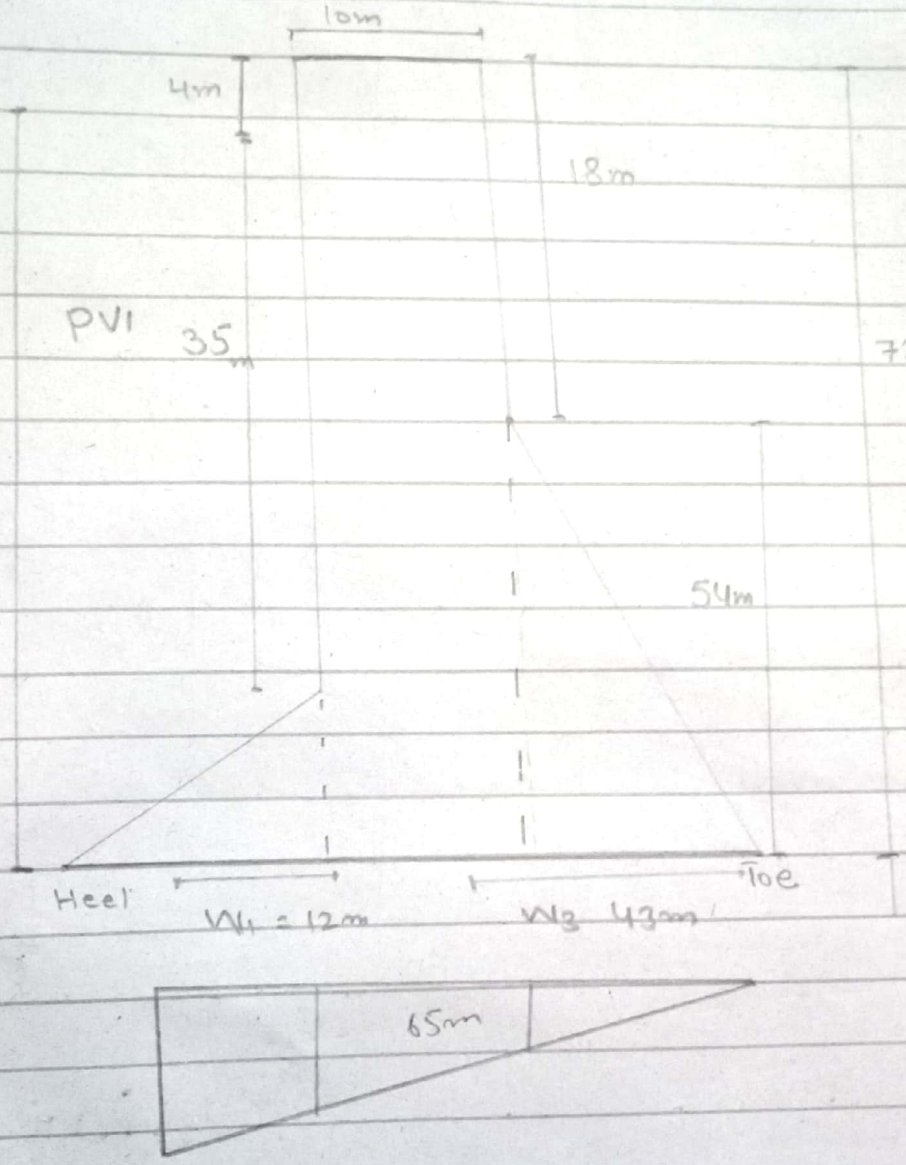
Ogee Spill way is gernally more efficent. in a condition where freezing point of water is less than 10 degree centigrade becuse the down Stream profile of the spillway is made to conincide with the shape of the lower nappe of the free faling Jet from the Sharp creasted weir. In this shape the lower nappe is similar to a projectile and hence down Stream surface of the ogee spillway will follow parabolic path where "O" is the origin of parabola.

Ogee spill way is also best for this condation because in this tempratire the head is maximum and when spill way runs with maximum

head the overflowing water just follow the curve profile of the spillway and ther is no gap between the water spill way surface so dis-charge is Maximum.

ID 7728

Q3:: Design The gravity dam by assuming ..... uplift pressure



24KN/m³ Assume Unit Weight for concrete

γ_w = 10KN/m³ Assume Unit Weight for Water

Forced And Moment Calculation

7728

Forces	Forced Forulas	FV(KN)	FH(KN)	Lever Arm (m)	M_R	M_o
W_1	$(\frac{1}{2})\times L\times W\times \gamma_d$	4752		57.0	270864	
W_2	$L\times W\times \gamma_d$	17280		48.0	829440	
W_3	$(\frac{1}{2})\times L\times W\times \gamma_d$	27864		28.67	798868	
P_{V_1}	$(\frac{1}{2})\times L\times W\times \gamma_w$	1980		61.0	120780	
P_{V_2}	$L\times W\times \gamma_w$	4200		59.0	247800	
P_u	$(-\frac{1}{2})\times L\times W\times \gamma_w$	-22100		43.33		957666.67
P_h	$(-1\frac{1}{2})\times L\times W\times \gamma_w$		-23120	22.67		524053
		Σ33976	+23120		2267652	1481720

For Factor of Saftey Against Tension

condation $\rightarrow e < B/6 = \frac{65}{6} = 10.83\ m$

Ecentricity of the resultant force.

$e = \frac{B}{2} - \bar{x}$: $\bar{x}$ location of resultant force from Toe

$$\bar{x} = \frac{\Sigma M_r - \Sigma M_o}{\Sigma F_V} = \frac{2267652 - 1481720}{33976}$$

$$\bar{x} = 23.13$$

So

$$e = \frac{65}{2} - 23.13$$

For safte against Tension

Condation $e < \frac{B}{6}$ = $9.37 < 10.83$

So It is safe in Tension.

For Factor of Saftey Against Stress

Condation → $\gamma_{neel} > 0$

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

$$\gamma = \left\{\frac{33976}{65}\right\}\left(1 + \frac{6(9.37}{65}\right)$$

$$\gamma_{ice} = 974.71432 \text{ KN/m}^3$$

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

$$\gamma_{neel} = \left(\frac{33976}{65}\right)\left(\frac{1 - 6(9.37)}{65}\right)$$

$\gamma_{need} = 70.70\ KN/m^2$

As per condation γ_{need} Will be grether than zero

$\gamma_{need} > 0$

$70.70 > 0$

So it is safe in Stress (ok)

For Factor of Saftey Against Over turning

Condition → $\left(\frac{\Sigma M_R}{\Sigma M_O}\right) > 2$

$= \frac{\Sigma M_R}{\Sigma M_O} \Rightarrow \frac{2267652}{1481720}$

$= \boxed{1.53 < 2}$

So as per Condation it is not safe in overturning (Not OK)

Now

$\Sigma M_R \; \Sigma M_O$

$\Sigma M_R = 2267652$

$\Sigma M_O = 1481720$

So $\Sigma M_R > \Sigma M_O$ the it is safe. (OK)

For Factor of Saftey Agaist Sliding

Condation → $\left(\frac{(\mu \Sigma F_V + B_V)}{\Sigma F_H}\right) > 1$

$F_V = 1400$

$\mu = 0.7 \quad (0.65 \text{ to } 0.75)$

$= \frac{((0.7 \times 33976) + (65 \times 1400)}{+23120}$

$= 4.96 > 1$ Safe OK

So it is conclude from condation that it is Safe Sliding (OK).