Date
No.

DEPARTMENT OF CIVIL ENGINEERING

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SUBJECT: HYDRAULIC STRUCTURES

SUBMITTED TO: Engr Adeed Khan

(Q1)
(a) Define reserviour also explian which type of reserviour will be more encomical and why?

(Aa) **RESERVIOUR:-** A reservior is a man-made lake or large freshwater body of water. Most people think of a reserviour as a lake and might even use the words interchongeably. However, the key difference is that reserviour are artifical and lakes are naturally. Mainly three types of reservio

→ Valley damed reserviour.

Date:
No:

⇒ Bank-side reservior
⇒ Service reservior

In above three types, service reservior is most economical because it is entirely man made. His frame construction is easily well as no need of any natural water body diverstion. It also required small space.

(Q1)
(b) Which type of Embankment dam you will suggest in a hilly area and why?

(A1)
(b) There are types of embankments dams. Earth fill embankments and rock fill embankments earth fill embankments are the one which consists of 50% or more soil which rock fill embankments are the one which consists of 50% or more rocks. If we have to build an embankment in hilly area we should build rock fill embankments have more strength. Then earth fill embankments and in hilly area rocks will be easily available which will make our project save and

Date:
No:

envornmical.

Q2

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

(A2)(a)

TYPES OF SPILLWAYS:

1. Straight drop spillway
2. Ogee spillway
3. Shaft spillway
4. Chute spillway
5. Side Channel spillway
6. Siphan spillway
7. Ca byrinth spillway

In condition where freezing point of water is less than -10 degree centigrade in winters the most efficient spillway is Chute spillway. Because Chute spillway disposed water from upstream to the downstream through a steepy sloped open channel so that the flow will be very fast the flowing water pressure will be

Date:
No:

high and will be in supercritial condition. That will dissipate energy from the following water, energy dissipators are also provided in this type of spillway thus the temperature of water will go high and it will go high and it will not allow water to freez and stop. So the water will move freely in this type of spillway as the water flow from steepy channel so that the kinetic energy will take place and increases the tempreature of water.

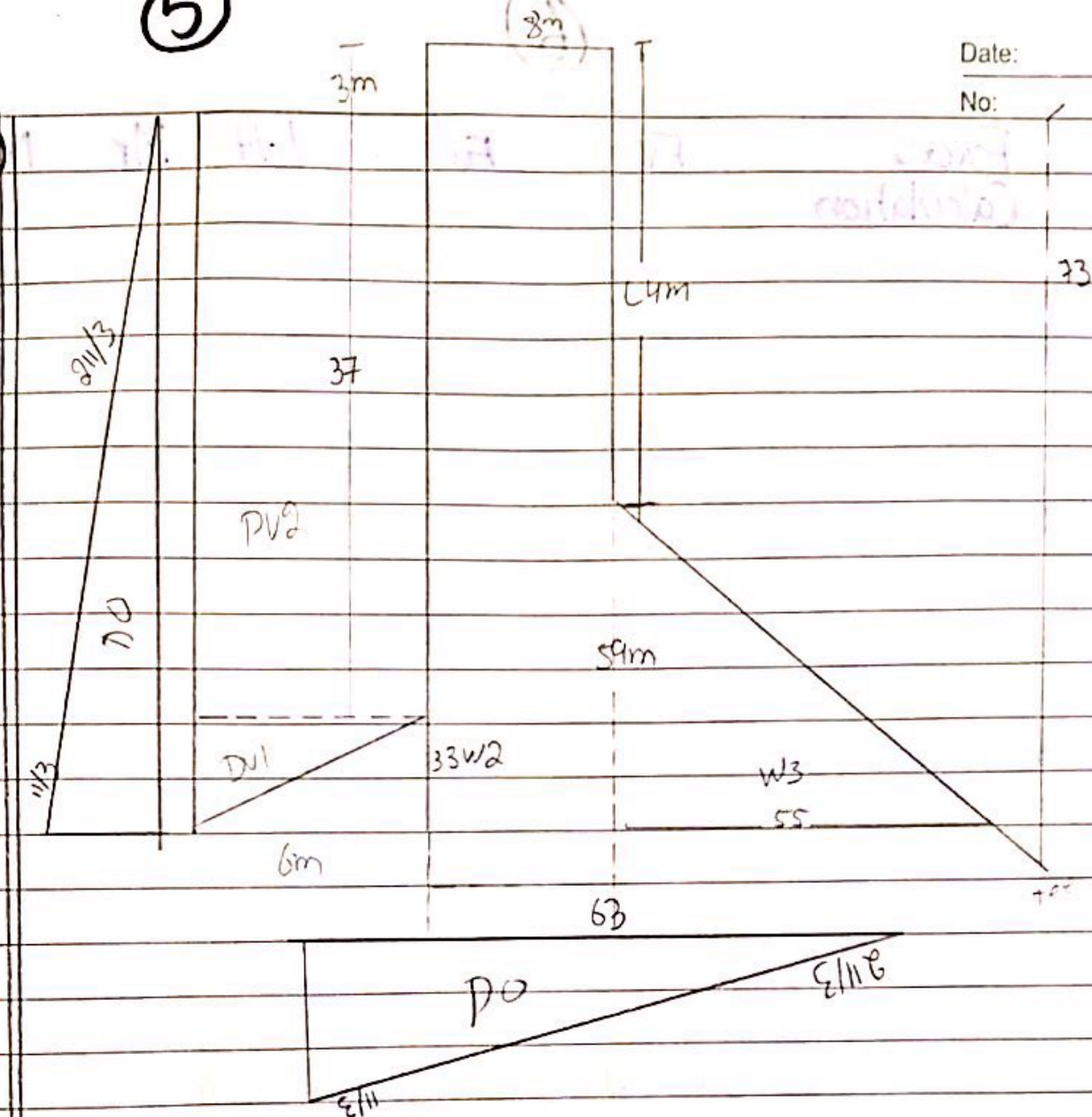
Q3 Desgin the gravity dam by assuming the dam dimenssions, find all the stability checks at least three of them must be in safe condition and economicsl. In reserviour full condition considering wight of dam, water pressure and uplift pressure.

(5)

Date:

No:

(43)



Date:
No:

Forces	Forces Calculation	Fv	Fh	L.A	Mr	Mo
W1	$\frac{1}{2}\times6\times32\times24$	2376		$63+9_3=65$	154440	
W2	$8\times73\times24$	914016		$55\times8_2=59$	826944	
W3	$\frac{1}{2}\times55\times59\times24$	38940		$55\times\frac{2}{3}=36.67$	14279298	
PV1	$\frac{1}{2}\times6\times33\times10$	990		$63+\frac{2\times6}{3}=67$	66330	
PV2	$6\times37\times10$	2220		$63+\frac{6}{2}=66$	146520	
PU	$-\frac{1}{2}\times69\times70\times10$	-24150		$69\times\frac{2}{3}=46$		1110900
PH	$-\frac{70^2}{2}\times10$	-2	-24500	$70\times\frac{1}{3}=23.3$		570850

$\Sigma Fv = 34392$ $\Sigma Fh = 24500$ $\Sigma Mr = 26221638168175$

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

$$\bar{x} = \frac{26221638 - 16817500}{34392}$$

$$\bar{x} = 27.34m$$

$$e = \frac{69}{2} - 27.34$$

$$\boxed{e = 7.16m}$$

Date:
No:

Condition

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

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

$7.16 < 11.5$ ok safe

$\gamma_{heel} = 0$

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

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

$\gamma_{toe} = 808.76$ KN/m²

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

$\gamma_{heel} = 188.10$ KN/m²

$\gamma_{heel} > 0$ ok safe

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

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

$= 1.5672$ Not safe

$\Sigma M_r > \Sigma M_o$

Date:
No:

2622163.87 16817 50.0 safe

$$\frac{\mu(\Sigma f_V + B + 9)}{\Sigma f_H} > 1$$

$$\frac{0.75 \times 34392 + 69 \times 400}{24500}$$

4.9971 ok safe.
