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STUDENT SECTION :
"B"

SUBJECT : HYDRAULIC
STRUCTURE.

Qno 1.

(a)

Reservoir:-

Mostly with a name "Reservoir" people think that it is a lake but actually reservoir is a large fresh body of water or can be a man made lake.

The main difference between reservoir and lake are the reservoir is artificial and lakes are naturally.

⇒ Reservoir is mainly used as a source of water supply.

⇒ Also used for furnishing power, irrigation purposes.

Main Three types of reservoir.

- 1) Valley dammed Reservoirs.
- 2) Bank side reservoirs.
- 3) Service reservoirs.

More economical Reservoir: (b)

More economical reservoir In all above reservoir Bank side reservoir is most economical.

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

Q no 1 (b)

Ans: According to my opinion the rockfill embankment I will suggest in hilly areas because as we know rocks are easily available in hilly areas. as compared to other materials such as sand, clay, mud etc which is not available in hilly areas.

There are more ~~an~~ gains in

hilly areas and ^(a) rock-fill dam does not allow water to pass through embankment. as compared to earthfill embankment in which water may penetrate.

Rockfill embankment are also known as gravity structure which are easy to build and rigid structures or gravity structures are self supported by their weights.

Qno2:-

Ans: Spillway :-

A Spillway is a hydraulic structure built at a dam site for diverting the surplus water from a reservoir 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.
- Straight Drop Spillway

• Siphon Spillway

Most Efficient Spillway where Freezing point of water is less than -10°C .

For concrete gravity dam "ogee Spillway" are often most commonly used and is located with in 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 form of drop spillway and also it is most commonly used in concrete gravity dam.

Following are the points

- Ogee Spillway have very high

discharging efficiency

- Have stable overflow pattern.
- Ease to pass floating debris.

"Chute Spillway" is also efficient it disposed water from upstream to the down stream through a steeply sloped open channel so that the flow will be very fast. The following water pressure will be high and will be in supercritical condition.

d

$$\sum F_v = 35884$$

$$\sum F_H = 26645$$

$$\sum M_v = 2796231.36$$

$$\sum M_o = 1839636.56$$

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

$$\bar{x} = \frac{2796231.36 - 1839636.56}{35884}$$

$$\bar{x} = 26.65 \text{ m}$$

$$e = 70/2 - 26.65$$

$$e = 8.35 \text{ m} \quad \boxed{8.35 \text{ m}}$$

Condition.

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

$$8.35 < 70/6$$

$$8.35 < 11.6 \quad \text{OK safe.}$$

$$\gamma_{\text{head}} = 0$$

$$\gamma_{\text{toe}} = \frac{\sum F_v}{B} \left(1 + \frac{6e}{B} \right)$$

$$\gamma_{\text{toe}} = \frac{35884}{70} \left(1 + \frac{6(8.35)}{70} \right)$$

$$\gamma_{toe} = 879.52$$

$$\gamma_{Heal} = \frac{\sum F_v}{B} \left(1 - \frac{6e}{B} \right)$$

$$\gamma_{Heal} = 145.732$$

$$\gamma_{toe} \text{ \& } \gamma_{Heal} > 0$$

OK safe. ✓

$$\frac{\sum M_v}{\sum M_o} = \frac{2796231.36}{1839636.5}$$

$$\underline{1.51} < \underline{2} \quad \text{not safe.}$$

$$\sum M_v > \sum M_o$$

$$\frac{2796231.36}{\cancel{1839636.5}} > 1839636.5$$

OK safe. ✓

$$\frac{\mu \sum F_v + B \times Q}{\sum F_H} > 1$$

$$\frac{0.75 \times 35884 + 70 \times 1400}{26645}$$

$$= \boxed{4.68 > 1}$$

Safe. ✓