Answer #01

(a)

Culvert	Cause way
Culvert is defined as a tunnel structure constructed under roads way or railways to Provide cross drainage to take electrical or other cable from one side to other. It is totally enclosed by soil or ground. Pipe culvert, box culvert and each culvert are the common type used under roadways and railway.	A cause way is a track, road or railway on the upper Point of an embankment across or a low or wet place or piece of water. It can be constructed of earth masonary wood or concrete. A cause way is Route raised up on an embankment. It may have or may not have opening for low water flow. In masonary cause way construction equal to the width of route and desired height may provided.

Answer #1
(b)

Cross Drainage Work:-

It is irrigation structures constructed for carrying the canal water safely over or under the drainage water are called cross drainage work. Cross drainage is a structure carrying the discharge from a natural stream across a canal interopting the stream.

Necessary:-

It is required to dispose of the drainage water so that the canal supply water remains uninterrupted.

Types of cross drainage:-

(1) **An Aqueduct:-**

It is an artificial channel for conveying water typically in the form of a bridge across a valley or other gap.

(2) **Siphon Aqueduct:-**

In a hydraulic structure where the canal is taken over the drainage

water cannot Pass clearly below the canal it flows under Siphon action. So it is known as Siphon aqueduct.

(b) Canal under a Drain :.

(a) Super Passage :.

The hydraulic Structure in which the drainage is taken over the irrigation canal is known as Super Passage.

(b) Siphon :.

A tube used to convey liquid upward from a reservoir and taken down to a lower level of its own accord. once the liquid has been forced into the tube typically by suction or immersion flow continues unaided.

(C) Canal crossing a Drain at the Same level.

(1) Level Crossing :.

A place where a railway and a road or two railway lines comes at the Same level.

(2) Drainage Inlet & outlet

Inlet and out let feature allow water to flow into and out of features & also limit the rate at which water flow along and out of the System

Answer #2 (a)

Weir	Barrage
Wiers are commonly used to controll the flow rates of rivers during periods of high discharge. Sluice gates are used to increase or decrease the volume of water going out. Adjustable shutters are provided on the crest to raise the water level to some required height	It is used to convert tidal energy into electricity by forcing water through turbines by activating a generater. When the water level on the up stream side of the weir is required to raised to different time. Barrage is an arrangement of adjustable gates or shutter at different tires over the weir.

Answer #2

(b)

Reynolds Number :-

The Reynold's number is the ratio of inertial forces to viscous forces the Reynolds number is a dimension less number used to categorize the fluid system in which the effect of viscosity important in controlling the velocities or the flow patterns of a fluid.

- The limit of Reynold's number for laminar flow is 2100.
- The limit of Reynold's number for turbulant flow is 4000.
- The limit of Reynold's number for transition flow is in b/w 2100 - 4000.

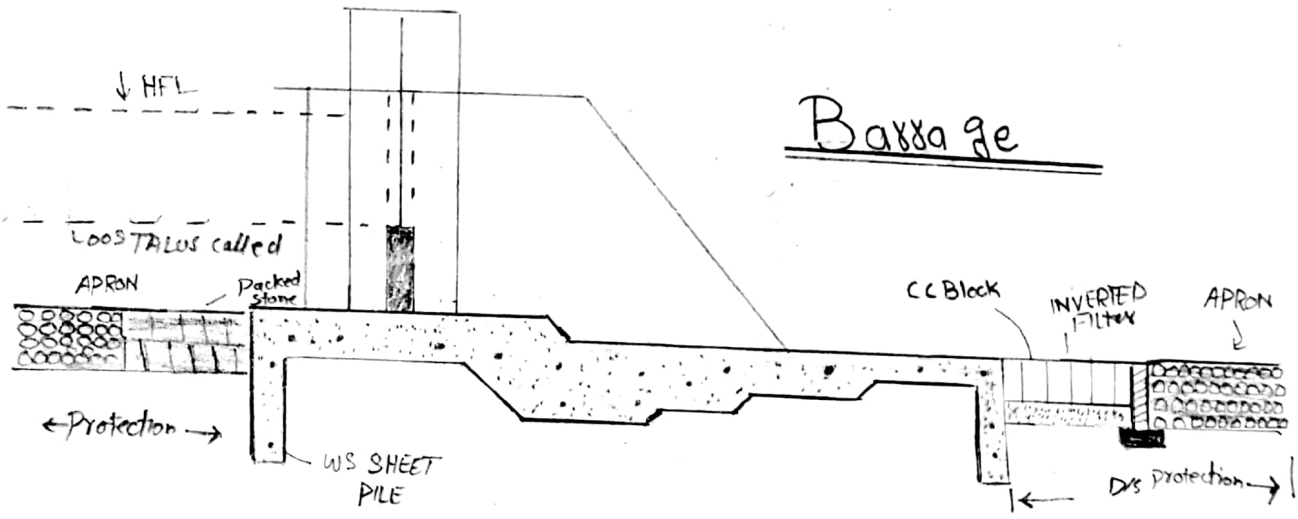
Lower Critical velocity :-

The velocity at which the flow enters from laminar to transition period is known as lower critical velocity.

Higher Critical velocity :-

A velocity at which turbulant flow starts. A velocity in which flow enters from transition period to turbulent flow is known as higher critical velocity.

Answer #3 (a)



Answer#3(b)

Ans:- Several formulas based on experimental results have been proposed to predict the maximum or equilibrium scour depth (y_s below or equilibrium general bed level) around bridge piers, In general, these assume the relationship.

$$y_s/b' = \phi(y_o/b', Fr, d/b')$$

Where b' is the pier width, y_o is the upstream flow depth, d is the sediment size, and Fr is the flow Froud number.

Laursen's (1962) experimental result understimate the scour depth's compared to many indian experiments which suggest the formula.

$$y_s/b' = 4.2(y_o/b')^{0.78} Fr^{0.52}$$

In a relatively deep flow a first order estimate of local scour may be obtained by

$$y_s = 2.3 K_a b'$$

where K_a = angularity co-efficient

Answer #4

Given Data:-

Length = 15 ft
Width = 15 ft
Live load = 1.5 kip/ft²
Dead load = 300 lb/ft² = 0.3 kp/ft²
Unit wt of Soil = γ = 100 lb/ft³ = 0.1 kip/ft³
Angle $\Theta = 30°$
Mix design = 1:2:4
Steel f_y = 60 ksi
Thickness = 0.92 m = 3.02 ft

Solution:-

For self wt of slab = $\gamma \times h$
= 150 × 3.02
= **0.453 kip/ft²**

$w = 1.5 + 0.3 + 0.453$
$w = 2.253$ kip/ft²

(2) Co-efficient of earth Pressure

$$K_a = \frac{1 - \sin\Theta}{1 + \sin\Theta}$$

$$Ka = \frac{1-\sin 30}{1+\sin 30}$$

$$\boxed{Ka = 0.333}$$

(3) Lateral pressure due to (D.L+L.L)

$$= (1.5+0.3) \times (0.333)$$

$$= \boxed{0.5994 \text{ kip/ft}^2}$$

(4) Lateral pressure due to soil.

$$= 0.333 \times 0.1 \times 18.$$

$$\boxed{= 0.6 \text{ kip/ft}^2}$$

Now Lateral pressure @ top = 0.5994 kip/ft^2

Also

@ Bottom = lateral pressure due to (D.L+L.L) + Lateral pressure due to soil

$$= 0.5994 + 0.6$$

$$\boxed{= 1.2 \text{ kip/ft}^2}$$