Name :- Ahmad Ali.
ID :- 7746.
Section :- C.

Q.NO :- 1.

Part :- a.
Answer :-

Following are the difference b/w the culvert and causeway :-

	Culvert	Causeway
①	culvert is of tunnel Shaped carrying a Stream of water under the roads and railway's etc.	A causeway is the course of raised road, it is built on a embankment.
②	It work as a bridge to pass it.	It is the support mostly by the earth or stone.
③	It is normaly useing for the natural flows of water for Controlling it.	It is not the bridge because it support's a roadway between the pier's.

Part:-b
Answer:-

→ **Cross Drainage work:-** is a structure carrying the discharge from a natural stream across a canal intercepting the stream.

→ **Necessary:-** It's required to dispose of the drainage water so that the canal supply water remains uninterrupted.

→ **Types:-** Some types of cross drainage is following:-

① **Adequate:-** It carries an irrigation cannal over the drain.

② **Super Passage:-** It carries a drain over an irrigation canal.

③ **Level Crossing:-** This structure makes

it possible to dispose off drain water safely at same level as that of a canal.

④ **Inlet & Outlet :-**

When possible drain water is taken in the canal to be discharged afterwards into a drain at suitable location.

Q.NO :-2.

Part :-a.

Answer :-

→ **Weir :-**

is an impervious barrier constructed across a river to rise the water level on the upstream.

→ Weir's are commonly used to control the flow rate's of river during period's of high discharge.

→ Sluice gate's are used to increase or decrease the volume of water going out.

→ **Barrage:-**
is a weir that has a adjustable gates installed over the top of it, to allow different water surfaces height at different time's.

→ It is used to convert tidal energy into electricity by forcing water through the turbine's by activating a generator.

Part:-b.
Answer:-

→ **Reynold's Number:-**
The Product of density time's length divided by viscosity co-efficient.

→ This is proportional to the ratio of internal force's and viscous forces in fluid flow.

→ **Laminar:-**
The flow in a pipe is Laminar if the reynold's number is less than 400.

→ **Turbulant:-**
If the reynold number

is greater than 4000 than it is a turbulant.

→ **Neither Laminar Nor Turbulant Flow:-**
When the Reynold's number is b/w 2000 and 2800, than flow is neither laminar nor turbulant.

→ **Lower Critical velocity:-**
The velocity at which flow change's from the laminar to transition is called Lower critical velocity.

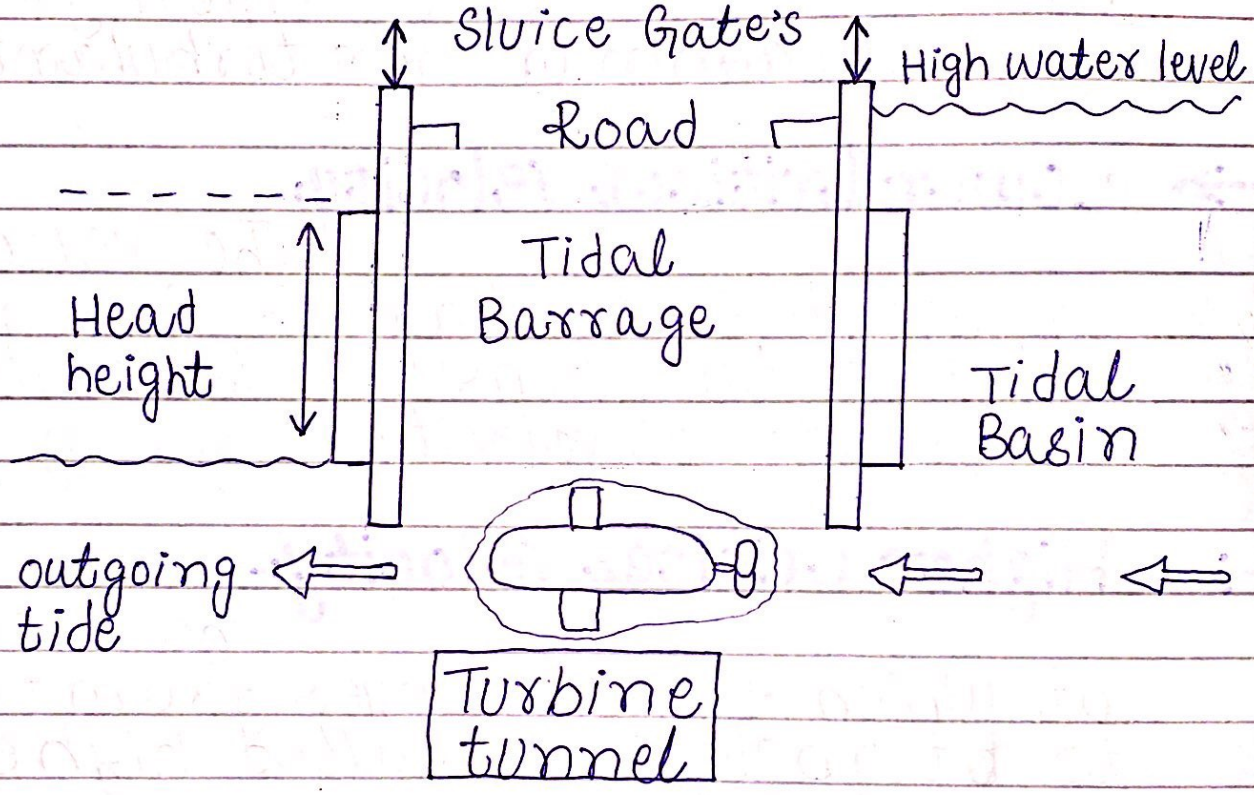
→ **Higher Critical velocity:-**
The velocity at which flow changes from transition to turbulant is called higher critical velocity.

Q.NO:-3.

Part:-a.

Answer:-

→ Barrage Sketch:-



Part:-b.

Answer:-

→ Scour Depth:-

If the contracted width is Less than regime width W, the normal scour depth D_N, under the bridge is given by:-

$$D_N = R_s (W/L)^{0.61}$$

where Rs is the regime scour depth.

→ The maximum scour depth in a single span bridge (no piers) with a straight approch (case 1) is about 25% more than the normal scour given by equation. whereas in the case of a multispan structure with a curved approch reach (case 2) it is 100% more than the normal scour. If the constriction is predominant, the maximum scour depth is the maxi-mum of case 1 or case 2, or the value given by:-

$$D_{max} = R_s (W/L)^{1.56}$$

Q.NO:-4.

→ **Given:-**

L.L = 1.5 kip/ft²
D.L = 300 lb/ft²
θ = 30°
unit weight of soil = 100 lb/ft³
Dimension = 15' x 15'
fy = 60 ksi steel.
Concrete = 1:2:4 = M15

→ Solution:-

① Load calculation:-

Total Load carry on top slab:-

$= S.Wt + L.L + D.L$

S.Wt of slab $= 3 \times 150$

$= 450 \ lb/ft^2$

$W = 450 + 1500 + 300 = 2250 \ lb/ft^2$

② Coefficient of earth pressure:-

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

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

$$Ka = 0.33$$

③ Lateral Pressure due to (D.L + L.L)

= Total vertical Load (L.L + D.L) x Ka

$= (1500 + 300) \times 0.33$

$= 594 \ lb/ft^2$

④ Lateral Pressure due to soil :-

$= Ka \times \gamma h$

$= 0.33 \times 100 \times 18$

$= 594 \ lb/ft^2$

⑤ Lateral Pressure :-

Top :-

= Lateral Pressure due to (D.L + L.L)

$= 594 \ lb/ft^2$

Bottom :-

= Lateral Pressure due to (D.L+L.L)
+ Lateral pressure due to soil.

$= 594 + 594$

$= 1188 \ lb/ft^2$