Question Banks of Earth dam

Q1: Using concrete core of earth dams is undesirable, explain.

Q2:Explain when will the sloughing of the downstream toe of earth dam occur?

Q3: Earth fill dams possess many advantages, Enumerate?

Q4: Choice of energy dissipators at particular spillway depends on many factors (Enumerate).

Q5: What are the main problems of rock foundation? How can be treating it?

Q6: What is the best alternative for reducing seepage in deep pervious foundation? Why?

Q7: What are the problems arisen with pervious foundation?

Q8: Generally, in homogeneous earth dam a flatter slope is provided, why?

Q9: Enumerate causes of piping through the earth dam.

Q10: What measures should be adopted for stilling basin in the case if tail water rating curve lower than hydraulic jump curve at low discharges but higher at high discharges.

Q11: Enumerate some conditions which may lead to emergency condition

Q12: Uncontrolled spillway required longer crest length compared with controlled spillway.

Q13: What is the best alternative to protect downstream bed of river from scouring if free Overfall spillway is provided?

Q14: A chute spillway consists of two spans with **20 m** width of each span, head above the crest = **2 m**, spillway height = **30 m**, design a stilling basin with **30 m** width using Indian standards, the stilling basin bed level is higher than the reservoir bed level by **4 m**. Discharge coefficient = **1.95**, consider there is no effect on discharge coefficient. The ratio of actual velocity to the theoretical velocity is **0.65.** Tail water level = **325m**, y'= **4.0 m**.

*Use Kp = **0.01**, Ka = **0.1**.*

Q15: A gravity dam has an Ogee Spillway, with crest length **25 m**, N.W.L = **474.5 m** and maximum head above the crest is **3.1m**. New hydrological study determined flood discharge from the catchment area, it indicated that the spillway capacity is insufficient to pass the

new flood discharge; flood discharge is greater than spillway capacity by **30%**. Design a side channel spillway L shaped in plan and semi trapezoidal in section as **Auxiliary spillway** (Determine crest level and water surface profile in collector channel) for passing the extra discharge from the main spillway using the following data: (*Consider flow through the entire channel is subcritical*).

Q16: Design of a chute spillway to pass a flood discharge of 400 m^3/s using the following data:

Normal water level = 745 m Four piers at the spillway crest, distance between two piers from its centerline is 8.8 m. The approach channel is trapezoidal (side slope 0.5H: 1V, length is 20 m, Bed level is 744 m Discharge coefficient C = 1.983 (corrected for spillway height and upstream face inclination). Length of first and second part of chute channel is 100 m and 150 m respectively, Average slope of the hill is 1:2. Provide slope of the first part of chute channel: 80% greater than critical slope

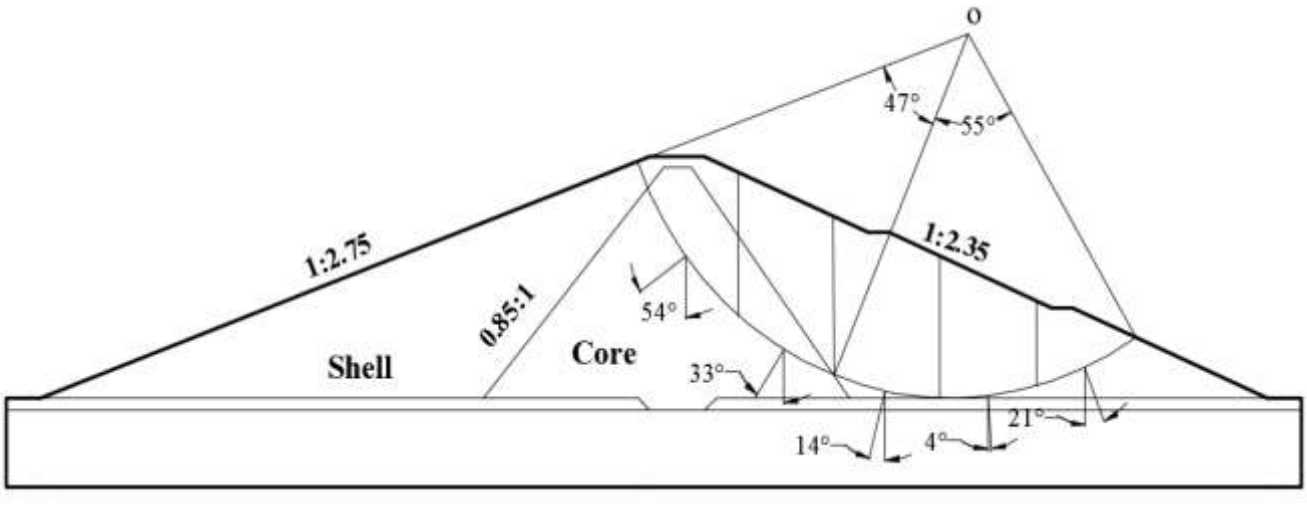
Use Rounded nosed pier (Kp = 0.01, Ka=0.1) with 0.8 m thickness, n= 0.015.

Note: design the downstream profile only

Q17: Design a stilling basin for a spillway using USBR standards, if the intensity discharge over the spillway crest is 8 m^3/s/m, width of the stilling basin is 25 m, initial depth of water is 0.65 m. (*Crest length of the spillway is 30 m*). Tail water level and depth are 357 and 6.5 m

Q18: Check the stability of the downstream earth dam its cross section shown below, for after construction condition. (If permissible factor of safety = 1.5, width of each slice = 14 m).

	Cohesion KN/m^2	**Angle of internal friction**	**γ (KN/m3)**
Core	210	4	19.6 (Moist)
Shell	2	39	21 (Moist)



Slice No.		1	2	3	4	5
Area m^2	Shell	52	202	310	212	90
	Core	123.8	75	-----	-----	-----
		54	33	14	-4	- 21

Q19: Design an Ogee overflow spillway with downstream crest profile using the following data:

Design discharge: **150 m^3/s**

Maximum water level: **688.5 m**

Normal water level: **686.5 m**

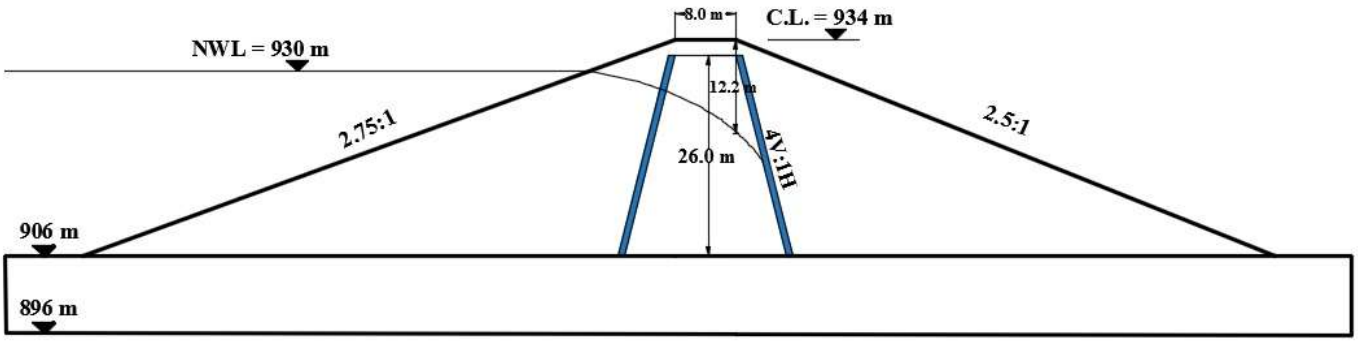
Average bed level of river: **660.5 m**

Discharge coefficient **C = 2.05** (there is no any effect on discharge coefficient).

Number of span = 4, Downstream slope is **1H:1.25V**

Rounded nosed pier (**Kp = 0.01**) with 0.8 m thickness and rounded abutment (**Ka = 0.1**) is provided.

Q20: An earth dam its section shown below, check stability of Downstream slope against horizontal shear



	Cohesion KN/m^2	φ	γ (KN/m3) wet	γ (KN/m3) dry
Core	250	2	19.0	17.5
Shell	25	41	21	20
Foundation	40	22	19.5 (Avg.)	

Q21: Flow on a stepped spillway is skimming flow, estimate percentage of energy dissipation at the downstream end of the spillway, if height and length of steps are 0.4m and 0.8m respectively, discharge passed over spillway is 200 m^3/s. (consider length of crest = 50 m, number of steps = 50)