CEL351: Design of Hydraulic Structures
Major Test

Time: Two Hours **Marks: 40**
Solve the following:

Assume any suitable data, if not given.

PART A

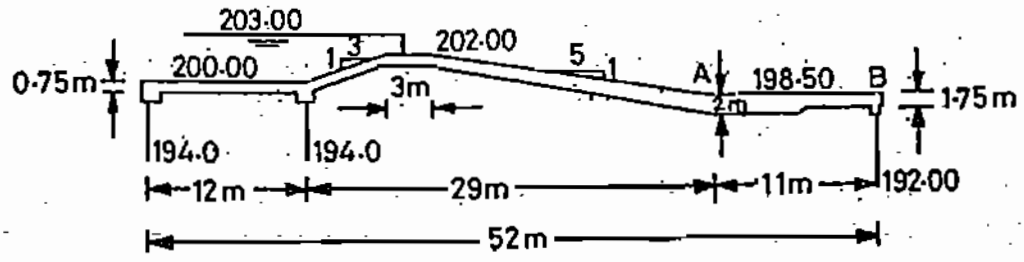
Q.1 (a) Diseuss briefly the energy dissipators to be used below an overflow spillway, when T.W.C. is below J.H.C. for all discharges. **[2]**

(b) Design a lined canal to carry a discharge of 50 eumecs. Assume bed slope as 1 in 8100, n as 0.015 and side slope as 45°. **[3]**

Q.2 (a) Draw the uplift pressures obtained by Khosla's solution and Bligh's theory for a horizontal impervious floor. **[2]**

(b) A wide irrigation channel is designed to have a depth of 3 m and bed slope of 1.6 x 10^{-4}. The bed sediment has an average median size of 0.3 mm. If the specific gravity of bed soil is takcn as 2.65, fall velocity of bed particles as 0.04 m/s and the observed Manning's 'n' to be 0.02, compute the bed load transported by the channel in N/s/m width of channel. Also compute the suspended load concentration at 2 cm above channel bottom. Consider $\beta = 1$, $k = 0.4$ and $\nu = 1.01 \times 10^{-6}$ m^2/s. **[5]**

Q. 3 Draw corrected subsoil hydraulic gradient lines for the following structure:
(a) with and
(b) without intermediate pile:



[8]

P.T.O.

Place Roof Joists	10	Erect Brick Walls	FS	-15	Erect Brick Walls
			FF	-	Erect Brick Walls
Place Roof Decking	5	Place Roof Joists	SS	1	Place Roof Joists
			FF	1	Place Roof Joists
Lay Built-up Roofing	5	Place Roof Decking	FS	60	Place Roof Decking

11) A contractor has six pieces of special excavation equipment of different categories, and he is engaged in six excavation jobs with different site conditions. He has rated the performance of the equipment in each category for each site condition and uses the rating of 1, 2, 3, ... 9 as shown in the table, in which 1 represents the most desirable and 9, the least desirable. How should he assign one piece of equipment to each job so that the total rating scores will be a minimum 7.5

		Site number					
		1	2	3	4	5	6
Equipment number	1	4	5	3	2	7	1
	2	5	4	2	3	4	6
	3	6	8	1	4	3	7
	4	3	2	9	7	6	5
	5	1	3	5	1	8	4
	6	2	6	7	5	2	3