



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIFTH YEAR SECOND SEMESTER EXAMINATION

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 522 DESIGN & CONSTRUCTION OF DAMS

DATE:

TIME:

Instructions to candidates:

. You should have the following for this Examination,
Battery-powered calculator

. This paper consist of **Five Questions**

. Attempt Question **One** and **Any other Two**.

. Question **One** carries **30 Marks** and is **COMPULSORY**.

The rest are **20 Marks** Each.

1.
 - (i) With the aid of well-labeled sketches, explain clearly the factors that determine the location of a dam structure. (15 marks)
 - (ii) Using a diagram show the details of an idealized inter-dam morphology. (5 marks)
 - (iii) Highlight the various kinds of investigative work required before a dam construction project is undertaken.. (10 marks)
2. Discuss dams based on
 - (i) Functions served (10 marks)
 - (ii) Hydraulic design (5 marks)
 - (iii) Materials of construction (5 marks)

3. An earth dam has been made at an angle of 30° to the horizontal, radius is 40m passing through the toe of the earth dam slope and through a point 8m away on the crest from the edge of the earth dam. $c=15 \text{ kN/m}^2$, $\phi=30^\circ$, $\gamma=18\text{kN/m}^3$ depth of the earth dam 20. Using a suitable scale, draw the diagram of this dam to scale Check the stability of the upstream face of the dam by Swedish Circle Method. (20 marks)

4. Calculate the earthquake forces and moments acting on the base of the dam shown in Fig. 1. If the values of ($\alpha_h=0.1$ and $\alpha_v=0.05$), $\gamma_c = 25.0 \text{ kN/m}^3$. (20 marks)

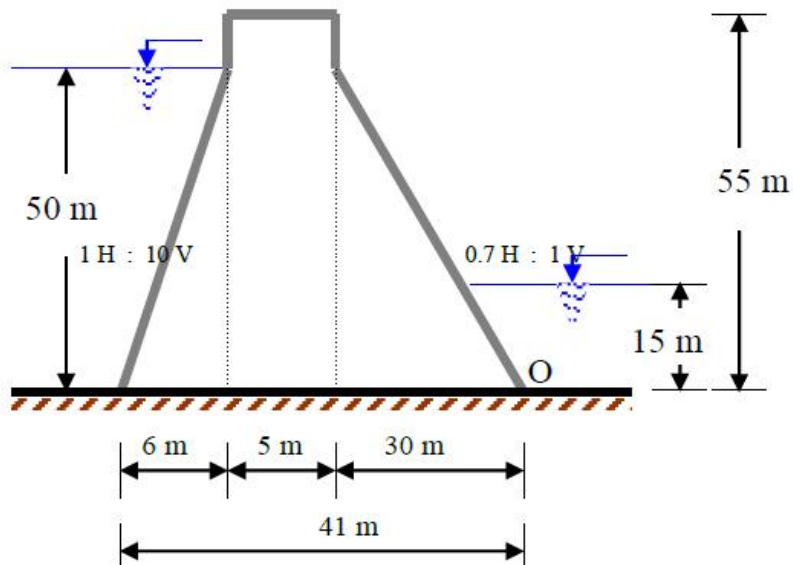


Fig. 1

5. Check the stability of the gravity dam shown in **Fig. 2** for the reservoir empty reservoir full conditions. Also, find the principal and shear stresses at the toe and heel of the dam. Assume $\mu = 0.75$. Consider only the weight of the dam. Water pressure and uplift pressure. Take the average shear strength (q) = 1.4 MPa and $w_c = 24 \text{ kN/m}^3$. Also, check the stability (i) when the uplift pressure does not act. (ii) when the drains are choked.

(20 marks)

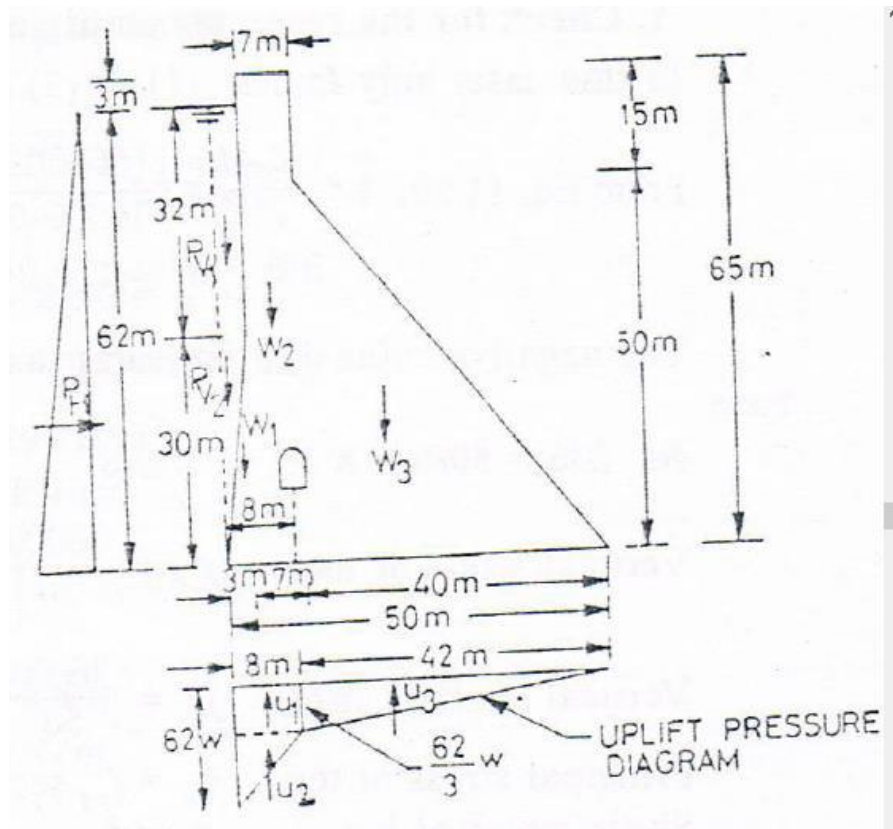


Fig. 2