



## TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF BUILDING & CIVIL ENGINEERING  
**UNIVERSITY EXAMINATION FOR:**  
BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING  
TVC 4427: DAM AND RESERVOIR ENGINEERING **PAPER 1**  
END OF SEMESTER EXAMINATION  
**SERIES: APRIL 2025**  
**TIME: 2 HOURS**  
**DATE:**

### Instructions to Candidates

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

### QUESTION ONE (COMPULSORY) 20 Marks

The following table gives the discharge of a river during a certain year. Determine the required reservoir capacity by use of a **flow duration curve method** if a hydropower plant is designed to operate at an average flow (20 Marks)

| Month                         | Jan | Feb   | Mar   | Apr | May  | Jun   | Jul   | Aug   | Sep | Oct | Nov   | Dec   |
|-------------------------------|-----|-------|-------|-----|------|-------|-------|-------|-----|-----|-------|-------|
| Discharge (m <sup>3</sup> /s) | 105 | 107.1 | 148.2 | 497 | 1100 | 964.7 | 338.6 | 177.6 | 141 | 140 | 142.7 | 126.6 |



## ANSWER ANY TWO QUESTIONS FROM THIS SECTION

### QUESTION TWO (20 Marks)

- (a) With aid of neat sketches, outline the two main groups of arch dams based on shape of the dams (10 Marks).
- (b) With aid of a sketch, outline the use of Straight Drop Spillways (10 Marks)

### QUESTION THREE (20 Marks)

With aid of sketches, outline the water pressure forces on a gravity dam for:

- (a) Case – 1: No Tail water in Downstream side,
- (b) Case-2: Tail water in Downstream side

### QUESTION FOUR (20 Marks)

A reservoir is to be constructed at a location where monthly flow data are available for 28 months. It is required to release 35 MCM of water from the reservoir every month. Find the minimum size of the required reservoir by the Sequent Peak Algorithm method

| Month        | 1    | 2    | 3    | 4   | 5   | 6 | 7 | 8 | 9   | 10  | 11  | 12 | 13  |
|--------------|------|------|------|-----|-----|---|---|---|-----|-----|-----|----|-----|
| Inflow (MCM) | 17.1 | 47.2 | 76.7 | 2.6 | 0.7 | 0 | 0 | 0 | 0.6 | 0.1 | 0.7 | 0  | 6.2 |

  

| 14   | 15   | 16  | 17 | 18 | 19  | 20  | 21  | 22 | 23  | 24 | 25  | 26    | 27    | 28   |
|------|------|-----|----|----|-----|-----|-----|----|-----|----|-----|-------|-------|------|
| 10.1 | 40.7 | 0.6 | 0  | 0  | 0.3 | 0.2 | 0.4 | 0  | 0.3 | 0  | 8.7 | 184.9 | 527.2 | 48.1 |

### QUESTION FIVE (20 Marks)

- (a) With aid of a sketch, outline Hydraulic Failure of earth dams caused by Overtopping of the dam (10 Marks)
- (b) Define Reservoir sedimentation and outline at least FOUR Natural and FOUR human activities causing reservoir sedimentation (10 Marks).