



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN
CIVIL ENGINEERING (Y 5 S1)

ECE 2503: WATER RESOURCES ENGINEERING I

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- Answer Booklet

This paper consists of FIVE questions.

Answer question ONE (COMPULSORY) and any other TWO questions

Maximum marks for each part of a question are as shown

This paper consists of TWO printed pages

Question One (Compulsory - 30 Marks)

- a) Discuss TWO characteristics that make water a special resource. (2 marks)
- b) Outline how water supply is being affected by use of water resource by other sectors. (8 marks)
- c) Discuss the factors which are considered for the selection of a site for a proposed dam. (7 marks)
- d) With the aid of a sketch, explain the various storage zones of a reservoir. (7 marks)
- e) Differentiate the following:
 - i) Reservoir yield from safe yield.

- ii) Spillway from sluiceway.
- iii) Dam from Reservoir. (6 marks)

Question Two (20 marks)

- a) Water in a reservoir may be used in different ways. Discuss **FOUR** uses of water in a reservoir. (4 marks)
- b) With the aid of sketches, discuss **FOUR** types of earthen dams. (4 marks)
- c) With the aid of sketches, explain how seepage may be controlled in earthen dams. (4 marks)
- d) Explain the following methods of estimating silt load into a reservoir.
 - i) Silt sampling method
 - ii) Capacity surveying method (8 marks)

Question Three (20 marks)

- a) With the aid of sketches, describe the following types of spillway gates.
 - i) Tainter gate
 - ii) Drum gate
 - iii) Flush board
 - iv) Rolling gate (8 marks)
- b) Sketch the following types of scour protection works below overflow spillways.
 - i) Horizontal apron
 - ii) Sloping apron
 - iii) Bucket apron
 - iv) Auxiliary (8 marks)
- c) With the aid of sketches differentiate Buttress dam from Arch dam. (4 marks)

Question Four (20 marks)

- a) Discuss **FOUR** steps to undertake when planning a water resources project. (4 marks)
- b) A flow net is plotted for a homogeneous earthen dam of height 25m and length 2000m with a free board 2m. The results obtained indicate number of potential drops as 10 and number of flow channels as 4. The dam has a horizontal filter of 30m at the downstream end and the coefficient of permeability of the dam material is 5×10^{-4} cm/sec. Calculate discharge through the dam. (7 marks)
- c) Outline the construction of the following outlet works.
 - i) Bell mounth
 - ii) Submerged intake
 - iii) Wet intake tower (9 marks)

Question Five (20 marks)

- a) (i) Define gravity dam. (2 marks)
 - (ii) List the forces affecting the stability of a gravity dam. (3 marks)
 - (iii) Briefly explain the determination of factors of safety against possibilities of failure in a dam. (4 marks)

b) Discuss the methods for foundation treatment of a dam. (6 marks)

c) Explain the construction and use of a drainage gallery in a gravity dam. (5 marks)