



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2503 : WATER RESOURCES ENGINEERING I
SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

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) (30 MARKS)

- (a) Describe fully the effect of the following key components in the hydrologic cycle
- (i) Evapo-transpiration (3 Marks)
 - (ii) Precipitation (3 Marks)
- (b) Describe the following terms as used in ground water resources (8 Marks)
- (i) Perched water table –
 - (ii) Piezometric surface -
 - (iii) Unconfined Aquifer
 - (iv) Confined Aquifer –
- (c) Dams can be classified according to functions served. Describe the difference between Diversion Dam and a Detention Dam (4 Marks)
- (d) Describe the advantages and disadvantages of an earth dam and a Rockfill dam (8 Marks)
- (e) Describe the ecological and economic impacts of sedimentation (4 Marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION
QUESTION TWO (20 MARKS)



- (a) Describe at least eight factors to consider while providing the design capacity of a reservoir (8 Marks)
- (b) Describe a mass curve detailing at least four of its characteristics (5 Marks)
- (c) Two tube wells penetrating fully a 10m thick aquifer are located 200m apart. The salient data of the tubewells are tube diameter 30cm, depression head 5m, radius of influence 300m, and coefficient of permeability 10^{-3} m/sec (7 Marks)
- Are the tube wells interfering?
 - Discharge of tubewell when one well is working, and
 - Percentage decrease in discharge of the well if both wells are working under a depression head of 5m.

QUESTION THREE (20 MARKS)

- a) Describe at least three methods of controlling sediment inflow into a reservoir (6Marks)
- b) Sediment distribution pattern in a reservoir depends on several factors. Describe at least seven of these factors. (7 Marks)
- c) Evapotranspiration loss (cm) has been measured by open evaporimeter (pan coefficient =0.7) placed near reservoir area 5.2 km^2 . After a year the surface area of the reservoir reduces to 2.2 km^2 . Determine the annual quantity of water lost by evaporation when the pan evaporation loss (cm) over the year are known (7 marks)

Table 3

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	dec
Evaporation Loss	11.5	11.0	13.2	12.8	13.2	16.2	14.1	11.2	10.2	12.0	12.4	11.6

QUESTION FOUR (20 MARKS)

- a) Describe the two broad classes of drilled well based on the type of aquifer the well is drilled in? (4 Marks)
- b) Differentiate between bored wells and driven wells (6 Marks)
- c) A well penetrates fully in a confined aquifer 10m thick (saturated thickness) having coefficient of permeability of 0.0005m/sec. There is a drawdown of 4m at the well and its radius of influence is 300m.
- (i) Calculate the steady state discharge which can be withdrawn from this well(5 Marks)
 - (ii) what will be the percentage increase in the discharge if the radius of the well is doubled (5 marks)
 -

QUESTION FIVE (20 MARKS)

- a.) Describe at least five advantages and disadvantages of reservoirs (10Marks)

b.) Derive Theim-Forchheimer equation for steady state flow in confined aquifer
(10 Marks)