



“Investing in Africa’s future”

COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES

NANE 403: MANAGEMENT OF DRAINAGE BASINS AND WATER RESOURCES

[A]

EXAMINATION

NOVEMBER 2023

LECTURER: MR. W. ZENDERA

DURATION: 3 HRS

INSTRUCTIONS

- 1) Answer ANY FIVE questions.
- 2) ALL questions carry 20 marks
- 3) Clearly show all your calculations.

NANE 403: MANAGEMENT OF DRAINAGE BASINS AND WATER RESOURCES

Question 1

Discuss the critical water resource management challenges for;

- i. Catchment managers, [5 marks]
- ii. Scientists, [5 marks]
- iii. Community stakeholders, and [5 marks]
- iv. Infrastructure managers. [5 marks]

Question 2

- a) List for categories of stakeholders that should be involved in a river basin management. [4 marks]
- b) Explain 6 benefits derived from stakeholder participation in river basin management. [12 marks]
- c) For a named country draw an IWRM institutional framework for stakeholder participation. [4 marks]

Question 3

- a) Explain the role of trans-boundary organization in river basin management. [5 marks]
- b) Explain the following aspects of water resources planning and management.
 - i. Technical, [5 marks]
 - ii. Institutional, [5 marks]
 - iii. Economic and Financial. [5 marks]

Question 4

- a) Explain the objectives of the following water tariff structures and highlighting the various problems associated with these tariff structures in achieving water pricing objectives:
 - i. Fixed charge structure, [5 marks]
 - ii. Increasing by volume structure. [5 marks]

- b) The table below shows an increasing block water tariff structure for the City of Harare in 2012.

Harare 2012 Consumption (m ³ /month)	Tariff	Unit
Fixed charge	0.68	US\$/m ³
0-14	0.11	US\$/m ³
14-40	0.20	US\$/m ³
40-70	0.28	US\$/m ³
70-300	0.42	US\$/m ³
>300	0.50	US\$/m ³

During the month of May 2012, two households A and B consumed 6 m³ and 25.2 m³ of water respectively. Household A has two occupants and household B has 7 occupants.

- i. Calculate the water consumption per person/day for household A and B respectively. [2 marks]
- ii. Calculate the monthly bill for household A. [3 marks]
- iii. Calculate the monthly bill for household B [3 marks]
- iv. Give one disadvantage of the increasing block tariff. [2 marks]

Question 5

- a) Distinguish between the following:
 - i. Aquifer and aquitard, [3 marks]
 - ii. Aquiclude and aquifuge, and [3 marks]
 - iii. Unconfined aquifer and confined aquifer. [3 marks]
- b) Discuss the merits of relying on groundwater as a water resource. [6 marks]
- c) Explain the challenges associated with excessive groundwater Withdrawal. [5 marks]

Question 6

- a) State FIVE reasons for the increasing pollution of most water resources. [5 marks]
- b) Explain some of the upstream activities that will have an effect on downstream hydrological processes. [5 marks]
- c) Discuss some of the appropriate technologies and methodologies at hand to enable a development towards improved soil and water productivity. [10 marks]

Question 7

- a) For a named city of your choice.
- i. State the sources non-revenue water losses. [5 marks]
 - ii. Advise the city utility responsible for water allocation on how they can minimize non-revenue water loses. [15 marks]