



“Investing in Africa’s future”

COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES

NANE 403: MANAGEMENT OF DRAINAGE BASINS AND WATER RESOURCES

EXAMINATION

NOVEMBER/ DECEMBER 2022

LECTURER: MR. W. ZENDERA

DURATION: 3 HOURS

INSTRUCTIONS

- 1) Answer ANY FIVE question.
- 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 approaches to sustainable management, planning and protection of water resources under the following subheadings:

- i. Too much water, [5 marks]
- ii. Too little water, [5 marks]
- iii. Polluted water, and [5 marks]
- iv. Degradation of aquatic and riparian ecosystems. [5 marks]

Question 2

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 3

- a) Explain five main factors that influence the water demand in an urban set up. [10 marks]
- b) Discuss the institutions, policies and regulations that governs water resource usage in Zimbabwe. [10 marks]

Question 4

- a) Explain the current status of non-revenue water loss for the city of Mutare. [5 marks]
- b) Advise the city utility responsible for water allocation in Mutare on how they can minimize none revenue water loss. [15 marks]

Question 5

A catchment has a size of 100 km². In its original condition, the average annual total runoff from the catchment is 1.1 m³/s. The average annual total runoff from the catchment is 1.1 m³/s. The average annual rainfall is 800 mm/year. In an average year, 50% of the rainfall infiltrates and 12.5% of the rainfall reaches groundwater. Tests have turned out that the average annual evaporation from the unsaturated zone (being the sum of the transpiration and the bare soil evaporation) amounts to 340 mm/year. In all water balance computations over the year, one may assume that the storage effects are small.

Compute the water in mm/year which

- a) Reaches the root zone through the capillary rise in an average year. [5 marks]
- b) Seeps out from the groundwater to the surface water. [5 marks]
- c) Evaporates directly from interception. [5 marks]
- d) Evaporates in the catchment. [5 marks]

Question 6

- a) Define IWRM in detail. [10 marks]
- b) List the four Dublin guiding principles of IWRM. [4 marks]
- c) The ecosystem depend on water flows. Give three reasons for protecting terrestrial ecosystems in the upstream areas of a river basin. [6 marks]

Question 7

- 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]

END OF EXAMINATION PAPER

