



FACULTY	FACULTY OF AGRICULTURE, ENGINEERING AND NATURAL SCIENCE		
DEPARTMENT	DEPARTMENT OF ENVIRONMENTAL SCIENCE		
SUBJECT	HYDROLOGY		
SUBJECT CODE	GHE 3622		
DATE	NOVEMBER 2022		
DURATION	2 HOURS	MARKS	70

SUPLIMENTARY/SPECIAL EXAMINATION

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External Moderator: Prof M.D. Simatele, University of the Witwatersrand

INSTRUCTIONS

1. Present your work as neatly as possible.
2. Answer all the questions.
3. While most of the marks will be awarded for content, candidates must bear in mind the importance of presentation, i.e., insight and critical thinking.
4. The use of a calculator is allowed
5. This paper consists of 3 pages; including cover page.

EXAMINATION PAPER

Question 1: Definitions [10]

1.1 Complete the following sentences:

- 1.1.1 An isohyet is a line joining points with equal amount of _____ (2)
1.1.2 The attraction of molecules for other molecules of the same kind is _____ (2)
1.1.3 Windspeed is measured with a _____ (2)
1.1.4 Lysimeter is used to measure _____ (2)
1.1.5 A natural groundwater outlet is a _____ (2)

Question 2 [24]

- 2.1 Describe the hydrological cycle (6)
2.2 Explain the need for water balance in a hydrological process. (4)
2.3 Briefly explain how a hydrograph from an arid environment can be differentiated from that of a humid environment. (4)
2.4 Explain why “the volume is converted into a rainfall depth through division by the rain gauge surface area.” (2)
2.5 Using Thiessen’s polygons method, calculate the average rainfall for the catchment in figure 1. Confirm the rainfall using arithmetic mean. (8)

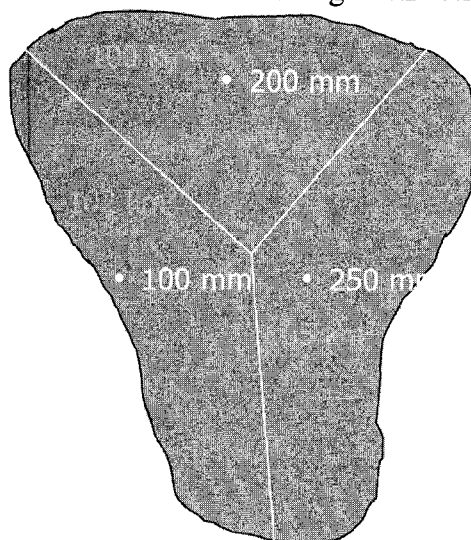


Figure 1: Catchment

Question 3 [11]

- 3.1 Explain what happens to precipitation falling on land. (4)
3.2 What are the two components of runoff? Which component is confined to a channel? (4)
3.3 Explain 3 ways how wind act as a factor in evaporation rate. (3)

Question 4 [25]

- 4.1 What is the fundamental physical process that makes the flow processes in the unsaturated zone so different from the saturated zone? Explain. (3)
- 4.2 Describe two different mechanisms that lead to overland flow. Contrast the conditions under which these two different processes occur. (4)
- 4.3 What is the main problem in measuring precipitation equivalent at a point, and over a catchment area? (2)
- 4.4 Draw a cross-section of a subsurface water system. Label the following: water table, phreatic zone, vadose zone, capillary fringe, unconfined aquifer, confined aquifer, potentiometric surface for the confined aquifer, perched water table, and, in the correct location, an artesian (flowing) well. (8)
- 4.5 Describe one way how a well might become contaminated by a nearby landfill. (2)
- 4.6 Water reclamation and reuse are some of Namibia's water management strategies. Briefly explain the difference between the two methods, their respective water quality that they produce and resultant water usage. (6)

Total Marks: [70]

End