



**University of Ruhuna- Faculty of Technology**  
**Bachelor of Biosystems Technology Honors Degree**  
**Level 4 (Semester II) Examination, November/December 2025**  
**Academic year 2023/2024**

**Course Unit: BSTE 4212 – Water Technology (Practical)**

**Duration: 1 hour**

**Answer all the questions**

**Question 1 (50 marks)**

A stream discharge measurement was carried out using the velocity-area method at six verticals. The obtained data are presented in the following table.

Vertical	Distance Interval (m)	Depth (m)	Velocity (m/s)	Wetted area (m <sup>2</sup> /s)	Discharge (m <sup>3</sup> /s)
1	–	0.25	0.12		
2	1.2	0.40	0.18		
3	1.0	0.55	0.23		
4	1.1	0.50	0.20		
5	0.9	0.35	0.16		
6	1.3	0.20	0.10		

- I. Draw a **labelled cross-sectional diagram** of the stream showing verticals, depths, and subsections. **(8 marks)**
- II. Compute the **wetted area** of each subsection using the mid-section method. **(12 marks)**
- III. Calculate the **discharge (Q)** for each subsection and the **total discharge**. Present values in a table. **(20 marks)**
- IV. State **one (01) advantage** and **one (01) limitation** of the velocity–area method. **(10 marks)**

**Question 02 (50 marks)**

- I. There are four rain gauge stations existing in the catchment of a river. The average annual rainfall values at these stations are 780, 640, 400, 520 mm. Allowable percentage error in mean value of rainfall is 10%. Calculate the optimum number of rain gauges in the catchment. **(20 marks)**
- II. Four rainfall stations (**P, Q, R, and S**) form a roughly rectangular catchment. Station **Q** is missing rainfall data for a particular monsoon day. The rainfall and long-term annual averages are tabulated below,

Station	Event Rainfall (mm)	Mean Annual Rainfall (mm)
P	45	2100
Q	?	1800
R	52	2200
S	48	2000

- a) Estimate the missing rainfall at Station Q using the **Normal Ratio Method**. **(10 marks)**
- b) If the stations form a polygon around Station Q, describe how the **Thiessen Polygon Method** could be applied after estimating the rainfall. **(10 marks)**
- c) State two limitations in estimating missing rainfall values. **(10 marks)**

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