Answer Key: Civil Engineering Licensure Exam – Mock Exam (Day 12: Hydrographic and Topographic Surveys)

February 24, 2025

Answer Key

Section A: Multiple Choice Solutions

1. Hydrographic surveying is concerned with: **(b) Determining water depths and underwater features**
2. Instrument used for depth measurement: **(c) Echo Sounder**
3. A topographic map represents: **(b) Elevation contours and landforms**
4. Contour interval depends on: **(d) All of the above**
5. Position of a survey vessel in hydrographic surveys: **(b) GPS and sonar**

Section B: Problem-Solving Solutions

1. Average riverbed depth:

$$d_{\text{avg}} = \frac{2.5 + 3.0 + 4.2 + 3.8 + 3.5}{5} = \frac{17}{5} = 3.4 \text{ m}$$

2. Actual ground distance between contour lines:

$$\text{Scale Factor} = 1 : 1000$$

$$\text{Distance} = 5 \times 1000 = 5000 \text{ mm} = 5 \text{ m}$$

3. Estimated cross-sectional area:

$$A = \text{width} \times \text{average depth}$$

$$A = 20 \times 3.2 = 64 \text{ m}^2$$

4. Canal water volume using trapezoidal rule:

$$V = \frac{w}{2}\left[d_1 + 2(d_2 + d_3 + d_4) + d_5\right]$$

$$V = \frac{15}{2}\left[2.5 + 2(3.5 + 4.0 + 4.2) + 3.8\right]$$

$$V = \frac{15}{2} \times (2.5 + 2(11.7) + 3.8) = \frac{15}{2} \times 29.7 = 222.75 \text{ m}^3$$

5. Elevation of the point:

$$RL_{\text{point}} = RL_{\text{BM}} + BS - FS$$

$$RL_{\text{point}} = 150.00 + 1.75 - 2.25 = 149.50 \text{ m}$$