

# CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS

| C12 - HYDROGRAPHIC SURVEYING                               |                                                                                                                                                                                | March 2026 |        |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|
| Note: This examination consists of 13 questions on 1 page. |                                                                                                                                                                                | Marks      |        |
| Q. No                                                      | Time: 3 hours                                                                                                                                                                  | Value      | Earned |
| 1                                                          | Why is it critical that a hydrographic surveyor know the speed of sound in water?                                                                                              | 5          |        |
| 2                                                          | Describe Snell's Law and how it is used in acoustic ray tracing.                                                                                                               | 10         |        |
| 3                                                          | What is the difference between a Linear Frequency Modulated (LFM) pulse (chirp) and a Continuous Wave (CW) pulse?                                                              | 10         |        |
| 4                                                          | Using a diagram, show how a single beam transducer's beamwidth affects the soundings horizontal uncertainty.                                                                   | 5          |        |
| 5                                                          | With the help of diagrams, describe the tide generating forces.                                                                                                                | 10         |        |
| 6                                                          | Describe 4 different non-tidal water level effects.                                                                                                                            | 5          |        |
| 7                                                          | Describe how you would connect a local vertical datum to a newer vertical datum such as the Canadian Geodetic Vertical Datum 2013 (CGVD2013).                                  | 10         |        |
| 8                                                          | What is the difference between chart datum and sounding datum?                                                                                                                 | 5          |        |
| 9                                                          | What is an inertial measurement unit (IMU) and what does it measure?                                                                                                           | 5          |        |
| 10                                                         | Specific to hydrographic applications, describe the difference between Multibeam Sonars and Side Scan Sonars. Include a discussion of what each would be used for and why.     | 10         |        |
| 11                                                         | Describe the checks, verifications and calibrations and other quality control procedures you would typically carry out prior to, during, and after an S44 1A Multibeam survey. | 10         |        |
| 12                                                         | What is a bathymetric surface and how is it derived from survey measurements?                                                                                                  | 5          |        |
| 13                                                         | What IHO S-44 specification would you recommend for a harbour survey? Why?                                                                                                     | 10         |        |
|                                                            |                                                                                                                                                                                | 100        |        |