

**ASSOCIATION OF CANADA LANDS SURVEYORS - BOARD OF EXAMINERS
WESTERN CANADIAN BOARD OF EXAMINERS FOR LAND SURVEYORS
ATLANTIC PROVINCES BOARD OF EXAMINERS FOR LAND SURVEYORS**

SCHEDULE II / ITEM 2

October 2004

HYDROGRAPHIC SURVEYING AND OCEANOGRAPHY

Note: This examination consists of 7 questions on 2 pages.

Marks

Q. No

Time: 3 hours

Value Earned

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| 1 | <p>Define and explain (with the use of diagrams /sketches if necessary) the following terms:</p> <ul style="list-style-type: none"> a) amphidromic point b) mixed, mainly Semi-Diurnal Tide c) sedimentation d) acoustic impedance e) deep isothermal layer f) draft (draught) g) false echo h) squat i) territorial sea j) lead line | 20 | |
| 2 | <p>With the aid of diagram(s), describe in detail the process of constructing a co-tidal chart. You must demonstrate by example/calculation that you fully understand time corrections and range ratio (as well as how they are applied to a sounding) at any point within the area covered by the co-tidal chart.</p> | 10 | |
| 3 | <ul style="list-style-type: none"> a) Explain harmonic and non-harmonic tidal constituents. b) Using diagrams and description, explain neap and spring tides. c) Explain two methods of measuring tidal heights. | 2 5 3 | |
| 4 | <ul style="list-style-type: none"> a) Frequently, marine positioning requirements are specified in terms of accuracy. Describe the difference between predictable accuracy, relative accuracy and repeatable accuracy. b) In the mid 1970's a pingo-like feature was located in the Beaufort Sea; it was positioned using LORAN (rho-rho). In 2003, a hydrographic survey party experienced some difficulty in locating the feature using DGPS as a positioning system. Considering only the positioning, give explanations as to what may have been some factors to be considered when re-locating the feature in 2003. | 5 5 | |
| 5 | <p>Describe in detail the relationship (with formula) between salinity, temperature, pressure, density, elasticity, etc. in determining the velocity of sound in sea water.</p> | 15 | |

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| 6 | <p>In the conduct of a hydrographic survey it is quite common to use a vertical beam echo sounder in conjunction with a side scan sonar. Describe the components and operation of BOTH systems and explain why it may be necessary to use both on the same survey area.</p> | 15 | |
| 7 | <p>A mining site in Hudson Bay will go into production in 2007. A reconnaissance survey has determined that in order for the ore to be shipped out (by a self-unloading bulk carrier) a modern CHS chart will be required. This chart will cover a Bay/Inlet as well as the dock and loading area. The bay/inlet will be charted at a scale of 1:20,000 covering a body of water approximately 4 nautical miles in length (running in an east-west general direction) and 4 cables wide. The dock/loading area will be an inset at 1:2,000 covering a square area approximately 3 cables by 3 cables.</p> <p>Using sketches, explanations (and personal assumptions), describe and plan the hydrographic survey required to construct the chart (and inset).</p> <p>Suggestion: Address: existing data, water level recovery, shoreline determination, survey scale, positioning system(s), echo sounder(s), anchorage areas, bottom sampling, sounding line pattern/direction, shoal examinations, contour delineation, data recording and processing, reports etc.</p> | 20 | |
| | Total Marks: | 100 | |