

**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 2005

HYDROGRAPHIC SURVEYING AND OCEANOGRAPHY

Note: This examination consists of 8 questions on 1 page.

<u>Q. No</u>	<u>Time: 3 hours</u>	<u>Marks</u>	
		<u>Value</u>	<u>Earned</u>
1	Define each of the following terms: a) Surface Current b) Beaufort Scale c) Leadline d) Thermocline e) Continental Margin f) Electronic Line of Position g) Multiple Echoes h) Squat (of a vessel) i) Territorial Sea j) Nautical (navigational) Chart	20	
2	Tidal streams are affected by bathymetry, friction, inertia/momentum, Coriolis force, river run-off and winds. Describe how each affects the stream.	10	
3	a) Describe false echoes (from an echo sounder) and name three causes. b) Explain harmonic and non-harmonic tidal constituents.	5 5	
4	a) Name and describe two main factors that contribute to the propagation loss of acoustic waves as they travel through sea water. b) Describe ambient noise and reverberation as they apply to underwater acoustics.	5 5	
5	a) What is sounding datum and chart datum? Explain the process of transferring a sounding datum? b) What is a co-tidal chart and when would you use it to reduce soundings?	5 5	
6	a) Describe the effects of water temperature, salinity and pressure changes on the speed of an underwater acoustic wave. b) Name five mechanical methods of determining water depth.	5 5	
7	In the conduct of a hydrographic survey you may require sonar transducer arrays to be arranged in either: a) a single beam echo sounder, b) sweep system, c) swath/multi-beam system or d) side scan system. Describe each system and articulate how each is used. Give the advantages/disadvantages of each and describe how the sounding lines may be run using each system.	20	
8	a) Describe how you would calibrate a single beam echo sounder. b) Describe the difference between a magnetostrictive and a piezoelectric transducer.	5 5	
Total Marks:		100	