

**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
HYDROGRAPHIC SURVEYING AND OCEANOGRAPHY**

March 2002

Note: This examination consists of 5 (five) questions on 2 (two) pages.

Marks

Q.No

Time: 3 hours

Value Earned

1	<p>The hydrographic surveyor must understand the characteristics of tides and allow for their vertical movement.</p> <p>a) With the aid of diagram(s), and using the relative movements of the Earth, Moon and Sun, explain the tide producing forces, and the combined effects of the sun and the moon on the earth. In your explanation, clearly demonstrate your understanding of the terms apogee, perigee, aphelion, perihelion and lunar day.</p> <p>b) Explain the difference between a diurnal and a semi-diurnal tide.</p> <p>c) Elaborate on meteorological effects on wave forms similar to tides.</p> <p>d) Define a datum, and describe the difference between a sounding datum and a chart datum.</p> <p>e) Why are tides much higher in certain areas such as the Bay of Fundy?</p> <p>f) Define an amphidrome, co-tidal chart, and Beaufort Scale.</p> <p>g) Explain Harmonic Analysis and its Application to Tides.</p>	10 4 4 4 4 6 4	
2	<p>Sounding operations are perhaps the most important part of the hydrographic surveyor's work. Today, most sounding is carried out by the use of echo-sounders.</p> <p>a) Describe the general principles of an echo sounder. Include in your answer the nature of the echo pulse (frequency/duration), beam forming, transducer types, etc.</p> <p>b) To obtain true depth with an echo sounder, various corrections must generally be applied to the sounder depth. Explain by giving examples.</p> <p>c) It is not uncommon to get "a false echo" (erroneous depth) with an echo sounder. List and describe five such false echoes.</p> <p>d) Describe the effect of water temperature, salinity, and pressure changes in the speed of an underwater acoustic wave.</p> <p>e) Describe two non-acoustic sounding methods and under which conditions you would possibly use them.</p>	10 10 5 8 4	

3	<p>Planned lines of soundings must cover the sea-bed in a methodical manner.</p> <p>a) What are two basic requirements the plan must fulfill?</p> <p>b) Why could the plan be different if you were using a Multibeam Swath System rather than a single beam echo sounder?</p> <p>c) Explain the process of “shoal” examination or searching, focusing on different sounding line patterns.</p> <p>d) Why is it sometimes necessary to use side-scan sonar in conjunction with single beam echo sounding.</p>	4 4 4 4	
4	<p>With the aid of diagrams explain the difference between an acoustic sweep system and a multibeam swath system. Give examples when it would be more beneficial to use one or the other.</p>	5	
5	<p>Explain why the Mercator projection would or would not be the projection of choice for a nautical chart.</p>	6	
Total Marks:		100	