CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS

C12 - HYDROGRAPHIC SURVEYING

October 2012

Note: This examination consists of 9 questions on 1 page. **Marks**

Q. No	Time: 3 hours	Value	Earned
1.	Define the following in one or two sentences: a) CTD b) Side Scan Sonar c) Cleared Depth d) Shoal Exam e) LIDAR f) Seiche g) Cavitation h) Snell's Law i) Tidal Range j) Heave	 2 2 2 2 2 2 2 2 2 2	
2.	a) Name the three ocean parameters that affect sound velocity in the ocean. b) Draw two typical sound speed profiles in the open ocean, one at the equator and one in the arctic. c) Which parameter has the greatest effect in the upper (near surface) region? d) Which parameter has the greatest effect in the lower (towards bottom) region?	2.5 2.5 2.5 2.5	
3.	a) With the help of a diagram, describe the components necessary for reducing water depth measurements from a singlebeam transducer face to a chart datum. b) Describe three of the main sources of vertical uncertainty involved in this reduction.	4 6	
4.	Describe 3 different non-acoustic depth measuring techniques.	10	
5.	In relation to Multibeam surveying, what is a "patch test" and why is it performed? Which four components is it designed to address?	10	
6.	Explain tides, making sure you include: generating forces, daily and monthly periods, amplitude ranges, etc.	10	
7.	a) Describe the factors that affect the speed of sound of an underwater acoustic wave in water. b) Why is it critical that a hydrographic surveyor know the speed of sound in water?	5 5	
8.	With the help of a diagram, describe the various vertical datums used in hydrographic operations. Explain what each datum is used for and how it is related to the others.	10	
9.	Describe the purposes of nautical charting surveys including all essential data to ensure safety of navigation. Describe everything you would take into account in order to plan and conduct a hydrographic survey for charting.	10	
	Total Marks:	100	