

**CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS**

**C12 - HYDROGRAPHIC SURVEYING**

**October 2013**

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

<u>Q. No</u>	<u>Time: 3 hours</u>	<u>Marks</u>	
		<u>Value</u>	<u>Earned</u>
1	Please define the following in one or two sentences		
	a) LAT datum	2	
	b) HAT datum	2	
	c) Spring Tide	2	
	d) Harmonic Constituent	2	
	e) Tidal Range	2	
	f) Lead Line	2	
	g) Interferometry (in the context of multibeam technology)	2	
	h) Patch Test ((in the context of multibeam surveying)	2	
	i) CTD	2	
j) Acoustic Doppler Profiler	2		
2	a) In terms of acoustic transducer design, what are the trade-offs between the acoustic pulse duration and system resolution?	5	
	b) How is the beam width of a single beam transducer defined, in terms of intensity loss in dB? What is it in percent?	5	
3	a) What two factors affect the single beam echo sounder footprint size?	5	
	b) With the help of a diagram, describe the components necessary for reducing Single Beam water depth measurements from the transducer face to a chart datum.	5	
4	As they apply to multibeam surveying, describe vessel motion determination and compensation techniques for: heave, roll, pitch, heading and yaw.	10	
5	Compare and contrast the use of multibeam versus bathymetric LIDAR in hydrography.	10	
6	Summarize the differences between beam forming and phase differencing multibeam systems.	10	
7	a) What is the approximate time period of the three primary tidal effects (in terms of hours, days, weeks and/or months)?	5	
	b) Name, and describe causes of, four different non-tidal water level variations	5	
8	With the help of a diagram, describe the relationship between ellipsoidal, geoidal and tidal vertical datums, as used in hydrographic operations. Explain how each are derived, what they are used for and how they are related to each other.	10	
9	Describe the procedures that should be followed when planning a hydrographic survey for charting.	10	
		100	