

**CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS**

| <b>C12 - HYDROGRAPHIC SURVEYING</b>                               |   | <b><u>March 2017</u></b> |                      |
|---|---|--------------------------|----------------------|
| <b>Note: This examination consists of 12 questions on 1 page.</b> |   | <b>Marks</b>             |                      |
| <b><u>Q. No</u></b>   | <b><u>Time: 3 hours</u></b>   | <b><u>Value</u></b>      | <b><u>Earned</u></b> |
| 1.  | Please define the following in one or two sentences   |                          |                      |
|   | a) Beam width   | 2                        |                      |
|   | b) Lead line  | 2                        |                      |
|   | c) Semi-diurnal tide  | 2                        |                      |
|   | d) Uncertainty  | 2                        |                      |
|   | e) CTD  | 2                        |                      |
|   | f) Chart Datum  | 2                        |                      |
|   | g) Survey Datum   | 2                        |                      |
|   | h) Patch test   | 2                        |                      |
|   | i) Spring tide  | 2                        |                      |
|   | j) HAT  | 2                        |                      |
| 2.  | What is an inertial motion unit (IMU) and what does it measure?   | 5                        |                      |
| 3.  | For what purposes would an IMU be used during a survey?   | 5                        |                      |
| 4.  | Provide 2 reasons for why it is desirable to take water level observations throughout the course of a hydrographic survey.  | 10                       |                      |
| 5.  | If your side scan sonar (SSS) passed directly over a school of fish in mid-water, where would they appear in your SSS image?  | 5                        |                      |
| 6.  | The SSS tow fish has been positioned within 20 metres of a 2 metre trench. Describe what the side scan sonar image would look like.   | 5                        |                      |
| 7.  | With the use of diagrams, describe the four main errors that a multibeam “patch test” is designed to address. Make sure you include where, how and why the patch test lines are run.  | 10                       |                      |
| 8.  | In relation to the frequency of an underwater acoustic signal, what is the tradeoff between vertical resolution and range?  | 5                        |                      |
| 9.  | What is a side or bow mounted transducer and what advantages does it have over a hull mounted transducer?   | 5                        |                      |
| 10.   | How is sound velocity determined from a CTD profile?  | 5                        |                      |
| 11.   | What is IHO S-44 and what is it used for?   | 5                        |                      |
| 12.   | A local port authority wants to provide all the facilities for modern navigation and docking. How would you advise them to proceed? What equipment and capabilities should they develop and what information will they need to provide to the modern mariner? | 20                       |                      |
|   |   | 100                      |                      |