

CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS

C6 – GEODETIC POSITIONING

March 2022

Note: This examination consists of 6 questions on 2 pages.

Marks

<u>Q. No</u>	<u>Time: 3 hours</u>	<u>Value</u>	<u>Earned</u>
1.	<p>In geodetic positioning, different types and categories of coordinates are used that involve the implementation of 3D, 2D, global, local, curvilinear, Cartesian, and planar coordinates. One type of these coordinates is known as natural coordinates.</p> <p>a) What is meant by natural coordinates? What do they depend on? What is their main datum?</p> <p>b) Define two coordinate frames that are based on natural coordinates. For each frame, state the name and used abbreviation, define the axes and used coordinates, and draw a figure showing the aforementioned elements.</p> <p>c) For the two frames used in b), state the main relationship between them and illustrate this relation in a single figure showing both frames.</p>	4 7 4	
2.	<p>One of the classic definitions of Geodesy was “<i>Geodesy is the determination of the Earth’s gravity field potential function</i>”. Another one was “<i>Geodesy is the measurement and representation of the Earth and its gravity field</i>”.</p> <p>a) What is the relationship between the gravity potential and the gravity vector?</p> <p>b) What are the components that constitute the Earth’s gravity vector? What causes each component? Which component is the largest? What are the locations on the surface of the Earth where each component has its smallest and largest value?</p> <p>c) Define a level surface and discuss its properties in detail. Give examples of known level surfaces used in geodetic positioning and how each one was/is obtained.</p> <p>d) How is the geopotential number defined? How are geopotential numbers used to obtain different types of heights? Which quantity (or parameter) will govern the obtained height type?</p>	3 7 5 5	
3.	<p>With the evolution of GPS as the most common GNSS, surveyors have been using it on a daily basis with implementing different techniques. In addition, other GNSSs have been developed and used worldwide.</p> <p>a) Discuss in detail the RTK technique. Include what the acronym stands for, when it should be used, observations, tools, obtained accuracy, advantages, disadvantages, and possible applications.</p> <p>b) In some of the RTK applications, a virtual reference station (VRS) is created. Explain this concept and how it is implemented.</p> <p>c) What other GNSSs are currently available with GPS?</p> <p>d) What is meant by WADGPS, LADGPS, and WAAS? How are they implemented and what are their main applications?</p>	7 3 3 4	

