CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS

E4 - ADVANCED REMOTE SENSING

October 2014

Q. No	Note: This examination consists of 10 questions on 1 page. Time: 3 hours	Marks Value	Earned
1.	Remote sensing encompasses a wide range of spectral regions, for example visible and microwave. What ranges are most common in high spatial-resolution satellite and air imagery used over urban areas? What spectral characteristics of ground objects in these areas make these ranges appropriate?	10	
2.	Images are received with a digital number (DN; also called Grey Level or Brightness Value) in each pixel. What physical property of ground objects would be represented by the DN of • a Landsat image? • a Radarsat 2 image?	10	
3.	In a working environment, a layer representing the elevation (a DEM) is sometimes found in a file package along with the image data itself. Give at least two ways in which that DEM could have been obtained and attached to the image file.	10	
4.	Define active and passive sensors. List at least two advantages and two disadvantages of each form. Include an example of each among existing sensors whose imagery is readily available	10	
5.	Answer **either** a **or** b: a) Describe the principles of Radar Interferometry, and give an example of an application where this technology would be appropriate. Include a definition of coherence. b) When using LiDAR data, explain what is meant by the terms "first return," "last return" and "intensity." Outline how LiDAR can be used in one common applications area of your choice (applications area examples: forestry, urban planning, etc.).	10	
6.	What is object-based analysis, when used in a remote sensing context? Name one reason why an analyst might want to form objects.	10	
7.	High temporal resolution imagery is becoming more important for examining both natural cycles and directional change on the Earth's surface. In detecting changes to the forested landscape, what would be the major characteristics of the image that would need to be acquired? Lay these out for a particular forestry change application of your choice.	10	
8.	What characteristics of ground objects influence the backscatter of active microwave (radar) instruments?	10	
9.	Thermal imagery was retained among the new Landsat 8 products to provide information related to agricultural irrigation and other water uses in semi-arid areas. Explain how thermal imagery would be used in this application. Demonstrate in the answer that you understand basic principles of thermal data.	10	
10.	In validating the results of image analysis, sampling must be undertaken to provide the ground information that is to be accepted as correct. For a classified image with 6 classes, how many accuracy sample pixels would be needed and what? Include an example.	10	
	Total Marks:	100	