

CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS

E4 – ADVANCED REMOTE SENSING

March 2024

Although programmable calculators may be used, candidates must show all formulae used, the substitution of values into them, and any intermediate values to 2 more significant figures than warranted for the answer. Otherwise, full marks may not be awarded even though the answer is numerically correct.

Note: This examination consists of 10 questions on 2 pages.

Marks

Q.No

Time: 3 hours

Value Earned

1.	Airborne remote sensing platforms require careful mission planning. Please discuss five important mission planning considerations when flying in class “G” in Canadian airspace.	10																																																																																																					
2.	Imaging scanners mounted on remote sensing satellites are usually classified into two categories i.e. push-broom and whisk-broom. Discuss both by comparing them with each other.	10																																																																																																					
3.	Briefly explain four types of image resolution associated with optical satellite remote sensing.	10																																																																																																					
4.	<p>A subset of a Landsat-8, band-8 classified image with its pixel DN values is shown below. How many classes can be extracted from this image. Please calculate area covered by each class. Please also calculate the area of each class if it is False Colour Composite (FCC) image of Landsat-8. Please colour code (you may use different hashing style if colour markers/pencils are not available).</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>80</td><td>80</td><td>80</td><td>80</td><td>200</td><td>200</td><td>200</td><td>160</td><td>160</td><td>160</td></tr> <tr><td>80</td><td>80</td><td>80</td><td>80</td><td>200</td><td>200</td><td>200</td><td>160</td><td>160</td><td>160</td></tr> <tr><td>80</td><td>80</td><td>80</td><td>200</td><td>200</td><td>40</td><td>40</td><td>40</td><td>80</td><td>80</td></tr> <tr><td>80</td><td>80</td><td>200</td><td>200</td><td>200</td><td>40</td><td>40</td><td>40</td><td>80</td><td>80</td></tr> <tr><td>80</td><td>80</td><td>200</td><td>200</td><td>200</td><td>40</td><td>40</td><td>40</td><td>80</td><td>80</td></tr> <tr><td>80</td><td>80</td><td>80</td><td>80</td><td>200</td><td>200</td><td>200</td><td>40</td><td>40</td><td>80</td></tr> <tr><td>80</td><td>80</td><td>80</td><td>80</td><td>200</td><td>200</td><td>200</td><td>40</td><td>40</td><td>40</td></tr> <tr><td>80</td><td>80</td><td>80</td><td>160</td><td>160</td><td>160</td><td>200</td><td>200</td><td>160</td><td>160</td></tr> <tr><td>80</td><td>80</td><td>160</td><td>160</td><td>160</td><td>160</td><td>200</td><td>200</td><td>160</td><td>160</td></tr> <tr><td>80</td><td>80</td><td>160</td><td>160</td><td>160</td><td>160</td><td>160</td><td>200</td><td>200</td><td>160</td></tr> </table>	80	80	80	80	200	200	200	160	160	160	80	80	80	80	200	200	200	160	160	160	80	80	80	200	200	40	40	40	80	80	80	80	200	200	200	40	40	40	80	80	80	80	200	200	200	40	40	40	80	80	80	80	80	80	200	200	200	40	40	80	80	80	80	80	200	200	200	40	40	40	80	80	80	160	160	160	200	200	160	160	80	80	160	160	160	160	200	200	160	160	80	80	160	160	160	160	160	200	200	160	10	
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5.	A natural color composite of Landsat 8 having 6,000 pixels in each row and 6,000 rows in an image. Calculate the print size of the image if you want to plot it on 1:250,000 scale. Also calculate the scale of quarter image if it needs to be printed on the same page size.	10																																																																																																					

6.	Please discuss three commonly-used image enhancement techniques.	10	
7.	Describe accuracy analysis of image classification while explaining diagonal and non-diagonal matrixes.	10	
8.	Please explain the concept of multi returns in LiDAR point cloud data while explaining the significance of multi returns.	10	
9.	<p>a) Calculate the radius and area of the LiDAR spot on the ground if the transmitter aperture is 8mm, range is 1 km and divergence angle is 0.7 mrad.</p> <p>b) Calculate the radius and area of the LASER spot on the target having 1060 nm wavelength of 1 km of range and diameter of its pinhole is 1mm.</p>	10	
10.	Please explain three resolutions associated with the Side Looking Airborne RADAR (SLAR).	10	
	Total Marks:	100	