ASSOCIATION OF CANADA LANDS SURVEYORS - BOARD OF EXAMINERS
WESTERN CANADIAN BOARD OF EXAMINERS FOR LAND SURVEYORS
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SCHEDULE I / ITEM 4
APPLIED PHOTOGRAMMETRY AND REMOTE SENSING

<u>**February 2001**</u>
(1990 Regulations)
This examination consists of __13__ questions on __2__ pages   **(Closed Book)**

<u>Q. No.</u>	<u>Time: 3 hours</u>	<u>Marks</u>

1.	Briefly explain the following terms:
	  a) Principal point
	  b) Fiducial marks
	  c) Collinearity condition
	  d) Coplanarity condition
		4

2.	A distance ab on a vertical photograph is 50 mm, and the corresponding ground distance AB is 1000 m. If the camera focal length is 152 mm, what is the flying height above the terrain upon which the line AB is located?	4
3.	How many 1:10,000 aerial photographs would be required to give a complete stereo coverage of a rectangular project area 15 km long by 10 km wide? For this project, you are using a standard aerial camera with a focal length of 152 mm and a 230 by 230 mm format. The forward overlap is specified as 60% and the sidelap is specified as 30%.	10
4.	There are two ways to calculate the exterior orientation parameters of a photo, namely relative orientation followed by subsequent absolute orientation, and space resection. Compare these two methods in terms of number of photos and number of ground control points necessary to solve the unknowns	10
5.	a) What are the differences between an aerial photograph and an orthophotograph in terms of projection type, scale, and measurability (e.g. horizontal distance)? Tabulate your answer b) What are the main differences between rectification and differential rectification in terms of, projection type, unknowns, known quantities, and results? Tabulate your answer	10
6.	a) What is the main goal of aerial-triangulation? Briefly describe one aerial-triangulation method. b) Briefly describe the benefits of the Global Positioning System (GPS) to aerial-triangulation.	12

7.	Briefly explain the following terms:
	  a) Atmospheric window
	  b) Spectral Reflectance
	  c) Spatial resolution
	  d) SLAR
	  e) False-color composite
	  f) Radiometric calibration
		10

8.	List two important differences between image enhancement and image classification	5
9.	What are the factors involved in remote sensing image acquisition that affect the image geometry?	5
10.	a) What is a high pass filter used for? b) What is a principal component analysis (PCA) used for? c) Explain the main differences between the TM sensor on the LANDSAT and the HRV sensor onboard the SPOT satellite.	10
11.	You have a series of satellite images, with spectral bands in the visible and new infrared, of a Canadian agriculture area taken over the following dates: May 1, June 15, July 20, August 10, and September 10. What analysis techniques would you apply in order to: a) Identify and estimate the surface of the main agriculture crops? b) Study the progress of the crops through the growing season?	10
12.	a) Briefly describe the necessary steps for rectifying a SPOT image b) Shown below is an image input and a mapped output position as calculated from hypothetical transformation parameters, i.e. the rectified output image should contain the pixel brightness value from the input position (2.7, 2.4) Which brightness value would you assign to the output grid using the Nearest Neighbour assignment **Columns** **3 3 5 8** **3 4 5 9** **Rows** **3 4 9 11** **3 5 11 14** **x output position at column 2.7, row 2.4**	6
13.	The following is a sample of a remote sensing image: 7 7 10 5 7 6 4 4 5 What is the smoothed value at the central point using the following filters: a) Mean b) Median	4

Total Marks: 100