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<table>
<tr><td colspan="2" align="center">**SCHEDULE I / ITEM 4**
REMOTE SENSING & APPLIED PHOTOGRAMMETRY</td><td colspan="2" align="center">**October 2006**</td></tr>
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		Marks	
Note:	**This examination consists of 13 questions on 3 pages.**		
<u>Q. No</u>	Time: 3 hours	<u>Value</u>	<u>Earned</u>
1	Briefly explain the following terms together with the factors that control them for a given digital imaging system: a) Radiometric resolution, b) Spectral resolution, and c) Geometric resolution.	9	
2	a) What are the differences between active and passive remote sensing systems? Discuss the pros and cons of these systems. b) You have a digital B/W (8 bits/pixel) and a color (24 bits/pixel) image. Comment on the radiometric and spectral resolutions of these images (i.e., which one has higher radiometric and spectral resolution)	5 3	
3	a) Explain how can you use the spectral reflectance curve to identify the moisture content in vegetation and soil? b) Most remote sensing systems avoid detecting and recording wavelengths in the Ultraviolet and blue portions of the spectrum. Explain the rationale behind this practice.	3 3	

4	a) Briefly explain the following terms:
	      i. Registration,
	      ii. geo-coding, and
	      iii. ortho-rectification.
	
	b) What are the main characteristics/differences between supervised and unsupervised classification strategies? Tabulate your answer.
		6
		
		5	

5	Compare LIDAR and RADAR with respect to the following aspects a) Sensor type (active or passive). b) Utilized wavelength band. c) Sensitivity to weather conditions.	10	

	d) System output. e) Auxiliary/support systems. f) Footprint g) Platform height.		

6	The following is a 3x3 sub-image of a remote sensing scene:
	
	     95 94 84
	
	     86 27 96
	
	     100 97 87
	
	Derive the smoothed value at the central pixel using the following filters:
	
	a) 3x3 moving average,
	
	b) 3x3 median filter, and
	
	c) the following smoothing mask
	
	$$\frac{1}{12}\begin{bmatrix} 1 & 1 & 1 \\ 1 & 4 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$
		6	

7	An aerial camera with IMC is used to acquire photography at a flying height of 5200 m above ground. The focal length is 153.15 mm. The aircraft is flying at 325 km/hr and an exposure time of 1/250 second is used. How far across the focal plane must film travel during the exposure in order to obtain an image with no image motion blurring?	7	
8	A distance between 2 points on a map at a scale of 1:62,500 is 28.65 mm. The distance between the same points on a vertical photo taken with a 152.11 mm focal length camera is 46.19 mm. If both points lie at an elevation of 84 meters, compute the flying height above datum	7	
9	a) What is the target function (i.e., objective) of a bundle adjustment procedure involving an image block with ground control and tie points?	2	
	b) What are the parameters that are solved for in the following standard photogrammetric problems? i. Single photo resection,	8	

	ii. Photogrammetric intersection,		
	iii. Bundle adjustment, and		
	iv. Bundle adjustment with self-calibration		
10	a) What is meant by exterior orientation of an imaging system? What are the involved parameters?	4	
	b) What are the alternative methodologies for determining the exterior orientation parameters of an imaging system?	4	
11	You are given a stereo-pair with twenty identified tie points. List the balance between the observables and the unknown parameters in a bundle adjustment procedure to solve for the exterior orientation parameters as well as the ground coordinates of tie points. Can you estimate the involved unknown parameters? Why?	6	
12	What are the quantities measured by a GPS/INS system onboard an imaging platform? What are the main requirements for relating these measurements to the exterior orientation of the exposure stations?	6	
13	a) What are the factors affecting the precision of the outcome from a photogrammetric bundle adjustment procedure?	2	
	b) What are the factors affecting the accuracy of the outcome from a photogrammetric bundle adjustment procedure?	2	
	c) How would you evaluate the precision and the accuracy of the outcome from a photogrammetric bundle adjustment procedure?	2	
	Total Marks:	100	