

AMERICAN UNIVERSITY OF BEIRUT
Geology Department
Geol 313
Final Exam

June 5, 2000

Student Name: _____

Part I. Choose the best answer (30 pts.)

1. . . . , as an element of air-photo interpretation, refers to spatial arrangements of objects in the image.

- | | |
|------------|---------|
| a. Shape | b. Size |
| c. Pattern | d. Tone |

2. Sparsely growing shrubs (level II of Land use/ Land cover classification system) belong to . . . (level I).

- | | |
|----------------------|----------------|
| a. agricultural land | b. forest land |
| c. built-up land | d. rangeland |

3. The drainage of . . . is characterised by centripetal pattern with very few surface streams.

- | | |
|-------------------|---------------------|
| a. granitic rocks | b. bedded limestone |
| c. sand dune | d. lava |

4. . . . MSS systems, multiband photographic systems use . . . optical systems which leads to problems in ensuring that data in separate bands are comparable to one another spatially and radiometrically.

- | | |
|-------------------------|---------------------------|
| a. Like . . . different | b. Unlike . . . different |
| c. Like . . . the same | d. Unlike . . . the same |

5. Due to . . . effects, MSS systems are restricted to operate in either (or both) 3-5 μm or 8-14 μm range of wavelengths.

- | | |
|----------------|-----------------|
| a. atmospheric | b. electronic |
| c. technical | d. instrumental |



6. . . . emits only a fraction of the energy emitted from a blackbody at the equivalent temperature, and its emissivity can vary with wavelength.

- a. Ideal material
 - b. A graybody
 - c. A white body
 - d. Real material
-

7. Except for thermal band, the ground resolution of MSS sensors is about . . . m, whereas that of TM sensors is . . . m.

- a. 69 . . . 30
 - b. 80 . . . 30
 - c. 69 . . . 10
 - d. 80 . . . 10
-

8. The orbit altitude of Landsat -4, and -5 are . . . km.

- a. 965
 - b. 310
 - c. 705
 - d. 185
-

9. . . . as one procedure of digital image processing involves correcting distorted or degraded image data and eliminating noise.

- a. Image enhancement
 - b. Data merging and GIS integration
 - c. Image classification
 - d. Image rectification and restoration
-

10. The microwave portion of the spectrum includes wavelengths within the approximate range of :

- a. 14 μm to 1 mm
 - b. 1 mm to 1m
 - c. 14 μm to 1 m
 - d. 3 μm to 14 μm
-

11. Depending on the wavelengths involved, microwave energy can see through:

- a. haze
 - b. light rain and snow
 - c. clouds and smoke
 - d. all of the above
 - e. none of the above
-

12. In 1971, a radar survey was begun in . . . that resulted in the mapping of nearly 500,000 sq km of land.

- a. Venezuela
 - b. Columbia
 - c. Brazil
 - d. Panama
-

Part II. Circle T = true or F = false and explain why if it is false (20 pts.)

T F 1. Systems operating at long wavelengths must "view" large areas of the earth at any given time in order to obtain a detectable energy signal.

T F 2. In comparison with multispectral scanners, multiband photographic data are somewhat easy to calibrate radiometrically because they stem from the photochemical processes of photography.

T F 3. Terrain temperatures are normally lower than those of water during the night and higher than water temperature during the day.

T F 4. The optical spectrum ranges between 0.3 and 3 μm and it is termed so because lenses and mirrors can be used to refract and reflect such energy.

T F 5. With decreasing orbit altitude the satellite orbital period increases.

T F 6. Fog and clouds are essentially opaque to thermal but not to microwave radiation.

T F 7. Thermal capacity is a measure of the rate at which heat passes through a material, whereas thermal conductivity determines how well a material stores heat.

T F 8. The altitude of Landsat -4 and -5 was increased in order to reduce the frictional effects of the atmosphere.

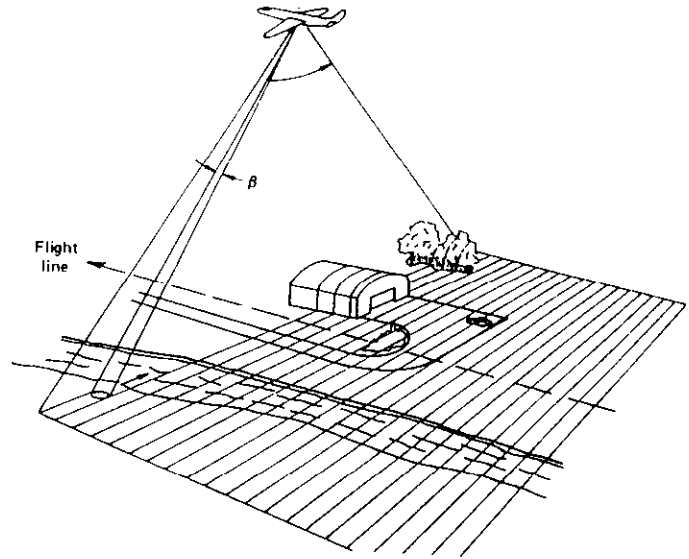
T F 9. In the unsupervised approach of classification we determine spectrally separable classes and then define their informational utility.

T F 10. Doppler radar systems (nonimaging radar) are used to measure vehicle speeds. They use Doppler effect frequency shifts in the transmitted and returned signals to determine an object's velocity.

Part III. Answer only five of the following seven questions (50 pts.)

1. Discuss the geologic mapping in airphoto interpretation.
2. Using Figure 1 introduce the across-track multispectral scanning.

Figure 1



3. Using the Table 1 discuss the radiation from real materials.

Table 1 **Kinetic versus Radiant Temperature for Four Typical Material Types**

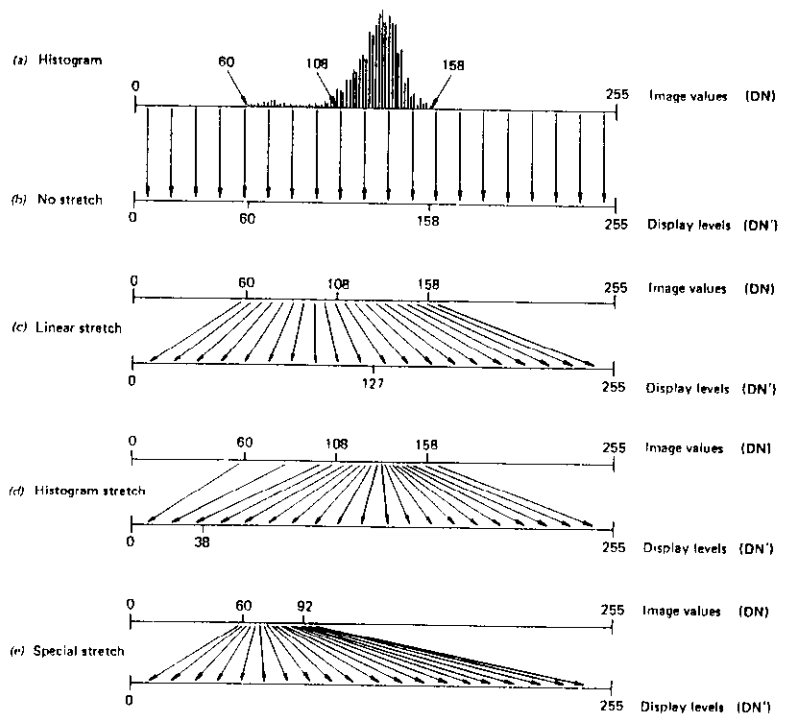
Object	Emissivity ϵ	Kinetic Temperature T_{kin}		Radiant Temperature $T_{rad} = \epsilon^{1/4} T_{kin}$	
		K	°C	K	°C
Blackbody	1.00	300	27	300.0	27.0
Vegetation	0.98 0.925	300	27	298.5	25.5
Wet soil	0.95	300	27	296.2	23.2
Dry soil	0.92	300	27	293.8	20.8

4. Give an overview of the Landsat Satellite Program and indicate the four types of sensors that have been included in these missions.

5. Using schemes describe the convolution and edge enhancement of spatial feature manipulation (Image Enhancement).

6. Discuss contrast manipulation including gray-level thresholding, level slicing, and contrast stretching (use Figure 2).

Figure 2



7. Introduce the spatial resolution of SLAR systems including range and azimuth resolution, draw schemes.

GOOD LUCK