

**DEPARTMENT OF MINING ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR**

End-Spring Semester Examination 2002-03

III yr. B. Tech.

Date: 24.04.2003

Time: 3 hrs.

Full Marks: 100

No. of Students:04

Subject Name : Elements of Photogrammetry and Remote Sensing (284014)

Answer any FIVE Questions.

[Assume any data, if required, giving reasons for the choice.]

1. (a) What is image classification? Discuss with necessary sketches the following classifiers of MSS data: (10)

- i. Parallelopiped classifier
- ii. Gaussian Maximum likelihood classifier

(b) Given below is the Error matrix resulting from classifying randomly sampled test pixels. Determine the overall accuracy and the \hat{K} statistics and comment on the results.

(10)

Reference data							
	Water (W)	Sand (S)	Forest (F)	Urban (U)	Corn field (C)	Hay (H)	Row Total
Classification data							
W	226	0	0	12	0	1	239
S	0	216	00	92	1	0	309
F	3	0	0360	228	3	5	599
U	2	108	2	397	8	4	521
C	1	4	48	132	190	78	453
H	1	0	19	844	36	219	359
	233	328	429	945	238	307	2480

2. (a) What are the main characteristics of LISS and PAN images? Describe how low resolution multispectral FCC images are generated from LISS and PAN images. (10)

(b) What is RADAR? Mention the application of RADAR. Explain the factors that affect the microwave signatures of an object in microwave remote sensing. (10)

3 Write short notes on *any two* of the following: (10×2)

- a. GIS and its application in mining
- b. Atmospheric influences on spectral response pattern
- c. Principle of radial line triangulation
- d. Application of Remote Sensing

4. (a) What are the main components of an ideal remote sensing systems. Explain them briefly. (10)
- (b) What is the difference between image rectification and image registration. Describe the process how image registration is done using the “Image Analyst” package? (10)

5. A vertical photograph was taken with a 152.3 mm focal length camera. Ground points A and B have elevations 435 m and 447 m above sea level respectively. The horizontal length of the line AB is 586 m. The images of A and B appear as a and b . The measured photo coordinates are

$$x_a = 18.25 \text{ mm}$$

$$y_a = -61.35 \text{ mm}$$

$$x_b = 109.67 \text{ mm}$$

$$y_b = -21.25 \text{ mm}$$

Calculate the flying height of the photograph above sea level by a trial-and-error approach.

(20)

6. An area, which is 40 km long in North – South direction and 30 km wide in the East – West direction, is to be photographed with a 300 mm focal length camera for the purpose of constructing a mosaic. The photograph size is 23 cm \times 23 cm. The average scale is 1: 10,000 effective at an average elevation of 215 m above sea level. Overlap and sidelap are to be 60 % and 35 % respectively. An intervalometer is to be used. The ground speed of the aircraft is 240 km/hr. The scale of the existing base map is 1: 60,000. The two outer flight lines are to coincide with east and west boundaries of the area. Determine the data for the flight plan and prepare the flight map on the base map. (20)