

Bengal Engineering and Science University, Shibpur
M.E.(Civil) 1st Semester Examination, December, 2012
Remote Sensing (CE-930)

Time: Three hours

Full Marks: 70

Figures in the margin indicate Full Marks

Answer Question No. 1 and any three from the rest

1. Write short notes on any two of the following: (10)

- i) Nominal Scale
- ii) Interval Scale
- iii) Band Ratioing
- iv) Universal Transverse Mercator Projection

2. (5+5+10=20)

- a) Explain i) Histogram normalization ii) Reference stretch
- b) Subset of an image is given below.

48	40	105
40	55	95
38	60	88

Calculate the resulting brightness value of the central pixel of the subset image when i) Sobel, and ii) Laplacian filters are applied?

c) Consider an image that is composed of 64 rows and 64 columns with the range of brightness values that each pixel can assume limited to nine values. The frequency of brightness values in each range is given in the following table:

Range	0	1	2	3	4	5	6	7	8
Brightness Values	750	990	720	450	346	300	270	180	90

Perform histogram equalization and draw the histogram before and after the equalization.

3. (10+10=20)

- a) What do you mean by supervised classification? Describe any two methods of classification algorithm of supervised classification technique.
- b) In a particular classification process using Maximum Likelihood Classifier, three classes are selected and the following statistics are derived.

Class	Mean	Standard Deviation	No. of Samples
Soil A	52	11	2305
Soil B	41	18	2410
Soil C	32	5	1988

Classify the following image. (If two likelihood values are equal, take any class)

26	38	32	29	49	52
38	29	32	51	47	42
32	39	25	24	41	39
35	47	33	41	51	29
29	49	39	47	37	36
34	37	41	52	29	28

4.

(8+7+5=20)

- a) Explain spatial interpolation technique of rectification.
- b) Discuss any two intensity interpolation techniques of rectification.
- c) In a certain geometric transformation, following relationship is obtained between the original image co-ordinates (x' , y') and output image coordinates:

$$x' = 0.72 + 1.37 x + 2.88 y \quad \text{and} \quad y' = 1.26 + 2.74 x + 4.95 y$$

Estimate the resulting brightness value of the pixel (17, 10) of the output image, using any two methods of intensity interpolation. Following brightness values of some pixels in the original image are available [BV(x, y)]: 23(52, 97), 31(52, 98), 29(53, 97), 37(53, 98).

5.

(8+7+5=20)

- a) Describe the different data structures used in GIS.
- b) What is spatial modeling? Discuss with an example.
- c) Describe polygon-on-polygon overlay procedure.

6.

(10+5+5=20)

- a) Discuss briefly about i) Panchromatic image and ii) Multispectral image.
- b) Classify the satellite imaging systems in terms of spatial resolution with example.
- c) What are zero-sum kernels? Where they are used?