

*Figures in the margin indicate Full Marks*

*Answer any five questions*

1. (7+7=14)  
a) Explain briefly the different types of geometric correction.  
b) Discuss briefly about image transformation techniques.
2. (3+6+5=14)  
a) Explain the percentage linear contrast stretching technique.  
b) Calculate the new brightness values of the subset image shown below when 95% contrast stretching technique is applied.

200	210	190
175	225	180
150	250	205

- c) Discuss briefly about different types of convolution filtering with example.
3. (4+10=14)  
a) Differentiate between unsupervised classification and supervised classification.  
b) In a particular classification process using Maximum Likelihood Classifier, three crops are selected and the following statistics are derived from the training areas.

Crop Type	Mean Spectral Value	Standard Deviation
Paddy	25	12
Wheat	40	10
Sugercane	62	8

Classify the following image using the statistics.

25	24	31	37	39
24	28	45	20	41
25	26	50	56	70
35	33	58	52	52
33	38	48	60	64

4. (6+8=14)  
a) Explain feature geometry in GIS and its representation in different types of model.  
b) An area is to be chosen for industrial purpose. How will you solve the problem using GIS?

5.

(8+6=14)

- a) Describe any two classification algorithms of supervised classification technique.
- b) An analyst classifies an image in the following classes. One thousand random points are then established and used for classification accuracy assessment.

Class	Forest	Water	Settlement	Agriculture
Forest	75	18	56	8
Water	4	115	14	5
Settlement	6	60	450	17
Agriculture	15	0	0	157

Compute the errors and accuracy for each of the classes.

6.

(5+5+4=14)

- a) A vertical photograph was taken at a flying height of 10 km above sea level with a camera. The focal length of the camera lens is 15cm. Calculate the photo scale at two points at ground elevations of 1500m and 2000m. Calculate also the flying height above terrain if scale of the photograph with this camera is 1:5000.
- b) A film in camera with a 40mm focal length is properly exposed with a lens opening diameter of 10mm and exposure time 1/500 seconds. If the lens opening is reduced to 5mm, what should be the exposure time to have same brightness?
- c) If the relief displacement for a 44m high tower at A is 2mm and radial distance from the centre of the photograph to the top of the tower is 56mm, estimate the flying height above the base of the tower.

7.

(7+7=14)

- a) If radial distances  $r_a$  and  $r_b$  to points A and B in a vertical photograph taken from a height 1500m above datum are 64mm and 62.5mm respectively where A is 150m below datum and B is 170m above datum, find the radial distances to be laid off from a and b to plot a' and b'.
- b) The length of line AB and elevation of its end points A and B are to be determined for a stereopair containing images a and b. The flying height (average from two photos), airbase and focal length of camera lens were 1500m, 600m and 150mm respectively. The measured photographic coordinates in mm of points A and B in the flight line coordinate system are  $x_a = 54.6$ ,  $x_b = 98.7$ ,  $y_a = 50.8$ ,  $y_b = -25.4$ ,  $x_{a'} = -59.5$  and  $x_{b'} = -27.4$ . Find the length of the line AB and the elevations of A and B.