

Question 1: 14 marks

1. Name four possible limitations of *in situ* measurements in remote sensing? [4 marks]
2. With examples, outline three important aspects/forms of data collection during remote sensing process. [6 marks]
3. Describe two broad generalised processes and elements involved in electromagnetic remote sensing of Earth resources [4 marks]

Question 2: 10 marks

Digital remotely sensed data are transformed to useful information, possibly via the conversion of an analog electrical signal data recorded by the remote sensing sensor to a digital value.

1. What is the importance of the preprocessing stage in the data-to-information conversion process in remote sensing? [4 marks]
2. By giving examples, distinguish between multi-spectral and hyperspectral remote sensing systems. [4 marks]
3. Pushbroom sensors are thought to yield accurate measurement of the reflected radiant flux from a specific portion of the terrain. Give two reasons for this? [2 marks]

Question 3: 7 marks

1. Name any two possible causes of low Signal-to-Noise ratio: S/N in the Brightness Values (BV) of a remotely sensed data? [1 marks]
2. How can a digital remote sensing analyst assess the quality and statistical characteristics of a remote sensed data? *any two ways* [1 marks]
3. Univariate statistics do not provide information on the covariance of spectral measurements. Table 4 shows the correlation matrix derived from a sample multi-spectral data set.

Table 1: Correlation matrix derived the multi-spectral data set recorded from vegetated terrain

Band	1	2	3	4
1	1			
2	0.38	1		
3	0.92	0.50	1	
4	0.96	0.20	0.84	1

- What do the high correlation between bands 1& 3 and 1& 4 signify? [1 marks]
- Which band provides unique information not found in the other bands? [2 marks]
- What is the proportion of total variation in the brightness values of band 4 that can be explained by a linear relationship with values of the random variation in band 1 ? [2 marks]

Question 4: 7 marks

- Enumerate any four important Digital Image Processing (DIP) system considerations. [2 marks]
- Name any three main features that an ideal remote sensing storage media should have. [3 marks]
- What are the attributes required of a good (remote scientist) digital image processing analyst? *state atleast two*[2 marks]

Question 5: 12 marks

The following is a sample pixel data record output from a remote sensing sensor.

50	96	108	84	97	95	112	105
55	106	118	104	107	145	152	145
-	-	-	-	-	-	-	-
57	102	106	105	103	134	144	137
54	116	108	114	97	115	102	125

1. Name the type of sensor malfunction depicted above [2 marks].
2. Suggest one possible way of correcting this problem. Now use the methodology suggested to complete the above table [10 marks].