Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

B.E.GEOINFORMATICS

4th Semester

GI23403 DIGITAL IMAGE PROCESSING

(Regulation 2023)

Time: 3hrs Max.Marks: 100

CO1	understand and comprehend the sources, properties of the remote sensing images for further processing of them for application
CO2	appreciate the image processing fundamentals and facilities available in commercial software and skill required for handling images with GEE platform
CO3	apply various image processing functions and routines for enhancing and extracting information from the images and assessing their correctness.
CO4	evaluate various image processing functions and operations for appropriate selection for information extraction.
CO5	construct image processing solutions for given application concerning remote sensing images

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10x2=20Marks)

(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Differentiate univariate and multivariate image statistics with a suitable example.	2	1	L2
2	Identify the suitable type of resampling technique recommended for continuous data.	2	1	L1
3	List the key features of GEE.	2	2	L1
4	Identify the suitable JavaScript operators for categorizing NDVI values into distinct color zones in GEE environment?	2	2	L1
5	Determine the suitable radiometric enhancement technique for imagery with a bi-modal or tri-modal histogram?	2	3	L3
6	Calculate the adjusted pixel value (y) for a pixel with an initial DN value of 90 in a band with a radiometric resolution of 2^8 after applying the Minimum-Maximum stretch operation.	2	3	L3
7	Differentiate parametric and non-parametric decision rules.	2	4	L2
8	What role does ground truth data have in influencing supervised and unsupervised classification results?	2	5	L1
9	Compare the potential of commission and omission error over overall accuracy and kappa statistics in LULC classification.	2	5	L2
10	List any four sensor-related factors that contribute to image degradation.	2	3	L2

PART- B(5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Examine the different spatial sampling and quantization methods adopted for optical remote sensing and microwave data acquisition with clear illustrations.	13	1	L3

	OR			
11 (b)	Examine the various sources of radiometric and geometric distortions in optical remote sensing imagery.	13	1	L3
12 (a)	Write a JavaScript code to perform a Tasseled Cap Transformation on a Landsat image in GEE platform to extract wetness, brightness, and greenness information using arrays and matrices functions. Combine all the sub-array elements to produce a single composite image.	13	2	L3
	OR			
12 (b)	Demonstrate the appropriate use of JavaScript operators in the Google Earth Engine (GEE) environment for a vegetation and an urban application.	13	2	L3
13 (a)	Analyze the significance of PCA in processing and interpreting hyperspectral and SAR imageries.	13	3	L4
	OR			
13 (b)	Categorize convolution and frequency filters according to their functions and applications in image processing.	13	3	L4
14 (a)	Analyze the working principle, merits, and demerits of "box" and "minimum distance to mean" decision rules.	13	4	L4
	OR			
14 (b)	Analyze the necessity of ground truthing for optical data classification, the methods for its collection, and the process of organizing field data effectively.	13	4	L4
15 (a)	Argue the merits and demerits of using visual image interpretation keys for first level LULC maps from optical imagery and waterbody delineation from SAR imagery.	13	5	L5
	OR			
15 (b)	Justify the use of unsupervised classification for accurately mapping vegetation cover in a heterogeneous landscape with varying spectral characteristics.	13	5	L5

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Evaluate the results of the LULC classification from the given confusion matrix using ROC statistics and argue whether the classification algorithm is appropriate for urban sprawl modeling with the remaining time-series data.	15	5	L5

Classification Results

	Classes	Barren Land	Settlements	Waterbody	Vegetation
Ground Truth	Barren Land	25	1	0	0
	Settlements	0	16	1	0
	Waterbody	0	6	19	0
	Vegetation	0	0	10	30