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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

Geoinformatics

VII Semester

GI 5702 Geospatial Analysis with R Programming

(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	State the capabilities of R and its data, variable types
CO2	Describe various operators, control statements and scoping rules in R
CO3	Apply R programming for manipulation of datasets
CO4	Produce various graphs and distribution plots using R
CO5	Analyse dataset using Statistical Tools available in R

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 between Vector and List data types in R.	2	1	L4
2	What is vectorization in R?	2	1	L2
3	Define recursion in the context of R programming.	2	2	L1
4	Assess the relevance of scoping rules in R.	2	2	L4
5	List various Set Operations in R programming with an example.	2	3	L3
6	Develop a R code to generate and sort a vector by selecting 5 letters randomly from each of the lowercase and uppercase alphabets.	2	3	L6
7	Create a scatter plot of X-coordinate vs. Y-coordinate with blue solid circles for elevations more than 100m and red triangle for elevations less than or equal to 100m with a legend.	2	4	L6
8	Write the syntax of R function used for binomial distribution with all arguments and their purpose.	2	4	L2
9	What is the Concept of SVM method?	2	5	L1
10	Write a R-code to compare two NDVI images using t-test.	2	5	L3

PART- B(5x13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Describe the different data types available in R, providing examples of each.	13	1	L1
	OR			
11 (b) i)	Explain various data input/output operations in R programming, including the various functions used for reading and writing data files.	7	1	L1
ii)	Describe the step-by-step procedure to create and visualize a simple data frame in R.	6	1	L1
12 (a)	Explain the structure and syntax of control statements in R, providing examples for each.	13	2	L1
	OR			
12 (b)	Describe various types of Operators available in R with one example for each type.	13	2	L1

13 (a) i)	The rainfall data at Anna University observation station for the last 10 days is given as 0.4, 3.6, 37.8, 3.9, 9.8, 4.5, 33.9, 0.5, 0.0, 0.2. Read the values into a vector and calculate mean, standard deviation, cumulative rainfall, maximum and minimum rainfall and days on which the maximum and minimum rainfall.	7	3	L3
ii)	Describe various any twelve mathematical functions available in R with their syntax and applications.	6	3	L3
	OR			
13 (b) i)	Describe various Linear Algebra Operations on Vectors and Matrices with example.	**6**	3	L3
ii)	A spatial dataset containing landuse classes contains names as abbreviations, different punctuation and inconsistent capitalization. Write a R Programme to clean, transform, and analyze the names using string manipulation functions.	**7**	3	L3
14 (a)	Explain the Plot function in R Program with various arguments to the function. Write a R Programme to plot the correlation between two bands of satellite data represented as vectors with trend line.	**13**	4	L4
	OR			
14 (b)	Discuss various elements described in a Box Plot and write a programme that summarises the 11 band satellite imagery as Box Plot.	**13**	4	L4
15 (a)	Explain the concept of Decision Tree. Describe the application of decision tree algorithm in classification of satellite imagery using suitable R code.	**13**	5	L3
	OR			
15 (b)	What is Random Forest algorithm. Explain the implementation of Random Forest Algorithm in Classification of multiband satellite data.	**13**	5	L3

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16. i)	The NDVI image generated from a satellite image is to be used to generate a binary image containing 0 or 1. Develop R program to sort pixel values in ascending order and Identify the top 5% highest values which represent regions with the densest vegetation. Classify the top 5% pixel values as 1 and others as 0. Also save the reclassified raster and visualize it.	**8**	3, 4	6
ii)	A satellite image with three bands (Red, Green, and Blue) is to be used to Visualize the clustered data using a scatter plot. Develop R Programme for the same with suitable explanation.	**7**	4	6