UNAM
UNIVERSITY OF NAMIBIA

FACULTY	**AGRICULTURE, ENGINEERING AND NATURAL SCIENCES**		
DEPARTMENT	**ENVIRONMENTAL SCIENCE**		
SUBJECT	**GEOSCRIPTING II**		
SUBJECT CODE	**GRS3552**		
DATE	**NOVEMBER 2022**		
DURATION	**3 hours**	**MARKS**	**100**

SPECIAL/SUPPLEMENTARY EXAMINATION

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Internal Moderator: Martin Hipondoka, PhD

This Question Paper consists of **2 pages** excluding this cover page.

INSTRUCTIONS

1. Work in an orderly manner and present your work as neatly as possible.
2. While most of the marks will be awarded for content, candidates must bear in mind the importance of presentation, i.e. insight and critical thinking.
3. Number your questions correctly and clearly.
4. Answer **all** the questions.
5. Please be reminded that cheating in the examination will result **in a failing grade.**

Question 1

a. What is the difference between inner *join* and outer *join?* **[4]**
b. In the context of Python programming language, how would you tell whether the dataframe emerging from join operation is for a spatial dataframe? **[6]**
c. Suppose you have two dataframes (**dataframe4** which is spatial dataframe and **dataframe5** which is non-spatial dataframe) in Python. Write a ***generic*** Python function that can take such dataframes as inputs, merges the two dataframes into one dataframe, and return the merged dataframe as a spatial dataframe. **[15]**
d. Which Python packages will be critical for your function in (c) to work properly? Motivate your answer. **[5]**

Question 2

Suppose one of your friends send you a word document with data in Table 1 below. Write Python code that can create the following:

a. A bar chart for percentage of male population aged 0-4 years that attended Early Child Development in 2011. **[12]**
b. A pie chart for percentage of female population aged 0-4 years that **did not** attend Early Child Development in 2011. **[18]**

Table 1: Percent of male and female population aged 0-4 years that attended Early Child Development in 2011 per region in Namibia

Region	Male	Female
Zambezi	9.2	10.7
Erongo	23.5	25.2
Hardap	6.8	7.8
Karas	16.6	17.1
Kavango	10.9	10.9
Khomas	23.4	23.7
Kunene	7.4	7.5
Ohangwena	10.8	11.8
Omaheke	6.6	6.4
Omusati	8.6	9.6
Oshana	15.6	17.1
Oshikoto	12.1	12
Otjozondjupa	11.9	13.7

Question 3

Suppose the Ministry of Works and Transport sets a new **rule** that no cultivation should be done in an area which is within 0.5 km from roads. Farmers affected by this new rule would be compensated for a cultivation area they may lose due to this new rule. So, the Ministry requested you to assist in identifying cultivation areas which are within 0.5 km from the road, and also to calculate the total area per cropfield that will be affected by this new rule. The Ministry provided you with the shapefile of roads, lakes, cropfield boundary and schools.

Do the following:

a. Based on the Ministry's criteria mentioned above, explain in details the steps you would follow using Python programming language to identify cultivation areas that would be affected by the new rule. **[20]**

b. Write the Python code you would use to identify cultivation areas that would be affected by the new rule. Adhere to good programming practices. **[20]**

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