UNAM
UNIVERSITY OF NAMIBIA

FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES
DEPARTMENT	ENVIRONMENTAL SCIENCE
SUBJECT	GEOSCRIPTING II
SUBJECT CODE	GRS3552
DATE	OCT/NOV 2021

DURATION	3 hours	MARKS	100

NORMAL EXAMINATION

Examiner: Eliakim Hamunyela (PhD)
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. **In geoscripting, when does** the need to perform attribute *join arises?* [5]
b. Study the code in Figure 1 below. Explain why it would not be surprising that **dataframe3** would be a non-spatial dataframe. Motivate your answer. [5]
c. **Given the codes in Figure 1 below,** do you think the importation of gdal, pandas and matplotlib and geopandas packages was necessary? Motivate your answer for each package. [5]

```
import gdal
import os
import numpy
import pandas
import geopandas
import numpy as np
import pandas as pd
import geopandas as gpd
import matplotlib.pyplot as plt

dataframe1=pd.read_csv('PopulationData.csv')
dataframe2=gpd.read_file('Constituencies_boundary.shp')

dataframe3= pd.merge(dataframe1, dataframe2, how ="inner", on ="CONSTITUENCY")
```

Figure 1: Python code

Question 2

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

a. A pie chart for percentage of male that attended Early Child Development in 2011. [15]
b. A scatter plot showing the relationship between male and female population that attended Early Child Development in 2011. [15]

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 Education wants a map showing total number of schools per region. It then contracted you to create this map, but it only gave you a word document containing a table with three columns (Region Name, Number of Schools, and Number of Learners per School).

a. Explain step by step how you would create this map using Python. Number your steps clearly.   **[10]**
b. Translate the steps you explained in (a) above into a Python code that would create the map if you run it. Adhere to good programming practice.   **[15]**
c. Write a Python code that can calculate the average number of learners per school per region.   **[5]**

Question 4

Suppose the Ministry of Works and Transport wants a map showing building structures which are within 10m from the main roads in Namibia. It then contracted you to create this map, but it only gave you shapefiles of main roads and building structures.

a. Explain step by step how you would create this map using Python. Number your steps clearly.   **[10]**
b. Translate the steps you explained in (a) above into a Python code that would create the map if you run it. Adhere to good programming practice.   **[15]**

----END---