

| | | |
|-------------|--------|---------------|
| Exam. | | Regular |
| Level | BE | Full Marks 80 |
| Programme | BGE | Pass Marks 32 |
| Year / Part | IV / I | Time 3 hrs. |

Subject: - Application of GIS With Python (*Elective I*) (GE72501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What is python? Is python the right choice for web based programming, why? Write a Python program to print the following string in a specific format. Sample String: "Twinkle, twinkle, little star, How I wonder what you are! Up above the world so high, Like a diamond in the sky. Twinkle, twinkle, little star, How I wonder what you are"

[1+3+2+2]

Output:

Twinkle, twinkle, little star,

How I wonder what you are!

Up above the world so high,

Like a diamond in the sky.

Twinkle, twinkle, little star,

How I wonder what you are

Write a Python function that takes a sequence of numbers and determines if all the numbers are different from each other.

2. When we need ordered container of things, which will be manipulated? How is memory managed in python?

Write a Python program to create all possible strings by using 'a', 'e', 'i', 'o', 'u'. Use the characters exactly once.

Write a Python program to print a long text, convert the string to a list and print all the words and their frequencies.

[2+3+3]

3. What do you understand by recursive function in python programming? Highlight your answer with python programming using recursive function.

Write a Python program to count the number of each character of a given text of a text file.

Write a Python program to add two positive integers without using the '+' operator. [3+2.5+2.5]

4. What do you understand by control statement and iterations? Describe different forms of control statement and iteration in detail and also express your view on when and how different forms are used with suitable python example.
Write a Python program to lowercase first n characters in a string. [2+4+2]
5. What do you understand by Concatenation, comparison, Length of a string, string subscripts, positive and negative indices, 'in' operator, Strings methods in Python programming? WAP to demonstrate their use using python language.
Write a Python program to extend a list without append. [6+2]
6. What do you understand by Nested List? Write python example to illustrate Nested list.
Write a Python program to generate all permutations of a list in Python.
Write a Python script to sort (ascending and descending) a dictionary by value. [3+2.5+2.5]
7. What is the use of copy module function in python? Mention its type and describe their use with suitable python example.
Write a Python function to create and print a list where the values are square of numbers between 1 and 30 (both included).
Write a Python program to execute a string containing Python code. [1+3+2+2]
8. What is detour? Write a python code for demonstrating the use of detour. List out and describe spatial data processing supported by Python programming.
Write a python code for calculating attributes of vector data. [1+2+3+2]
9. Write a python code for following:
a. Opening a layer (shapefile)
b. Getting info about the layer
c. Getting features Geometry
d. Create new feature [2+2+2+2]
10. What do you understand by spatial reference systems? Describe the method of specifying latitude and longitude in brief. [1+2+2.5+2.5]
Write a python program for following:
a. Getting layer projection
b. Creating a new projection

| Exam. | Regular / Back | | |
|-------------|----------------|------------|--------|
| Level | BE | Full Marks | 80 |
| Programme | BGE | Pass Marks | 32 |
| Year / Part | IV / I | Time | 3 hrs. |

Subject: - Application of GIS with Python (*Elective I*) (GE72501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Why are the advantages of learning python programming? Write about different types of projects which can be carried out using python programming? [2+2]
- b) What do you mean by literal? What are the different types of literal used in python? [1+2]
2. a) What is a function? What are the advantages of using a function in a program? How is function defined in python? State with an example. [1+2+3]
- b) What do you understand by recursive function in python programming? Highlight your answer with python programming using recursive function. [1+3]
3. a) Write a Python program to construct the following pattern, using a nested for loop. [5]

*

* *

* * *

* * * *

* * * *

* * *

* *

*

- b) Write your own python program to convert the word 'PrIsTiNe' into all uppercase, all lowercase and title case. [3]
4. a) Are list mutable or not? List out and describe various List Methods with suitable Python examples. [1+4]
- b) What is the use of copy module in python programming? Mention its types and describe their uses with suitable python examples. [1+2]
5. a) What do you mean by traversal of a string? What does it mean for strings to be immutable? Explain with example. [2]
- b) How are positive and negative indices assigned on a string? If a = 'Popsicle' what are the output of following expressions. [2+3]

a[:3]

a[1:4:1]

a[-3:-1]

a[:-4]

a[1]

a[-1]

6. a) Define Tuple and Set with suitable examples. [4]
- b) What is a dictionary? How does it differ from a list? How would you create dictionary? Show examples of dictionary. How do you access the value in dictionary? [4]
7. a) Briefly describe how you open a file for reading, how you open a file for writing, and give short but complete descriptions of the read and write functions. [4]
- b) Write a python program which opens a text file and write two lines of sentence on it. [4]
8. a) Explain in brief about GDAL library. Write any three raster dataset that GDAL module can read and write. [1+1.5]
- b) What does OGR module do? Write any three vector data format that OGR module can read and write. [1+1.5]
9. a) Write a pseudocode for georeferencing an image. [2]
- b) Write a code to get the following metadata of "wards.shp": [3]
- Total no. of features
Geometry type
Spatial reference system
10. You have given a raster file 'xyz.tif' write a code: [4]
- a) To get projection parameters
b) To get number of rows and columns
c) To get datatype of values
d) To create an empty raster file in tif format with number of columns, rows, projection, datatype same as input raster file.
11. You are provided a vector data in point shape file format "wards.shp", which have two field namely "NAME" and "POPULATION". Write a pseudocode for program which will print the x-coordinate, y-coordinate, values of "NAME" and "POPULATION" field. [4]
12. Write short notes on: (Any three) [2×3]
- a) Importance of python in geoinformatics
b) NumPy
c) Proj.4
d) GEOS

**64 A TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Chaitra**

| Exam. | Regular | Full Marks | 80 |
|-------------|---------|------------|--------|
| Programme | BGE | Pass Marks | 32 |
| Year / Part | IV / I | Time | 3 hrs. |

Subject: - Application of GIS with Python (Elective-I) (GE7250I)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary

1. What are the characteristics of python programming language?
2. Write output by python interpreter for following:

```
>>>Istname = "sally"
>>>class = "Elecneel"
>>>I/2
>>>I.0/2
>>>2**{I+1}-8/2**{(0.0-6/3*4)}[2]
```

3. What is function? What are the advantages of using function in a program? How function is defined in python?

[2+2+1]

4. Write a function called 'add' that receives two arguments (integers), adds them up in a local variable x and prints x.

[2]

5. Write a function called 'next' that takes one argument (an integer) and prints the number that follows after it.

Call this next with the following arguments: 1, 2, 3, 2+1, 3-1,-2 and report the results:
Call next again on x, y, z where x is 2, y is 3 and z is x-y.

[2]

* 5. Write a function called 'next' that takes one argument (an int/str) and prints the number that follows after it. [2]

Call this next with the following arguments: 1, 2, 3, 2+1, 3-1,-2 and report the results.

[2]

- Q Consider the following Python program:

```
def fun(x, y):
    return x * y
```

[2]

```
a = fun(2, 3)
b = fun("2", 3)
print a, b
```

[2]

What does it evaluate to?

Q Consider the following function:

```
def what(n):
    if n == 0:
        return 0
    else:
```

```
        return n + what(n-1)
```

[2]

What does it do? What's the result returned by what (3)?

- Q Define what do you mean by traversal of a string? What does it mean for strings to be immutable? Give example.

[2]

✓ 9. What is a string slice? If $a = \text{"blueberry"}$ evaluate the following: [2]

$a[2:3]$
 $a[2:]$
 $a[:3]$
 $a[:]$
 $a[-1:-3]$
 $a[:-1]$

✓ 10. What is list in python? How do you create it? What is nested list? Is list mutable or immutable? Why? [4]

✓ 11. What is index? How do you use index to access the elements of list? [1]

✓ 12. What does + operator does if operands are list variable? Similarly what is the output for following: [2]

$[0]^*10$

✓ 13. Give any two list methods with examples. [2]

✓ 14. What does range () function do? [2]

✓ 15. If a is $[1, 2, 3]$ [2]

- what is the difference (if any) between a^*3 and $[a, a, a]$?
- is a^*3 equivalent to $a + a + a$?

✓ 16. What is dictionary? How does it differ from the list? How would you create dictionary? Show example of dictionary. How do you access the value in dictionary? [3]

Write a function name histogram which would take a string as parameter and return a dictionary where keys are the letter of the string and values are the number of occurrence of that letter in given string. [2]

✓ 17. Briefly describe how you open a file for reading, how you open a file for writing, and give short but complete descriptions of the read and write functions. [4]

✓ 18. What is the difference between readline, readlines, read, write and writelines? [5]

✓ 19. Explain what the following code does: [1]

```
class One:  
    def fun(x):  
        return x  
  
a = One()  
print a.fun()
```

✓ 20. Define a class called 'Point' which will have attribute x and y. Point class should have constructor which will initialize the value of x and y and have method to print x and y value. [1+1+1+2]

- Create two point objects with value (3,4) and (6,8).
- Use above defined method to print x and y value.
- Write function which will take above two points as parameters, calculate distance between points, and print distance.
- Write a function which will calculate the mid-point of above two points and return the point object i.e. mid-point, and print the mid-point values using method.

22. Explain in brief about GDAL library. Write any three raster data format that gdal module can read and write. [2]

23. What does OGR module do? Write any three vector data formats that OGR module can read and write. [2]

24. Explain the basic structure of GDAL dataset and OGR dataset with diagram. [2+2]

25. Write a function called get-extent() which will take filename of raster file as parameter and prints the coordinates of top-left corner and bottom-right corner. [4]

26. You have given a raster file "abc.tif". Write code for: [3]

- a) To open raster file
- b) To get projection parameter
- c) To get Geotransform parameter
- d) To get number of columns
- e) To get number of rows
- f) To get datatype of values

27. Write the full signature of following function and meaning of each parameters: [2+2]

Create () function of Driver class.

ReadAsArray () function of Band class

28. You are provided vector data in point shapefile format "cities.shp", which have two field namely "NAME" and "POPULATION". Write a pseudocode for program which will print the x-coordinate, y-coordinate, values of "NAME" and "POPULATION" field. [3]

29. Write code to get the following metadata of "cities.shp": [4]

- Total number of features
- Spatial extent
- Geometry type
- Spatial reference system
