Time Allowed: 2 hours

Maximum Marks: 40
Minimum Pass Marks: 14

Roll No-3000J2821042

Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.
(ii) The figure in the right-hand margin indicates marks.

I. (a) Define ADT. Introduce different types of ADT. [4]

(b) Define Stack ADT. Explain different operations on Stack. [8]

(c) Define Queue ADT. Explain different operations on Queue. [8]

(d) Write an algorithm for binary search with example. [8]

II. (a) Define Array. Explain about row major and column major representation of array in memory with example. [4]

(b) Can you apply binary search to the following list? If not, what needs to be done? Search an element 44 after the application of the required operation. [8]

List: 3, 44, 38, 4, 47, 15, 36, 26, 27, 2, 46, 4, 19, 50, 48

(c) Sort the following list using Bubble sort. [8]

List: 8, 40, 39, 15, 30, 26, 6, 12, 7, 13, 41, 34, 7, 33

(d) Sort the following list using Heap sort. [8]

List: 10, 1, 2, 9, 43, 14, 34, 22, 48, 38, 5, 48, 28, 46

Time Allowed: 2 hours

Maximum Marks: 40
Minimum Pass Marks: 14

Roll No- 3000128210 42

Note: (i) Each question contains four parts. Part (a) of each question is compulsory.
Attempt any two parts from (b), (c), and (d) of each question.
(ii) The figure in the right-hand margin indicates marks.

I.   (a) Write down the basic properties of Boolean Algebra.   [4]

(b) Minimize the following boolean function by K-Map and write down   [8]
the minimized boolean expression (Function).

$$F(A, B, C, D) = \Sigma m(0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$$

(c) Simplify the following Boolean function and also determine which   [8]
rule is being used in each step.

$$AB + B(B + \bar{C}) + \bar{B}C$$

(d) What is DeMorgan's Theorem? Proof it by truth table and logic   [8]
circuit

II.   (a) Describe Full adder with its Truth Table.   [4]

(b) Explain the BCD adder with example.   [8]

(c) Explain any one of the Multiplexer with truth table.   [8]

(d) Explain Parallel adder in brief with suitable example.   [8]

Time Allowed: 2 hours

Maximum Marks: 40
Minimum Pass Marks: 14

Roll No – 3000128821042

Note: (iii) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.
(iv) The figure in the right-hand margin indicates marks.

I. (a) Explain different types of constructors in C++. [4]

(b) Explain briefly the characteristics of OOPS language and mention [8] advantages of OOPS approach over functional/procedural programming.

(c) What is meant by member access modifiers? Explain with one [8] programming example.

(d) Write about various operators and manipulators used in C++ with an [8] example.

II. (a) Write about standard C++ String class with their function names. [4]

(b) Define a class bank account with current and saving bank account as [8] inherited classes. Class bank account should have following data members: account number, name, and balance amount and member functions: to initialize the value, to deposit and withdraw amount after checking the minimum balance.

(c) WAP in C++ to implement array of objects, creating a class employee and [8] accepting and displaying multiple datasets accepted by the user using array of objects.

(d) Design three classes student, test and results, where a result is inherited [8] from test and test is inherited from student class. Write possible functions to initialize the values. Also write a main function for execution by creating objects.

Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

B.Tech (Honours) CSE (Data Science/ Artificial Intelligence)

Class Test - I, July, 2022

Subject: Python for Data Science

Subject Code: (A000275(022))

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

ROLL NO – 30001282104 2

Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.

(ii) The figure in the right-hand margin indicates marks.

I (a) Name two mutable and immutable data types. [4]

Enlist three differences between List, Tuple, Set and Dictionary.

(b) Define Python library. Why Python Programming is most commonly used in Data [8] Science? Explain in detail.

(c) What is Type Conversion? Explain its types with the help of suitable program. [8]

(d) Write the output of the following code snippets:

i) [8]

```
for i in range(7,10):
    print("Python")
print("DS and AI")
```

ii)

```
x = {1:10, 2:20, 3:30}
x[2]=25
print(x)
```

iii)

```
a = [1, 2, 3, 4, 5]
sum = 0
for x in a:
    sum += x
print(sum)
```

iv)

```
a = (1, 2)
print(a * 3)
```

v)

```
a = ["A", "B", "C", "C"];
print(a[-3:-1])
```

vi)

```
sales = {'AI':10, 'DS':32, 'PY':12}
for x in sales:
    print(x)
```

vii)
```
def test(*argv):
    for arg in argv:
        print(arg, end = '@')
test('Jan', 'Feb', 'Mar', 'Apr')
```

viii)
```
dict1 = {'first' : 'sun', 'second' : 'mon'}
dict2 = {1: 3, 2: 4}
dict1.update(dict2)
print(dict1)
```

[4]

II (a) Write a short note on:

i) __init__()

ii) Self parameter

iii) Data Hiding

iv) Finally keyword

(b) How a user-defined Module is created in Python? Briefly explain the various [8] methods of using Modules with the help of suitable example.

(c) Describe how an Exception is handled in Python. Give the description of any four [8] methods each of File and Directory handling with suitable example.

(d) Write the output of the following code:

i)
```
class Employee:
    def __init__(self, name, age,salary):
        self.name = name
        self.age = age
        self.salary = 50000
E1 = Employee("John", 23, 50000)
print(E1.name)
print(E1.age)
print(E1.salary)
```

ii)   [8]
```
a=input("Enter sequence:")
b=a[::-1]
if a==b:
    print("palindrome")
else:
    print("Not a Palindrome")
```

iii)
```
a = ["red", "orange", "yellow"]
b = ["apple", "banana", "cherry"]
for x in a:
    for y in b:
        print(x, y)
```

iv)
```
def greet(**person):
    print('Hello', person['fn'], person['ln'])

greet(fn='Elon', ln='Musk')
greet(ln='Bezos', fn='Jeff', age=50)
greet(fn='Bill', ln='Gates', age=55)
```

******

Time Allowed: 2 hours

Maximum Marks: 40
Minimum Pass Marks: 14

Roll No – 30001882104?

Note: (i) Each question contains four parts. Part (a) of each question is compulsory.
        Attempt any two parts from (b), (c), and (d) of each question.
        (ii) The figure in the right-hand margin indicates marks.

I.   (a) Find the eigen value and eigen vector of matrix $A = \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix}$ [4]

     (b) Solve the system of linear equations by Gauss Elimination method: [8]
         $x + y + z = 6;$ $x - y + z = 2;$ $2x + y - z = 1.$

     (c) Define Vector space over field F with its properties & examples.   [8]

     (d) Explain linear transformation with properties.   [8]
         Prove that $T: \mathbb{R}^n \to \mathbb{R}^n$, such that
         $T(a_1, a_2, \dots , a_n) = (0, a_1, \dots , a_{n-1})$ is linear transformation.

II. (a) Evaluate the double integral : $\int_0^{\pi/2} \int_{\pi/2}^{\pi} \cos(x + y)\, dy\, dx$ [4]

     (b) Evaluate the double integral : $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dx\, dy}{1+x^2+y^2}$ [8]

     (c) Evaluate the triple integral : $\int_0^2 \int_0^x \int_0^{x+y} e^x(y + 2z)\, dx\, dy\, dz$ [8]

     (d) Prove that by using change of order of integration: [8]
     $\int_0^{2a} \int_{x^2/4a}^{3a-x} f(x,y)\, dx\, dy = \int_0^a \int_0^{\sqrt{4ay}} f(x,y)\, dy\, dx + \int_a^{3a} \int_0^{3a-y} f(x,y)\, dy\, dx.$